

E-commerce and its impact on competition policy and law in Singapore

A DotEcon study for the
Competition Commission of
Singapore

Final Report – October 2015

Content

1 Introduction	1
2 E-commerce activity in Singapore	4
2.1 An introduction to e-commerce	4
2.2 E-commerce adoption in Singapore	17
3 E-commerce and competition	38
3.1 What changes with e-commerce?	38
3.2 The impact of e-commerce on market boundaries	59
3.3 The impact of e-commerce on market structure and competition	65
3.4 Vertical restraints	77
4 Implications of e-commerce for competition policy in Singapore	83
4.1 Defining a relevant market	84
4.2 Assessing market power	91
4.3 Assessing agreements	95
4.4 Dealing with abusive behaviour	101
4.5 Assessing mergers	104
4.6 Remedies	109
4.7 Advocacy	112
5 Conclusions	114
Annex A Case studies	120
Annex B Literature review	150
Annex C The Singapore government's e-commerce initiatives	203
Annex D Bibliography	211

Tables & Figures

Table 1: Top five retail categories for online shopping	26
Table 2: Reasons for not using mobile services to engage customers and e-payments	34
Table 3: Examples of e-commerce entry into Singapore market	36
Figure 1: Web traffic share in March 2014 of largest shopping sites in Singapore (hits in millions of visitors per month)	13
Figure 2: Who controls e-commerce activity within firms in South-East Asia?	14
Figure 3: Level of e-commerce adoption amongst businesses with internet usage	18
Figure 4: Proportion of online shoppers	19
Figure 5: Businesses using mobile services to engage customers	23
Figure 6: Revenue share of online sales in 2010	25
Figure 7: Retail Chains vs Pure-plays in the US: The sales figures and Compound Annual Growth Rate (CAGR) of pure-play (Web-Only) retailers compared to retail chains.	32
Figure 8: Proposed framework for defining relevant markets in the case of multi-sided platforms	90
Figure 9: Feedback effects and the SSNIP test in multi-sided markets	91

Glossary

B2B	Transactions between businesses
B2C	Transactions between businesses and consumers
B2B2B and B2B2C	These terms are used to describe the business models of platforms that act as intermediaries, either between different businesses (B2B2B), or between businesses and consumers (B2B2C)
Big data	A broad term popularly used to describe large volumes of data usually created as a byproduct of other activities (including data generated and collected online)
Brick-and-mortar firm	A firm that does not conduct business online, but only through 'traditional' offline channels (e.g. in physical stores)
C2B Models	The 'C2B' model captures cases where consumers create value for a business by providing information (e.g. about willingness to pay) or marketing services (via social media or a personal website) in return for reduced prices or free products and services
C2C	Transactions between consumers
Click-and-mortar firm	A firm that conducts business online and also through 'traditional' offline channels
Competitive bottleneck	A term describing multi-sided platforms where users on one side (e.g. buyers) do not multi-home and users on the other side (i.e. sellers) wishing to interact therefore have no choice but to use the platform chosen by the single-homing users
Drip pricing or component pricing	A pricing strategy whereby a firm advertises an initial 'headline' price that does not include additional fees, some of which may be unavoidable
Drop shipping	A supply chain model where orders received by a retailer are fulfilled directly by a wholesaler
E-commerce	Activities related to the buying and selling of goods or services over the internet, including ordering of goods and services online and ancillary activities that support such transactions, including the interaction between

	businesses across the supply chain
E-commerce adoption	Level of take-up of e-commerce. Among firms, it may be measured for example by percentage of firms offering online sales or conducting online marketing. Among consumers, it may be measured, for example, as the percentage of internet users that have purchased an item online
G2B	Transactions between government and businesses
Geo-blocking	Restricting access to content or redirecting to an alternative website based on a user's physical location
Long tail hypothesis or phenomenon	The possibility that e-commerce will be associated with an increase in range of available products and a shift of demand towards niche products
M-commerce	E-commerce activities conducted via a mobile device
Marketplace	An online platform that connects buyers and sellers. A B2C marketplace is analogous to shopping malls in the brick-and-mortar world
Most favoured nation (MFN) clauses, or price parity agreements	Agreements between a platform (e.g. price comparison website) and sellers, that restrict sellers' ability to offer lower prices through other sales channels (e.g. on other price comparison websites)
Multi-home	Where individual users make use of multiple platforms offering comparable services
Network effects	Network effects occur where the value of a product or service to an individual user depends on the number of other users (for a more detailed explanation, see page 11)
Offline channel	This phrase refers to trading that takes place offline (e.g. in physical stores), regardless of whether the firms involved are brick-and-mortar firms or click-and-mortar firms
Omni-channel retailing	An emerging business model where firms seek to engage with customers and supply products or services seamlessly across different channels (e.g. online and offline)
Online channel	This phrase refers to trading that takes place online, regardless of whether the firms involved are pure-play firms or click-and-mortar firms

Online firm	A firm that conducts business online (whether as a pure-play firm or as a click-and-mortar firm)
Online trading	Buying and selling goods or services over the internet
Platform (including two-sided or multi-sided platforms)	An intermediary, connecting different types of users on each 'side' (e.g. a marketplace with buyers on one side and sellers on the other)
Price dispersion	Variation in price of an item by different sellers or on different channels
Pure-play firm	A firm that conducts business only online and not through 'traditional' offline channels
Social commerce	Buying and selling of goods or services online involving social media, social interactions and social collaborations
Social listening service	Services provided by companies who scrape social media websites and monitor traffic to gather comments or messages linked to clients' names, brands or products
Tipping	Where network effects exist, it is possible that a single firm will become sufficiently large that the market 'tips' in its favour, meaning that the firm captures a majority share of the market and its strong position is reinforced by the network effects
TvO ratio – Relative website hit ratio	TvO hit ratio, Traditional versus Online Platform hit ratio, compares the number of visitors to traditional retailer websites versus online retailers or online platforms. It is calculated by examining monthly traffic data (adjusted for the rate at which users are directed to a site but do not browse it)
Web adoption	Level of take-up of internet use; this is similar to e-commerce adoption but somewhat broader – for example, a firm may have a low level of web adoption (e.g. a website with some basic information) without having adopted e-commerce

Executive Summary

Take up of e-commerce in Singapore, though lagging at the moment, is expected to grow strongly over the next few years

Singapore, with its strong commercial focus, open trade policy, good internet connectivity, a keen interest in using new technology and a passion amongst its citizens for shopping, seems to be the ideal environment for doing business online. Although at present, Singapore is lagging behind many other countries in terms of the propensity to use e-commerce (with online retail accounting for only 3% of retail revenue, compared with a global average of 6%, only a little over half of internet users in Singapore shopping online, and just under 70% of businesses having adopted e-commerce), this is expected to change dramatically over the next few years. By 2020, Singaporeans are expected to spend 30% more of their income online than offline.¹

The slow take up of e-commerce by local businesses has been attributed to a limited appetite to invest in e-commerce systems in light of a small domestic market, concerns over rapid technological change that could render investments obsolete within a short period of time, a desire to protect existing brick-and-mortar business, and last but not least the limited interest of shoppers to buy online. Singaporeans appear to have a strong preference for shopping in store rather than online, driven by the small geographical size of the city-state and its distinct mall culture. Yet, the predicted changes mean that the way in which Singaporeans shop and do business will change fundamentally, driven to a large extent by the increase in mobile commerce (m-commerce), for which Singapore with its high smartphone penetration is providing fertile ground.

Over the last few years, Singapore has seen a number of global leaders in the e-commerce world set up their regional headquarters in the city-state – often hoping to use Singapore as a testing ground before extending operations to the rest of South-East Asia. At the same time, established retailers are embracing the online sales channel, and firms such as Singapore Post Limited (Sing Post) are investing in the development of infrastructure to support local businesses in going online.

The predicted increase in the importance of e-commerce may affect competition in the market place. The Competition Commission of

¹ The Business Times, 22nd September 2014, *More Singaporeans Turn to Virtual Stores for Shopping*: <http://www.businesstimes.com.sg/top-stories/more-singaporeans-turn-to-virtual-stores-for-shopping>

Singapore (CCS) has commissioned DotEcon to consider the implications of e-commerce for competition policy and law in Singapore. The overall objective is to identify whether changes brought about by e-commerce may require specific attention in competition assessments and whether the competition law framework in Singapore can effectively deal with competition issues that might arise in an e-commerce context.

The increasing prominence of e-commerce can benefit competition and consumers

In the first instance, e-commerce may have many pro-competitive effects. Making use of technological developments, e-commerce can streamline supply chains and significantly reduce distribution costs. It may enable customers and suppliers to transact directly with each other, cutting out the middle man. Allowing hotels and airlines to sell directly to consumers and the substantial reduction in the number of travel agents that we have observed in many markets, including in Singapore, is a prime example of the effect that the internet can have on established business structures. Efficiency gains from supply chain and distribution network changes may be reflected in greater competitive intensity and lower prices.

E-commerce may also increase market competitiveness by allowing upstream suppliers to sell directly to customers and potentially lowering barriers to entry for retailers. Establishing an online presence would certainly seem to be cheaper than investing in a physical retail store, and with marketplaces such as Amazon and Qoo10 offering smaller retailers in Singapore a low-cost route into the market, it might seem that entry barriers have become much lower.

E-commerce can reduce search costs, and with buyers being better informed, sellers may need to compete harder to win and retain business.

New products and services may be introduced, and the variety of products on offer may increase. Online retailers are much less constrained than their brick-and-mortar counterparts by rack or shelf space and can typically stock a wider range of products. Reduced search costs make it easier for consumers to locate what they want, supporting a shift of demand towards niche products. This 'long tail' phenomenon, has been observed in markets for products such as books and clothing. Fulfilling previously unmet needs can lead to potentially substantial welfare gains.

E-commerce makes it easier for firms to collect detailed data about consumer behaviour and potentially use the data to the mutual benefit of the firm and the consumer, for instance by personalising the shopping experience for each customer.

With access to an adequate logistics network, e-commerce businesses can expand their geographic markets, and although the much-hailed 'death of distance' has not necessarily happened, it is clearly the case that shoppers nowadays have access to a far greater range of suppliers, including suppliers from other countries. Given

Singapore's tradition as a trading hub and its small geographical size, cross-border orders feature prominently online.

All of these effects should reduce prices. Indeed, empirical studies have found evidence of lower average prices with increasing adoption of e-commerce in relation to air fares, books, cars, CDs and life insurance.

However entry barriers remain, new barriers may arise and retailers may engage in price obfuscation

However, some of these beneficial effects may be overstated. Whilst it may have become easier to get into the market, growing a successful business requires suppliers to establish trust and reputation (perhaps more so than in the offline world, where an impressive storefront instils trust precisely because the underlying investment demonstrates commitment by the seller to stay in the market). Establishing such trust and reputation continues to require investments, and may be difficult for smaller retailers who trade through third party platforms. Depending on the goods the retailer offers, there may be a need to invest in logistics system (even though increasingly, third parties may provide such services). In short, lower barriers to entry may go hand-in-hand with greater barriers to expansion.

Retailers may engage in price obfuscation tactics that make it more difficult for consumers to search and compare prices online, and potentially exploit well-known behavioural biases.

Greater price transparency may result in lower prices at the expense of quality, and can increase the risk of collusion

Greater price transparency can result in lower prices, which benefits consumers, but if the focus of competition shifts exclusively to price, product or service quality may suffer. There has been some evidence of such an effect, for example in the market for travel services.

Greater price transparency online may be pro-competitive but it could also facilitate collusion between firms, as monitoring each other's behaviour becomes easier. The risk of co-ordinated outcomes may also increase with the growing use of 'robo-sellers' – systems that use pricing algorithms in combination with extensive market data to set prices. Such systems are better at detecting and punishing deviant behaviour and are less tempted than their human counterparts by short-run gains to deviate from the collusive outcome. The US antitrust prosecution for price fixing with the help of pricing algorithms in April 2015 is indicative of the relevance of such concerns.²

² Reuters, 6th April 2015, *U.S. announces first antitrust e-commerce prosecution*: <http://www.reuters.com/article/2015/04/06/us-usa-antitrust-ecommerce-plea-idUSKBN0MX1GZ20150406>

E-commerce platforms may bring about competition issues related to concentrated market structures and competition concerns from the use of MFN clauses

Whilst some established intermediaries may disappear, new ones emerge. Multi-sided e-commerce platforms can lower entry barriers for smaller retailers, but they come with their own challenges. Being subject to strong network effects, online platforms improve as their user base grows, making it more difficult for rival platforms to compete. Hence, markets for platform services are often concentrated. If switching between platforms is costly (as may be the case for sellers, for example, when they cannot migrate their seller rating from one platform to another and will therefore lose their reputation) and when platform users cannot or do not multi-home (i.e. use multiple platforms in parallel), such platforms are competitive bottlenecks, potentially capable of exercising market power and leveraging it into adjacent markets. Thus, the role of online platforms with market power may be an important area of focus for competition authorities.

Indeed, the European Commission's Digital Single Market strategy includes a specific commitment to conduct analysis in this area (EC, 2015). Allegations made against the likes of Google, which is involved in many online markets and holds a strong position in the market for online search, is an indication of potential concerns – for example, the European Commission has reached a preliminary conclusion that Google abused a dominant position in online search “by systematically favouring its own comparison shopping product in its general search results pages”³. Google's subsequent announcement of the imminent addition of a 'Buy' button to its search results signals defiance and a disparate view of its accused wrongdoing, as it prepares to lock horns with the authorities.⁴

Even where such online intermediaries are not dominant, they may use vertical restraints with detrimental effects for competition and consumer welfare. Whilst such restraints can often be applied to protect non-price dimensions of competition (e.g. in the form of exclusive or selective distribution arrangements to prevent free riding on a distributor's provision of customer service), they can also reduce the scope for competition within product markets.

The use of Most Favoured Nation (MFN) or price parity clauses by online intermediaries such as Amazon Marketplace, Apple and Amazon (e-books), Booking.com/Expedia/HRS (hotel bookings) and price comparison websites for motor insurance, has been investigated by competition authorities in the US and Europe, who

³ EC, 15th April 2015, *Antitrust: Commission sends Statement of Objections to Google on comparison shopping service; opens separate formal investigation on Android*, Press release: http://europa.eu/rapid/press-release_IP-15-4780_en.htm

⁴ BBC, 28th May 2015, *'Buy button' to be added to Google search results*: <http://www.bbc.com/news/technology-32915175>

have tended to find against the use of such clauses. As the European Commission notes in its Digital Single Market strategy, a concern is that online platforms may hold strong bargaining power in relation to its users (EC, 2015). These types of clauses are typically deemed anti-competitive where they have the effect of increasing price uniformity in the market, consequently reducing scope for competition amongst online intermediaries. Some of these online intermediaries are widely used by local consumers – Amazon for instance, accounts for the highest online retail sales in Singapore.⁵

The increasing role played by consumer data can create competition and consumer protection concerns

Data collected online may be used to the detriment of customers, and data collection itself may come at a cost of loss of privacy or risk of data security breaches, particularly when internet users are not fully aware of what data is being collected or how it will be used and shared with third parties. While these issues relate to data protection legislation, the collection and use of data may increasingly come to be seen as a competition issue in that it has the potential to affect the efficiency of market outcomes. Indeed, work by the UK Competition and Markets Authority published in June 2015 has considered this topic (CMA, 2015a), while the European Commission's Digital Single Market strategy also raises a concern about a lack of transparency with regard to online firms' use of information that they acquire (EC, 2015).

Competition policy needs to be alert to these problems in order to ensure that the benefits from e-commerce will be realised

While e-commerce does facilitate many business processes and can potentially improve choices for consumers, these benefits will not always automatically be realised, and competition policy may play an important role in ensuring that consumers and businesses benefit from the increasing adoption of e-commerce.

Most of the competition concerns raised (e.g. those relating to network effects) are not specific to e-commerce markets. Established competition law frameworks – including the legal framework in Singapore and the way in which it is being applied by the CCS – are generally well suited to address these issues and balance potential efficiency benefits against anti-competitive effects. However, some issues are likely to be more prevalent in e-commerce markets, and there may be subtle changes in emphasis on specific effects that are important in the assessment of such cases.

Network effects need to be analysed carefully when looking at e-commerce platforms

The implications of network effects that characterise e-commerce platforms need to be taken into account when defining relevant markets, assessing market power, looking at the impact of agreements and considering the counterfactual market developments in merger assessments. Specifically, the multi-sided nature of these platforms means that the relevant market and

⁵ Euromonitor (2014b)

market power possessed may have to be defined and assessed in relation to the firm's market position on both sides.

In merger assessments, the specific nature of competition in markets with strong network effects may be considered both in terms of the relevant counterfactual, and the potential benefits flowing from a merger. The tendency for the market to tip in the case of network effects may mean that pre-merger market structure is not a good indication of the prospective development of competition in the absence of the merger. A merger might be the natural way of exploiting network effects that arise from a platform growing in scale. Allowing mergers to perform that role may be appropriate, in particular, where it provides the opportunity to put in place safeguards in the form of undertakings that could mitigate the competition concerns arising in highly concentrated markets.

The importance of consumer data as a key asset needs to be recognised

Firms have greater ability to gather and process more detailed information about demand and the behaviour of their competitors. In combination with the use of algorithmic pricing and robo-sellers, this may present a greater risk of tacit collusion, and may result in a greater prevalence of price discrimination.

The effects of price discrimination on relevant market definition can be assessed by the CCS under the competition law framework in Singapore albeit possibly posing some practical difficulties. The extent to which (tacit) collusion supported by the use of common pricing algorithms can be addressed is less clear. First, such behaviour may be difficult to detect and the standard of proof required to prove co-operation may be high. Moreover, firms using pricing algorithms may not knowingly enter into such practical co-operation; thus such behaviour may not constitute an agreement nor concerted practice.

Customer data is likely to become a valuable asset in e-commerce and the increasing importance of such data needs to be factored into the assessment of market power. It may also give rise to competition concerns similar to portfolio market power concerns in relation to conglomerate mergers, as considered, for example, in the merger of WhatsApp and Facebook (though substantial concerns were not raised in this instance).⁶

⁶ European Commission, 3rd October 2014, *Case No COMP/M.7217 – FACEBOOK/WHATSAPP. REGULATION (EC) No 139/2004*: http://ec.europa.eu/competition/mergers/cases/decisions/m7217_20141003_203103962132_EN.pdf

<i>There may be a greater scope for vertical agreements having anti-competitive effects</i>	E-commerce platforms could potentially be competitive bottlenecks where vertical restraints are capable of causing competitive harm even where the platforms may not be considered to be dominant in the traditional sense. This means that there is perhaps a greater need to assess the competition impact of vertical agreements, in particular MFNs. The wide-ranging exemption on vertical agreements currently in effect in Singapore means that some competition issues might not be caught under the Competition Act in Singapore.
<i>Competition cases involving foreign firms could become more common</i>	Finally, with the increasing role of e-commerce, competition cases involving foreign firms may become more prevalent. The Competition Act in Singapore provides for extra-jurisdictional powers to investigate and enforce against foreign firms, but close co-operation with authorities and governments in other jurisdictions might be needed to make effective use of these powers.
<i>Competition agencies need to balance competition concerns with efficiency benefits before intervening in e-commerce markets</i>	Overall, the increasing role played by e-commerce does not necessarily call for a more or less interventionist approach by competition authorities. The presence of network effects can lead to rather concentrated markets and give rise to strong first-mover advantages, which might call for early intervention. On the other hand, the dynamic nature of markets may mean that market power is temporary and intervention creates the risk of stifling innovation and investment. Combined with the fact that investigations related to e-commerce can be relatively complex, this makes for a challenging situation for competition authorities. However, there are no hard and fast rules, and whether and how to intervene – and how quickly – are decisions that need to be made on a case-by-case basis, balancing potential competition concerns with efficiency benefits and the risk of creating market distortions through misguided intervention.
<i>Competition advocacy should ensure that the potential competition effects of policies that are designed to promote e-commerce growth, are duly considered</i>	Given the scope for e-commerce to increase competitiveness and create welfare gains, there is a role for competition advocacy to promote policies that enable the adoption of e-commerce amongst consumers and businesses through increasing trust and confidence and overcoming the barriers to take-up identified above. However, it is also important that such policies do take account of the potential competition risks (in particular as a consequence of network effects) and address the potential detrimental effects to which consumers might be exposed in an e-commerce environment (in particular in relation to over-confidence in the accuracy and quality of information available online, and the risks associated with the potential misuse of consumer data gathered in the course of e-commerce activities).

1 Introduction

E-commerce seems to be custom-made for Singapore. Conducting business over the internet encompasses many of the things that are commonly associated with Singapore as one of the leading entrepôt trade hubs⁷: a strong commercial focus and a passion for shopping combined with good internet connectivity and a keen interest in using new technology.

Yet the take-up of e-commerce by businesses and consumers alike has been relatively slow thus far. Despite a number of government initiatives to help businesses to get e-commerce-ready, online sales in Singapore account for less than 3% of total retail sales. Although this is substantially higher than in neighbouring countries, it is only about half the global average. In 2012, just over half of internet users had ever made a purchase online. This appears to reflect a distinct preference of Singaporeans for shopping in store rather than online, driven by the small geographical size of the city-state and its distinct mall culture.

This is forecast to change, however, partly driven by the increase in mobile commerce (m-commerce), for which Singapore with its love of smartphones⁸ is providing fertile ground. Some forecasters expect that by 2020, Singaporeans will spend 30% more online than offline. Established retailers are gradually embracing the online sales channel, and firms such as Sing Post are investing in the development of infrastructure to support local businesses in going online. At the same time, firms that have come into the market as pure-play online retailers are moving towards establishing physical retail presence, be it through pop-up stores (such as fashion e-tailers Zalora or Love Bonito) or permanent stores (such as sports e-tailer Decathlon).

The growth in the use of e-commerce should be expected to have an impact on competition in the market place. Cost savings from streamlined supply chains, new entry facilitated by the ability to compete without the need to invest in expensive retail real estate, and the greater ease with which customers can obtain information

⁷ Singapore had the second highest merchandise trade to GDP ratio between 2010 and 2013, trumped only by Hong Kong. See http://data.worldbank.org/indicator/TG.VAL.TOTL.GD.ZS?order=wbapi_data_value_2013+wbapi_data_value+wbapi_data_value-last&sort=desc

⁸ An Omnibus survey by Toluna in Sep 2014 found that "84% of internet users keeping their smartphone by their bed, and nearly half of them (47%) checking it if they wake up during the night". Asia Research Online, 2014, *Smartphone: Sleepless in Singapore*: <http://asia-research.net/2014/09/sleepless-without-smartphones/>

about products and suppliers online all should make markets more competitive and generate benefits for consumers. Geographic markets may become wider as close proximity to sellers is less relevant in the online world. Product variety may increase, and customers may find it easier to find exactly what they want.

However, e-commerce not only creates opportunities, but can also give rise to concerns. E-commerce platforms – such as the digital marketplaces in which buyers and sellers trade – are often subject to strong network effects, resulting in the potential ‘tipping’ of markets where larger firms enjoy strong competitive advantages and grow further, ultimately resulting in highly concentrated market structures. Sellers may engage in strategies that are aimed at obfuscating prices, and may use data collected about their customers to segment markets. Ever greater reliance on pricing algorithms may increase the risk of tacitly collusive outcomes. The focus of competition may shift towards price (or other product characteristics for which information can be easily communicated online and compared), to the detriment of other product characteristics. Vertical restraints can be used to protect these dimensions of competition, but can also be deployed to restrict or distort competition.

The long-running high-profile competition investigation into some of Google’s practices – somewhat controversially closed by the US Federal Trade Commission (FTC) in 2013⁹ but still very much alive in Europe¹⁰, the US antitrust prosecution for price fixing with the help of pricing algorithms in April 2015¹¹ and the launch of a European Commission inquiry into the e-commerce sector in May 2015¹² are evidence of the relevance of such concerns.

In this report, we discuss these effects of e-commerce and look at the implications that e-commerce has on the application of competition policy and law.

⁹ CNET, 20th March 2015, *Ugly documents surface in antitrust case that Google settled with FTC*: <http://www.cnet.com/news/google-causes-real-harm-to-consumers-and-to-innovation-ftc-says/>

¹⁰ EC, 15th April 2015, *Antitrust: Commission sends Statement of Objections to Google on comparison shopping service; opens separate formal investigation on Android*, Press release: http://europa.eu/rapid/press-release_IP-15-4780_en.htm

¹¹ Reuters, 6th April 2015, *U.S. announces first antitrust e-commerce prosecution*: <http://www.reuters.com/article/2015/04/06/us-usa-antitrust-ecommerce-plea-idUSKBN0MX1GZ20150406>

¹² EC, 6th May 2015, *Commission launches e-commerce sector inquiry*, Press release: http://europa.eu/rapid/press-release_IP-15-4921_en.htm

We begin with a brief description of e-commerce activity in Singapore (Section 2), and then look at the changes that flow from the adoption of e-commerce (Section 3). Specifically, we consider the impact that e-commerce has on the supply chain and the distribution of goods and services, and look at the informational effects of e-commerce, both in terms of reduced search costs for customers and a greater wealth of data available to suppliers.

We then consider how these changes affect competition, and look at the implications for competition law and policy in Singapore (Section 4). Finally, in Section 5, we present our conclusions.

Our report is based on a number of case studies involving interviews with industry players in Singapore (presented in Annex A), a review of the extant literature (see Annex B), investigations in other jurisdictions¹³ and survey data. We provide an overview of the Singapore government's initiatives to boost e-commerce adoption in Annex C. Finally in Annex D, we present the bibliography of the relevant studies and surveys used in this study.

We are very grateful to the companies and organisations that have participated in our study, enriching the study with their valuable insights. In particular, we would like to thank SP eCommerce, RedMart, Wego, eBay and the E-Commerce Association of Singapore (ECAS) for their participation and co-operation.

¹³ Findings from foreign market studies or decisions of foreign competition authorities may of course not be directly applicable to Singapore as local market conditions (including geography and consumer preferences) may be different. However, even where such differences exist, these examples often provide useful illustrations of general principles.

2 E-commerce activity in Singapore

2.1 An introduction to e-commerce

Electronic commerce or 'e-commerce' is the term commonly used to describe activities related to the buying and selling of goods or services over the internet.¹⁴ Though often seen to be synonymous with online shopping, e-commerce goes beyond the simple ordering of goods and services and covers ancillary activities that support such transactions, including the interaction between businesses across the supply chain.

E-commerce transactions may take place between businesses and consumers (B2C), amongst businesses (B2B) or between government and businesses (G2B, such as for instance online procurement). Making use of platforms such as eBay, consumers may directly trade with each other (C2C).

In this report, we will focus on B2B and B2C interactions, which are most likely to give rise to competition issues. C2C transactions tend to involve many small buyers and casual sellers without strong commercial motivation and who are unlikely to hold or exercise market power.¹⁵ Government as one of the parties in G2B transactions should be expected to consider competition issues in its e-commerce activities and protect and promote competition.

2.1.1 E-commerce – a brief overview

The history¹⁶ of e-commerce begins with the development of standards for electronic data interchange (EDI) that were intended to replace the use of paper documents in the supply chain.¹⁷ So e-

¹⁴ See <http://www.merriam-webster.com/dictionary/e-commerce>

¹⁵ Note, though, that competition issues may arise in relation to the platforms that enable C2C transactions, which are similar to those that may be observed in the context of other platforms (e.g. B2C platforms), which are covered in this report.

¹⁶ For a more detailed overview see the entry in the Encyclopaedia Britannica (<http://www.britannica.com/EBchecked/topic/183748/e-commerce>). A timeline up to 2010 is available online. See Monster Post, 8th September 2010, *The History of eCommerce – Timeline Infographic*: <http://blog.templatemonster.com/2010/09/08/history-of-ecommerce-timeline-infographic/>.

¹⁷ Electronic Interchange Facts, 14th July 2014, *What is EDI?*: <http://electronicdatainterchange-facts.com/what-is-edi/>

commerce has its roots in what is now called the B2B segment, where electronic communications were used to help improve the efficiency of business processes.

Many of the elements that characterise B2C e-commerce have been in place for a long time. For example, mail order – the idea of replacing direct interaction with a retailer by ordering goods from a catalogue – dates back to the 19th century when a Welsh draper began to send out catalogues detailing patterns and fabrics supplied by local wool mills, take postal orders and dispatch the products to the buyer.¹⁸

Mail order acquired a new dimension with the Minitel videotext online service rolled out by France Telecom and La Poste in the early 1980s.¹⁹ Besides being a directory service and providing access to databases, the service also allowed its users to order from participating mail order companies or buy airline or train tickets online. A combination of Videotex and telephone was used in an initiative to help the elderly by supporting online grocery shopping as early as 1984,²⁰ but it was not until the development of the World Wide Web, graphical browsers and the widespread take-up of the internet in the 1990s that B2C e-commerce took off.

Many of the online-only pioneers of e-commerce (so-called 'e-tailers' or 'pure-plays'), such as WebVan, did not survive the dotcom boom of the late 1990s.²¹ Others, such as Amazon, have flourished into massive businesses that cover an enormous range of e-commerce activities. At the same time, traditional retailers have developed e-commerce activities in order to create an additional sales channel and have turned from 'brick-and-mortar' businesses into 'click-and-mortar' businesses (sometimes also referred to as 'bricks and clicks').

E-commerce platforms that provide the virtual equivalent of marketplaces or shopping malls have emerged, and auction sites such as eBay provide an online equivalent of the jumble sale, allowing consumers to sell to each other. New payment systems (such as PayPal) have evolved alongside to support trade. A whole

¹⁸ BBC, Pryce-Jones: *Pioneer of the Mail Order Industry*: http://www.bbc.co.uk/legacies/work/wales/w_mid/article_3.shtml

¹⁹ Wired, 30th June 2012, *Before the Web, AOL, and Prodigy, There Was Minitel*: <http://www.wired.com/2012/06/services-begone/>

²⁰ BBC, 16th September 2013, *Online shopping: The pensioner who pioneered a home shopping revolution*: <http://www.bbc.co.uk/news/magazine-24091393>

²¹ WebVan was an early pioneer of home-delivered online grocery shopping. TechCrunch, 27th September 2013, *Where Webvan Failed And How Home Delivery 2.0 Could Succeed*: <http://techcrunch.com/2013/09/27/why-webvan-failed-and-how-home-delivery-2-0-is-addressing-the-problems/>

range of tools has become available to facilitate e-commerce activities, ranging from search engines to price comparison websites and shopping bots.

Physical delivery to the home or a convenient location for buyers to pick up their orders remains critical for all products other than those that can be delivered digitally (e.g. audio-visual media, tickets that the customer can print at home, etc.). The task of delivering goods to customers has been taken on by traditional postal services and new logistics companies, and given the key role that delivery plays in the customer experience, many e-commerce businesses have been experimenting with new forms of delivery.²²

The increasing use of mobile devices (smartphones and tablets) for accessing the internet has given rise to a new variety of e-commerce, commonly referred to as 'm-commerce'.²³ M-commerce creates new opportunities for the provision of location-based services and enables consumers to use online tools (such as price comparison websites) whilst shopping at physical stores.²⁴

Businesses increasingly realise the value of information about their customers that they collect in the process of transacting online. Combined with the falling cost of computing and data storage, data analytics plays an increasingly important role. Data about consumers' previous purchases, browsing behaviour, items in the basket and stated preferences can be used to create personalised

²² Amazon first tested drone deliveries in the US in 2013 and expanded the trial to Cambridge in the UK in 2014. In 2014, Google and DHL also tested drone deliveries in outback Australia and Juist, Germany respectively. In February 2015, Alibaba announced that it is testing drone deliveries in Beijing, Shanghai and Guangzhou in China. In April 2015, Amazon, Audi and DHL launched a pilot project to deliver parcels directly to the boots of customers' cars, allowing customers to use their car as a shipping address.

²³ A Visa survey conducted in 2012 indicated that almost half (47%) of online purchases made by local shoppers were done via mobile, with mobile expected to overtake the use of PC and laptops as the most used device to shop online within a year (at the time of the report) – see <http://www.channelnewsasia.com/news/singapore/shopping-transactions-on/1800512.html>. In late 2014 and early 2015, fashion retailers have reported increasing mobile traffic volumes, with mobile devices driving between 16%-63% of traffic (see: <http://www.specommerce.com/fashion-goes-mobile-in-asia-pacific/>).

²⁴ For instance, SP eCommerce suggests using geo-fencing apps to offer location specific deals and offers to customers as one of the m-commerce strategies retailers can deploy. See: <http://www.specommerce.com/fashion-goes-mobile-in-asia-pacific/>

recommendations that drive sales and loyalty.²⁵ Increasingly, such information is augmented with personal data available through social media sites (e.g. in the case where customers use their Facebook account to register with an online seller) further to improve targeting and the effectiveness of recommendation systems. 'Social listening services' monitoring traffic on social networks such as Twitter for content related to particular brands or products provide feedback to retailers and can allow them to identify trends and promote their brands.

Much of this information can be used to automate pricing decisions and change prices at a rate that would have been unimaginable a few years ago. Amazon reportedly made 2.5million price changes per day in the lead-up to the holiday season in November 2012. By comparison, Wal-Mart made about 50,000 price changes in the entire month (Mehra, 2015).

This brief overview shows that e-commerce covers a wide range of activities, and in the remainder of this section we will cover some of these in more detail.

2.1.2 The internet as a sales channel

E-commerce may be used as an additional or new sales channel

Using the internet as a sales channel to reach consumers directly is the most visible aspect of e-commerce. Online trading can provide an additional sales channel for traditional brick-and-mortar businesses, whilst pure-play firms only trade online.

Whilst pure-play firms often enjoy cost advantages (as they do not need to invest in physical stores, often in prime retail areas, and may operate on a streamlined supply chain), click-and-mortar firms benefit from being able to offer customers the choice of whether to buy in store or online, or in some cases combining both channels before completing the transaction. For example, customers may browse online and then buy in store, or inspect goods in store and then order online for delivery. According to a survey by Havas

²⁵ Personalised recommendations have been successfully deployed by the likes of Netflix and Amazon (Levin, 2011). Furthermore, online clothing retailers, such as the Shop Direct Group (Very.co.uk and Littlewoods) are also investing heavily in data analytics, including to provide personalisation. Shop Direct, 28th October 2014, *Very.co.uk and m-commerce boost profits at Shop Direct*: <http://www.shopdirect.com/very-co-uk-m-commerce-boost-profits-shop-direct/>

Worldwide, three quarters of Singaporeans compare reviews and pricing online before making a purchase (Payvision, 2013).²⁶

M-commerce brings about an even closer integration, allowing customers to use their smartphones while browsing in store – and most Singaporeans do. 78% of consumers in Singapore use their smartphones for this purpose, with close to 90% indicating that the ability to compare and get more information from browsing affects their purchasing decision. 73% of respondents said that they would leave a store if they found an alternative offer (online) that is 5% cheaper than in store (The Paypers, 2014).

Online selling may allow low-cost entry

Selling via the internet offers start-ups a low-cost mode of entry into the market, bypassing the need to incur costly rental and/or labour. Blog-stores for instance, which are blog platforms used as a web store mostly by amateur sellers, are becoming increasingly popular in the Singapore e-commerce scene.²⁷ In some cases, successful blog-stores may go on to develop into more professional set ups. For instance, 'Love, Bonito', the female fashion online retailer with the largest customer base in Singapore had humble beginnings as a blog-store (then 'Bonito Chico').²⁸

Recognising the importance of both a physical and online presence, and reflecting the growing use of multiple devices to browse or buy online, click-and-mortar retailers increasingly focus on offering consumers an omni-channel shopping²⁹ experience. In a survey

²⁶ Singaporeans are also more influenced by social media. According to the same survey, 60% are more likely to change their mind about a product or service based on what is published on social media, compared with 50% globally.

²⁷ Payvision (2013) and SP eCommerce (2014)

²⁸ The Straits Times, 18th Feb 2015, *Online blogshop turns out to be perfect fit*: <http://business.asiaone.com/news/online-blogshop-turns-out-be-perfect-fit>

²⁹ One definition that has been proposed is: "Omnichannel Retail' is an emerging concept for retail operating models, characterised by service delivery and customer engagement activities that blend online and offline channels." Sam Cammis (NUS-ISS), *Omnichannel Retail*: <https://www.iss.nus.edu.sg/Portals/0/Mailers/images/THOUGHT%20LEADERSHIP%20-%20Omni-Channel%20Retail.pdf>

conducted by SAP and Hybris Software in 2014³⁰, 90% of respondents agreed with the statement that they were “*working towards delivering a unified customer experience across online and offline channels*”.³¹ However, almost a third of respondents did not have an omni-channel strategy, indicating that providing an omni-channel experience is still work-in-progress for many retailers.

Overall, this suggests competition between online and offline channels, and means that sales volumes may understate the impact of e-commerce on competition. Even where transactions happen in the brick-and-mortar environment, e-commerce is important where customers compare prices on the website of competitors.

Access to good logistics infrastructure can widen geographic markets as foreign retailers are able to serve local consumers

In general, using the internet as a sales channel may widen geographical market boundaries. With online retailing, the physical distance between buyer and seller becomes irrelevant, as long as the product or services may be cost-effectively delivered to the buyer. Singapore has good logistics infrastructure and a mature market of logistics providers, including new logistics players such as Ta-Q-Bin and Ninja Van that offer quality logistic services for online retailers (including foreign e-retailers) to reach local consumers.³²

Consumers can also opt to order online and have their orders delivered to one of the local convenience stores operated by Seven Eleven (which are open twenty-four hours) or from SingPost’s POP (Pick Own Parcel) Stations, which are lockers located in public places such as shopping malls, commercial buildings and community centres. Starting from this base, the logistics infrastructure in Singapore should improve further with pure-play firms such as Rakuten and Lazada currently looking to invest in their own logistics

³⁰ The survey had a total of 122 respondents, 60% of survey respondents were company respondents (brands, retailers, publishers, etc.) and 40% were agency respondents (made up of vendors, agencies or specialist consultancies supplying services to B2B or B2C businesses). While the survey was of South East Asian organisations, nearly 60% of respondents were based in Singapore. The agency respondents were mostly companies with lower levels of revenue while company respondents were relatively evenly distributed in terms of revenue. This suggests that larger firms (in revenue terms) were over-sampled as they tend to account for a smaller proportion (by number) of all firms. Specifically, 17%/42% of company/agency respondents earned less than US\$1 million per annum; 20%/15% of company/agency respondents earned between US\$1-10 million per annum; 10%/15% of company/agency respondents earned between US\$10-50 million per annum; 10%/9% of company/agency respondents earned between US\$50-150 million per annum; 17%/6% of company/agency respondents earned between US\$150 million –US\$1 billion per annum; and 27%/12% of company/agency respondents earned more than US\$1 billion per annum.

³¹ The remaining 10% expressed a neutral stance and there was no disagreement.

³² SP eCommerce, 2014, *eCommerce in Singapore: 9 Must Knows*: http://www.specommerce.com.s3.amazonaws.com/dl/fs/141211_fs_singapore_factsheet.pdf

network, while the likes of Uber are also considering expanding into the logistics business.³³

A combination of its friendly import tax policies, size and good logistics means that the share of cross border online retail transactions in Singapore is higher than in other Asia-Pacific countries. In 2014, 55% of e-commerce transactions in Singapore were cross-border, compared with 40% in Malaysia, 18% in Japan, 25% South Korea and an estimated 14.5% in China³⁴.

Product variety may increase

In addition to widening geographical boundaries, providing products and services online may sometimes result in the introduction of new or differentiated products and services. For instance, subscription-based models (such as those offered by Vanity Trove and Bella Box for beauty products)³⁵ provide additional convenience to buyers who regularly buy a particular type of product by saving them the time they would have to spend on researching what products to buy.

In Section 3 below, we will discuss in more detail how e-commerce widens geographical boundaries and may lead to greater product variety, with potential effects on competition.

2.1.3 E-commerce platforms

Businesses (and consumers) may use third-party platforms for selling

Businesses may develop their own web store platform or sell via a third-party marketplace such as Amazon or eBay (sometimes also referred to as 'third-party platforms'). Platforms exist for both B2C and B2B transactions such as Amazon for B2C and Amazon Supply for B2B.³⁶ Sometimes, these transactions via a platform are referred to as B2B2C and B2B2B respectively to reflect the platform serving as the middleman between buyer and seller.

³³ eCommerce Insights, 2014, *10 Trends: That Will Shape The Future of E-Commerce in 2015*: <https://www.techinasia.com/10-trends-shape-southeast-asian-ecommerce-2015/>

³⁴ Figure for China: iResearch, 10th September 2013, *China Cross-border E-commerce Market Tops 2.3 Tr Yuan in 2012*: <http://www.iresearchchina.com/views/5151.html>; the other numbers are from Payvision (2013).

³⁵ For a one-off subscription fee, these companies periodically deliver a variety of beauty products (often referred to as a 'beauty box') to the subscriber.

³⁶ In some cases, rather than just providing a platform for buyers and sellers to interact in a marketplace, the 'middleman' also acts like a traditional retailer, i.e. buys directly from manufacturers or distributors and stocking the goods before selling directly to consumers. JD.com in China and Amazon for instance are examples of such mixed marketplaces (operates both B2B2C and B2C business models).

Platforms such as GrabTaxi and Uber for taxi bookings and Food Panda for food offer a new type of B2B2C marketplace for the trading of near-instant services.

Platforms can lower the cost of entry for suppliers and give rise to network effects

Developing a proprietary e-commerce platform is typically more resource intensive than relying on third party platforms. Using a third-party platform may also address many of the challenges associated with integrating services such as electronic-payments (e-payments), logistics or fraud protection which often poses hurdles to businesses attempting to extend their websites beyond simply providing information to prospective trading partners. A third-party marketplace often offers these services in-house, including offering buyers guarantees against fraudulent seller practices and seller reviews to inform buyers about a seller's reputation.

Moreover, users of third party platforms benefit from network effects that come from the large range of products and services offered by a marketplace drawing a significant share of web traffic.

Network effects

The term 'network effects' describes cases where the value of certain services or products to an individual user depends on the number of other users. Network effects may be direct or indirect.

With direct network effects, the more users are connected to a network, the greater the value to others. Telecommunications networks are a prime example as the value of joining a particular telecoms network increases with the number of subscribers because this means a greater range of parties with whom the user can communicate. Interconnection obligations on telecom networks are intended to avoid the largest network eventually taking the entire market (though setting different prices for on-net and off-net calls re-introduces network effects).

Indirect network effects arise from complementarities. A prime example here are operating systems (e.g. computer operating systems or game consoles) where the greater number of users of a particular system means that software developers find it more attractive to write programs and applications for that system, which in turn makes the operating system more attractive to users.

Indirect network effects are characteristic for multi-sided platforms that allow users to interact with each other. Rochet and Tirole (2003) argue that most network effects arise in an indirect manner because "*most markets with network externalities are characterized by the presence of two distinct sides whose ultimate benefit stems from interacting through a common platform*". Marketplaces are a typical example – the greater the number of buyers, the more attractive is the marketplace for sellers, and a greater range of sellers makes the marketplace more attractive for buyers. In general terms, the benefits to a group of users (say, the buyers) stem from the number of users on the other side of the platform (the sellers) – Rochet and Tirole (2006).

As a result, platforms often compete 'for the market' rather than 'in the market', trying to attract a critical mass of users. Successful platforms will attract a greater share of users on both sides, and the entire market may eventually 'tip' in favour of the largest platform.

The economics of multi-sided platforms and network effects has been a growing field of research over the last few decades, and there is a growing body of literature that looks at the competition issues that arise in such settings, taking into consideration pricing strategies and the option of platform users on either side to 'multi-home', i.e. be present on multiple competing platforms.

For instance, early studies such as Rochet and Tirole (2003) examine pricing in two-sided markets and find that platform fees are generally set to "*get both sides on board*". A monopoly platform will set prices according to relative elasticities of demand on either side of the market. This can in some cases give rise to somewhat extreme pricing structures where users on one side are charged a high price while members on the other side are charged below cost or may even access the platform for free. Rochet and Tirole (2006) also note that such an asymmetry may extend to other dimensions such as design and quality.

Rochet and Tirole (2003, 2006) also explore the issue of multi-homing and find that multi-homing (of users on one side) can be attractive for users when platforms are not interconnected. Multi-homing reduces market power of platforms. Therefore, multi-homing may create the incentive for the platform to demand exclusivity.

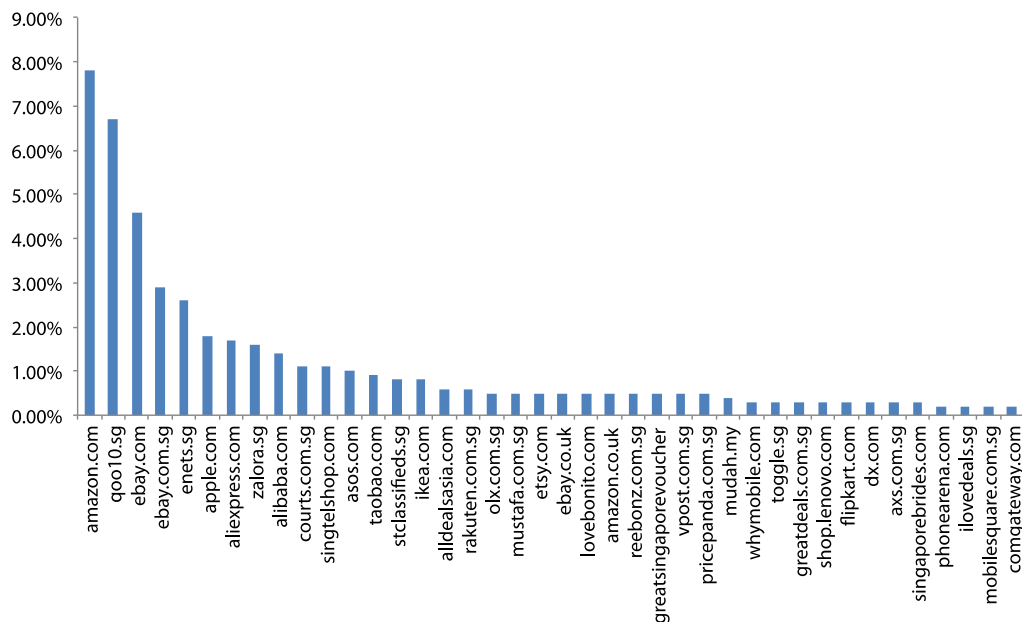
Even though they may be competing more directly with other suppliers on the same third-party platform, sellers will be able to enjoy some of the economies of scale and scope that would be difficult to achieve at the point of entry using their own website, for example. Compared with developing all necessary infrastructure for doing business online in-house, selling via a B2C marketplace may

therefore lower barriers to entry for retailers. On the other hand, selling via a marketplace may limit the extent to which businesses can differentiate their offerings and establish a premium status for their brand.

The decision to sell through third party platforms is of course not exclusive, and there are many examples (such as large hotels or airlines) that sell both directly and through third party marketplaces. Such strategies are driven by the desire to reach as many potential customers as possible rather than saving costs. They are resource-intensive, and unlikely to be viable for smaller suppliers or retailers at the point of entry.

Figure 1 shows the web traffic shares for the top retail sites in Singapore for March 2014. There is a rapid drop in share of web traffic between the top few sites and the rest of the field. Combining the domain's .co, .com and .sg shares, Amazon, Qoo10 and eBay (all B2C marketplaces) have roughly 7-8% of web traffic. The B2C marketplace with the next highest share is Aliexpress with 1.7%, followed by Rakuten with 0.6%. Aliexpress only turned from B2B to B2C at the end of 2012 and Rakuten entered in 2014, which means that their shares are likely to grow. Nonetheless, the web traffic shares of the most popular sites in Singapore show an overall pattern that is indicative of network effects benefitting the market leaders, but also show that a large number of smaller players are sustainable.

Figure 1: Web traffic share in March 2014 of largest shopping sites in Singapore (hits in millions of visitors per month)



Source: UBS (2014)

It is also interesting that eBay's .com site attracts one and a half times the traffic share of its .sg site. This could be a result of the

number of sellers and range of products available on the .com versus .sg site, with the number of sellers on the .com site making this site more attractive than the .sg site. Network effects would then suggest that the .com site attracts more sellers, including local sellers who are targeting the domestic market.

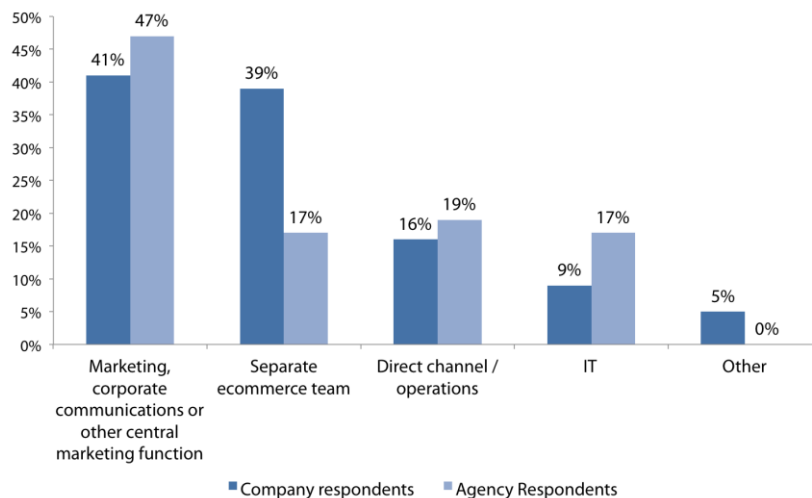
2.1.4 Online marketing and advertising

The internet is commonly used by businesses for marketing and advertising purposes

The internet has always been used by businesses for marketing and advertising purposes. Early academic studies by Wong and Ho (2004) and Kraemer et al (2002) found that businesses mainly used the internet for such purposes rather than transactional activities. Internet marketing and advertising can be used to boost sales irrespective of whether transactions are conducted online, and to date, online marketing and advertising continues to be a major aspect of e-commerce.

A 2014 survey by SAP and Hybris Software of businesses in South-East Asia found that for almost half of the respondents, the marketing and corporate communications department controlled e-commerce operations. This suggests that marketing is often the primary objective of a firm's e-commerce activity.

Figure 2: Who controls e-commerce activity within firms in South-East Asia?



Source: SAP and Hybris Software (2014)

*The nature of
online marketing is
changing*

Another survey by the E-Commerce Association of Singapore (ECAS, 2010)³⁷ found that the main motivations for engaging in online marketing were wider coverage (19%), higher return on investment (16%) and the desire to supplement traditional advertising (13%). Online marketing is often a strong complement to a firm's offline activities.

How the internet is being used for marketing purposes is however changing. Businesses are making use of social media to engage customers and conduct targeted marketing. For instance, in September 2014 Marc Jacobs held a casting for models for its Spring 2015 collection via social media platforms Instagram and Twitter. This turned the casting of models, which would normally just be a step in creating an advertisement for a new collection, into a marketing event in its own right. Holding the casting via social media generates buzz and interest, which may extend the reach of the advertisement beyond the originally intended audience.³⁸

Further engagement with customers is at the heart of one of the e-commerce trends identified by ECAS, namely the emergence of 'Consumer-to-Business' (C2B) models. The 'C2B' model captures cases where consumers create value for a business by providing information (e.g. about willingness to pay) or marketing services (via social media or a personal website) in return for reduced prices or free products and services. In this model, consumers can monetise the added value they create through sharing information online.

'Social Commerce' follows a similar route, making use of the information dispersion potential of social media by enabling 'social shopping' functionalities where a user can click to buy something a friend has just posted/tweeted/pinned about.³⁹

³⁷ The survey participants were mainly small SMEs with fewer than 10 staff (60%) and annual revenues lower than S\$1m (54%), covering a range of different industries including 15% retail, 14% travel, 9% manufacturing, 9% IT services, 3% each for business services, food, and education and 2% each for consulting, trading and media.

³⁸ Singaporean events organiser Nadia Rahmat's success in the casting was reported by the national newspaper – The Straits Times, 24th January 2015, *Singaporean model in March by Marc Jacobs global ads*: <http://www.straitstimes.com/lifestyle/more-lifestyle-stories/story/singaporean-model-marc-marc-jacobs-global-ads-20150124>

³⁹ ECAS views from interview with DotEcon on 13th Jan 2015 as well as The Business Times, 22nd September 2014, *More Singaporeans Turn to Virtual Stores for Shopping*: <http://www.businesstimes.com.sg/top-stories/more-singaporeans-turn-to-virtual-stores-for-shopping>

2.1.5 Collection and exchange of information

Beyond marketing and trading, e-commerce activities may include the online provision of support services such as personalised product recommendations or after sales support (e.g. product registration, FAQ, documentation, etc.).

Online retailers are increasingly seeking to use big data analytics to improve business efficacy by understanding consumer preferences and offering a curated shopping experience tailored to the individual. For example, Zalora noted that data analytics "*is something where we are very different to the offline world, and probably the biggest difference between us and the offline world. We're collecting a lot of data from existing customers, and future customers. We can use this data in order to tailor products for our customers*".⁴⁰ Singapore is a global leader in applied analytics and more businesses can be expected to utilise big data analytics going forward.⁴¹

Reflecting the scope for these additional types of e-commerce activities, ECAS (2010) notes that there was high demand from SMEs for website features such as live-casting (live broadcasting), online surveys and online forums.

In general terms, there is a trend towards more information about individual consumers and their needs and desires being gathered, analysed, potentially shared and exploited. In Section 3.1.2 below, we discuss informational effects that arise from e-commerce as well as some possible positive and negative effects of data analytics.

B2B e-commerce may also be aimed at building and maintaining business relationships and enhancing business communication. Ranganathan et al (2011) found that by engaging with suppliers online, several companies in the US (including Dell, Nokia, Walmart, and Rockwell Automation) improved their business performance. The use of web technologies to streamline their supply chain management activities allowed for "*greater integration with suppliers, reduce distribution costs, enhance superior supplier relationships*". Similar trends are also observed in Singapore. For example, consumer electronics firm Challenger, noted that a paperless system

⁴⁰ The Business Times, 22nd September 2014, *More Singaporeans Turn to Virtual Stores for Shopping*: <http://www.businesstimes.com.sg/top-stories/more-singaporeans-turn-to-virtual-stores-for-shopping>

⁴¹ Harvard Business Review in association with Singapore Sessions, *The Asia Innovation Series*: <https://www.edb.gov.sg/content/dam/edb/en/resources/downloads/singapore-sessions-report-1.pdf>

for its membership programme rolled out towards the end of 2014, is expected to save 600 man-hours a month once rolled out at all its outlets.⁴²

2.2 E-commerce adoption in Singapore

E-commerce involves transactions between multiple parties, whether they are firms interacting along a supply chain or retailers selling to final consumers. As a result, adoption of e-commerce by these different parties is strongly linked and take-up by firms and consumers is interdependent.

2.2.1 Level of adoption

E-commerce adoption by businesses has been rising but there is still plenty of room to grow

Whilst e-commerce adoption by businesses in Singapore in the past two decades has been sluggish – despite significant efforts from the Singapore government to encourage take-up since the mid-nineties (see Annex C) – there has been a steady increase with the most substantial growth occurring in the past few years.

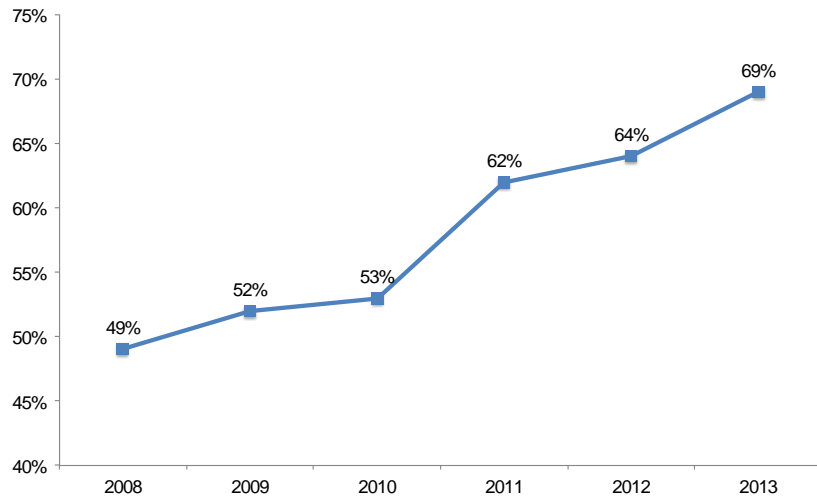
Findings from the IDA’s annual survey of infocomm usage by businesses⁴³ indicate that e-commerce adoption by businesses in Singapore has been steadily increasing since 2008. In 2013, 69% of businesses using the internet undertook e-commerce activities, 20 percentage points up from 2008. E-commerce adoption has increased sharply between 2010 and 2013, with the largest jump recorded between 2010 and 2011 (9 percentage points).⁴⁴

⁴² The Straits Times, 27th Dec 2014, *Less paper = more work done at Challenger*: <http://business.asiaone.com/news/less-paper-more-work-done-challenger>

⁴³ IDA’s 2013 survey on infocomm usage by enterprises was informed by a sample comprising a majority of small businesses with less than 10 employees (74%) from a mix of industries with the top three being wholesale and retail trade (29%), business services (22%) and construction (9%).

⁴⁴ Note that the IDA figures capture only businesses that conduct transactional activities such as placing or responding to orders as well as making or receiving payments online. Note also that the proportion of businesses with a web presence has remained fairly stable, reaching 46% in 2013.

Figure 3: Level of e-commerce adoption amongst businesses with internet usage



Source: IDA, Annual Surveys (2011, 2012 and 2013) of Infocomm Usage by Enterprises.

B2C adoption appears to be trailing B2B adoption

Comparing adoption figures from different sources is potentially fraught with problems because the definition of e-commerce matters (whether e-commerce activity is limited to transactional activities only or includes online marketing and providing other ancillary services online), and measurement approaches differ. Nevertheless, it would seem that B2C e-commerce adoption has been trailing B2B adoption.

Teo and Ranganathan (2004) found that 52.8% of the companies surveyed were adopters of B2B e-commerce.⁴⁵ By comparison, Goh (2005) found that only 36% of the companies surveyed were B2C adopters⁴⁶ - a figure that is consistent with the adoption level of 49% in 2008 presented by IDA. Similarly, Teo et al (2008) found that 62% of respondents were adopters of e-procurement⁴⁷, well in excess of the 49% of e-commerce adopters identified by the IDA.

⁴⁵ Teo and Ranganathan (2004)'s survey had a sample of 108 respondents from the top 1000 companies in Singapore by turnover. The sample consists in majority of large firms with annual revenues of S\$50m and above.

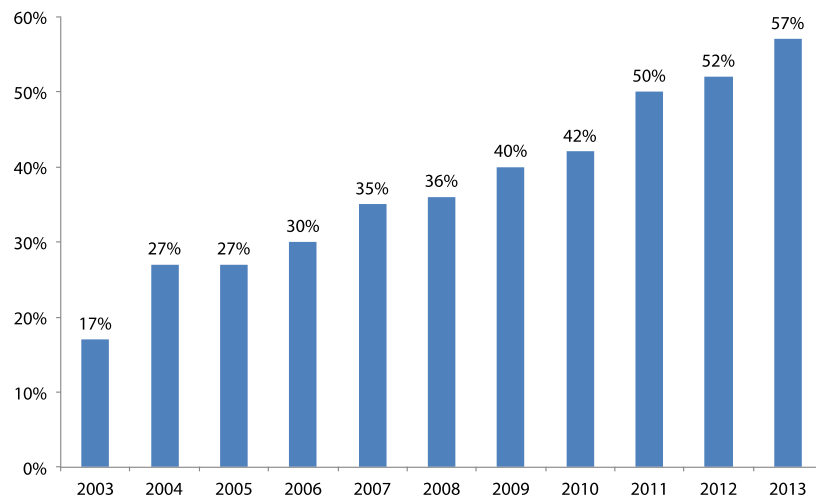
⁴⁶ Goh (2005) conducted an internet survey and had a sample of 53 firms. The majority of respondents were small companies with less than S\$1m in annual revenue and came from a mix of industries including 23% from retail/trading, 17% each from education/training and travel/tourism/hotels, 12% from restaurants/food and beverage and 8% from computer/IT. The majority of respondents (78%) already had a web presence.

⁴⁷ Teo et al (2008)'s survey was targeted at large companies of 100 or more employees, a sample of 141 companies was used. Majority of the sample (97%) were firms with annual revenues of S\$10m or more. Just over a third of the sample were firms from manufacturing, though the remainder of the sample is well balanced amongst a mixed of industries.

Take of up online shopping by consumers in Singapore has been slow, but is increasing steadily

The slower adoption of B2C e-commerce by businesses may be closely linked to the relatively slow adoption of online shopping by consumers in Singapore. According to the IDA, the proportion of online shoppers in Singapore has been increasing steadily since 2003 (and the increase has been largely linear as shown in Figure 4 below). In 2013, just over half of internet users had ever made a purchase online (57%)⁴⁸, with the highest proportion of online shoppers in the 25 to 34 age group (76%).⁴⁹ As foreign websites account for the majority of online sales (60% according to SP eCommerce (2014)), local websites may attract even fewer shoppers than suggested by overall online shopping adoption rates.

Figure 4: Proportion of online shoppers



Source: IDA, Annual Survey of Infocomm Usage in Households and by Individuals 2011, 2012 and 2013.

The IDA survey notes that in 2013, two in five respondents had made a purchase online in the previous week, and 41% of online shoppers made a purchase within the last month. This is roughly consistent with the findings from a survey in 2014 by Visa indicating that a quarter of Singaporeans shopped online at least once a week while

⁴⁸ These figures seem low compared with findings in other surveys of this nature. For instance, a Havas survey in 2013 indicated that 94% of Singaporeans have made a purchase online (Payvision, 2013) while an older survey by Mastercard (2008) found just over 70% of respondents shop online (double that indicated in the IDA survey for 2007). The reasons for the substantial discrepancies between IDA's and these other surveys are not clear.

⁴⁹ IDA's 2013 survey on Infocomm Usage in Households and by Individuals for 2013 is informed by a sample of 5000 households and 3500 residents aged 7-years old and above, though the proportion of online shoppers is calculated from the base of internet users aged 15-years and above.

almost 60% did so at least once a month.⁵⁰ It is also consistent with the results from a survey by CBRE Group conducted in August 2014, which found that 49% of respondents shopped online at least once a month.

By comparison, the CBRE survey found that 85% of respondents shopped at a brick-and-mortar store at least once a month. Two-thirds of respondents indicated that they expected to continue to prefer shopping at physical stores rather than online over the next two years. The CBRE survey also found that consumers are more likely to purchase big-ticket items in store, spending more in store than online.⁵¹ This is consistent with the Singapore Department of Statistics' household expenditure survey of 2012/2013 showing that in 2013 just 4% of total household expenditure was spent online.⁵²

⁵⁰ Visa Consumer Payment Attitude Survey 2014. "Demographics of the respondents were male and female credit card holders above the ages of 18 year olds and holders of at least one general purpose card (credit card). There were 500 respondents in each of the four markets and interviews were conducted online with representative quotas of gender and age. The study surveyed 2000 consumers in Singapore, Malaysia, The Philippines and Thailand." -

http://www.visa.com.sg/aboutvisa/mediacenter/NR_SGP_201114.html

⁵¹ The Straits Times, 12th March 2015, *More buy in-store than online: Survey*: <http://women.asiaone.com/women/shopping/more-buy-store-online-survey>

⁵² Singapore Department of Statistics (2015) – 11,050 households (headed by a Singapore citizen or permanent resident) were interviewed for the 2012/2013 survey.

E-commerce revenues are low, though Singapore is by far the most developed online shopping market in the region

Looking at overall online sales figures as a proportion of total sales yields similar results. Online sales in Singapore are expected to hit roughly S\$4.5 billion in 2015⁵³, accounting for less than 3% of total retail sales.⁵⁴ The equivalent global average in 2014 was just under 6%, with online sales in more mature e-commerce markets such as China, the UK and the US taking 10%, 13% and 6.5% of total retail respectively.⁵⁵ According to the 2010 ECAS survey, e-commerce related revenues made up less than 10% of total revenues for the majority of respondents, and only 11% of respondents stated that they earned more than half of their revenues from e-commerce (ECAS, 2010).

Yet, Singapore has the most advanced (by ratio of online retail value to total retail value) online shopping market in the South East Asian region. Online retail sales are estimated to account for a much smaller proportion of total retail in the Philippines (0.3%), Malaysia and Thailand (0.2% in both) and Vietnam (0.1%) (UBS, 2014).

Moreover, online sales have been growing rapidly, and the 2015 forecast for Singapore represents an increase of roughly 40% from 2014 and amounts to four times total online sales in 2010.⁵⁶ Given that the number of online shoppers has grown linearly, this means that those who buy online make more use of e-commerce opportunities, i.e. they buy more or higher-value items online.

⁵³ SingPost reported Euromonitor estimates of online shopping sales value of US\$3.45 billion (approximately S\$4.66billion66billion) in 2015 (SP eCommerce, 2014, *eCommerce in Singapore: 9 Must Knows*: http://www.specommerce.com.s3.amazonaws.com/dl/fs/141211_fs_singapore_factsheet.pdf). Separately, PayPal (2011) forecasts the online shopping market to hit S\$4.4billion in 2015.

⁵⁴ Singapore Chinese Chamber of Commerce and Industry President noted that e-commerce accounts for only 3% of Singapore's retail market (The Straits Times 9th June 2015, *SMEs get help to tap China's e-market platforms*). IDA presentation on 15th Aug 2013, *Increase Your Competitive Edge with an Integrated e-Commerce Solution*, quoted figures from Euromonitor, *Retailing in Singapore 2011*, indicating internet sales represent 3% of total retail sales. Firecroft Board Director and Head Asia Pacific, Dharendra Shantilal noted in The Business Times, 30th June 2014, *Views From The Top* segment that online retail accounts for 1.5% of purchases made in Singapore. In an article about e-commerce firms in Singapore published on Channel News Asia in 2014, Ku Yong Bae, the CEO of Glosis (which operates the popular Qoo10 platform), estimated that online retails constitutes less than 1% of total retail. UBS (2014) estimates that e-commerce sales as a percentage of total retail for Singapore in 2013 are 1%. A breakdown of online sales into B2C and C2C segments is not available, and C2C sales figures may not be accurately captured as some C2C transactions do not declare import or excise tax.

⁵⁵ eMarketer, 23rd December 2014, *Retail Sales Worldwide Will Top \$22 Trillion This Year*: <http://www.emarketer.com/Article/Retail-Sales-Worldwide-Will-Top-22-Trillion-This-Year/1011765>

⁵⁶ PayPal (2011) for 2010 figure and SP eCommerce (2014) for 2014 figure.

Online sales are expected to grow substantially

Despite taking a small share of total retail sales, online shopping in Singapore is eventually expected to overtake offline revenues. According to a Frost and Sullivan survey, by 2020, online shoppers in Singapore are expected to spend 30% more online than offline.⁵⁷ Leading e-commerce players are also forecasting rapid growth. For instance, Qoo10 (a popular B2C online marketplace) expects its transaction volume to double every year between 2013 and 2016.⁵⁸

Growth in m-commerce is expected to be one of the largest drivers of e-commerce sales going forward. According to PayPal (2011) m-commerce sales in Singapore are forecast to reach S\$3.1bn in 2015, accounting for nearly 70% of predicted total e-commerce sales volumes.

Figure 5 below shows that the proportion of businesses using mobile services to engage with customers has quadrupled between 2010 and 2013, though more than half of businesses still do not make use of mobile services. 45% of businesses use mobile services to deliver product and promotional information to customers while 37% use it as sales channel for goods and services, and 31% for customers to make bookings and reservations. It is evident from these numbers that m-commerce is on the rise, and given the high level of smartphone penetration in Singapore⁵⁹ the growth potential here is still significant.⁶⁰

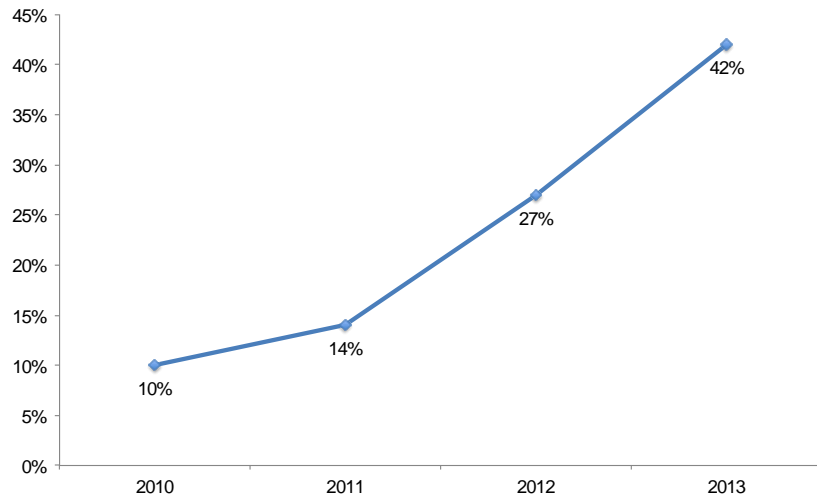
⁵⁷ The Business Times, 22nd September 2014, *More Singaporeans Turn to Virtual Stores for Shopping*: <http://www.businesstimes.com.sg/top-stories/more-singaporeans-turn-to-virtual-stores-for-shopping>

⁵⁸ Channel News Asia, 11th April 2014, *E-commerce firms thriving in Singapore*: http://www.mfa.gov.sg/content/mfa/media_centre/singapore_headlines/2013/201302/news_20130206.html

⁵⁹ Almost 9 in 10 mobile users in Singapore own a smartphone -- Vulcan Post, 3rd November 2014, *Google Reveals Singapore Number One For Smartphone Adoption, Surprised?:* <https://vulcanpost.com/67231/google-study-singapore-number-one-smartphone-adoption-insights/>

⁶⁰ See footnote 8.

Figure 5: Businesses using mobile services to engage customers



Source: IDA, *Annual Survey of Infocomm Usage by Enterprises 2011, 2012 and 2013*.

Payvision (2013) indicates that in 2013, only a quarter of Singaporean businesses have adapted their website for mobile use. Comparing this figure to the numbers from the IDA survey suggests that businesses are engaging customers through non-website based mobile services such as apps and messaging systems.

2.2.2 Drivers of e-commerce take-up

It is difficult to identify general factors that might explain adoption of e-commerce. In particular, studies looking at differences in adoption levels across industries and firm sizes appear to produce inconclusive and potentially counter-intuitive results.

Very early studies of adoption levels across different industries in Singapore indicate that there is no significant relationship between the level of internet adoption and industry type (Teo and Tan, 1998). Teo and Ranganathan (2004) found that B2B adoption in Singapore did not vary across industries, and Teo, Lin and Lai (2008) similarly showed that there was no significant variation across industries in Singapore in the use of e-procurement.

Levels of adoption appear to vary, however, with firm size: larger firms generally adopt new technologies sooner than smaller firms. For instance, Teo and Pian (2004) found higher levels of 'web adoption' amongst larger businesses in Singapore⁶¹ while Kowtha

⁶¹ That is, larger firms tend to have more sophisticated websites capable of conducting online transactions whilst smaller firms had more basic, informational websites.

and Choon (2001) found that in Singapore, the size of a business affects its commitment to e-commerce development.⁶² Teo and Ranganathan (2004) found that B2B e-commerce adopters in Singapore had higher annual IT expenditure than non-adopters. In addition, Teo et al (2008) found firm size to be significantly related to the adoption of e-procurement amongst firms in Singapore and noted that these findings were consistent with other studies. IDA's 2013 survey on infocomm usage by enterprises also found that the proportion of businesses adopting e-payment is higher in the sub-groups of larger businesses (where the IDA uses number of employees as a measure of firm size).⁶³

Overall, the finding that e-commerce adoption levels do not vary across industries is surprising. As industries should be expected to differ with regard to typical firm size and importance of IT spend, the finding that e-commerce adoption varies with the latter two factors seems to be inconsistent with a lack of variation across industries.

Also, one would expect that some industries are more suitable for e-commerce than others. Kramer et al (2002) and SAP and Hybris Software (2014) noted that the adoption of e-commerce by firms is driven predominantly by the perceived benefits in terms of being able to improve business efficiency and expand into new markets. In the travel industry, for instance, lower search costs offered by the internet coupled with the increased efficiency of e-ticketing and e-booking makes e-commerce an attractive business strategy for many sellers (airlines and hotels in particular), with efficiency gains in the form of cost savings enjoyed from bypassing travel agencies⁶⁴.

The largest online retail sector in Singapore is travel

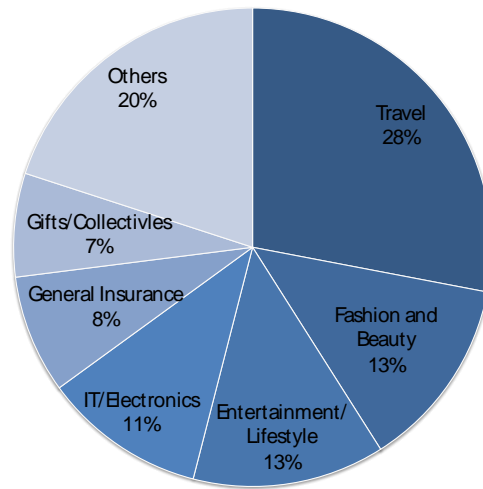
Indeed, in 2010, travel accounted for 28% of total online revenues - the largest share of online sales. Fashion and beauty and entertainment and lifestyle followed with 13% each. IT and electronics, general insurance and gifts and collectables complete the top six with shares of 11%, 8% and 7% respectively.

⁶² By contrast, Teo and Ranganathan (2004) compared the difference in annual revenues and annual IT spend of firms between adopters and non-adopters of B2B. They found no significant difference in the annual revenues of adopters and non-adopters of B2B. However, adopters and non-adopters differed significantly in annual IT spend. Therefore, it is not solely the size of a business in terms of number of employees or revenues that drives e-commerce adoption, but more specifically, it is the firm's focus on IT investment.

⁶³ The overall proportion of enterprises using e-payments in 2013 is 41%, though the proportion of businesses with more than 10 employees that adopt e-payment is above this average figure (51%-78%) whilst a lower proportion of smaller businesses (with less than 10 employees) actually adopt e-payments (37%).

⁶⁴ Indeed, ECAS notes in its interview with DotEcon conducted on 13th Jan 2015 that travel was one of the first industries in Singapore to adopt e-commerce.

Figure 6: Revenue share of online sales in 2010



Source: PayPal (2011)

Though more up to date information about the split of online sales into different retail categories is unavailable, it is worth noting that the top categories from the 2010 survey are broadly consistent with the most popular online retail categories as measured by buying intent and purchasing history of online shoppers shown in Table 1 below.⁶⁵

⁶⁵ In terms of online expenditure, the Singapore Department of Statistics 2012/2013 household expenditure survey found that 39% of online spend was on transport (including flights), 20% was on recreation and culture (including overseas package holidays) and 18% on accommodation (including hotel bookings). Outside of travel services, clothing and footwear (8%) followed by food (3%) were the categories with the highest online spend by households (Singapore Department of Statistics, 2015).

Table 1: Top five retail categories for online shopping

Nielsen Global (2014) <i>Proportion that will make a purchase in this category in the next 6 months</i>	The Paypers (2014) <i>Proportion of online shoppers who have made a purchase in this category</i>	IDA (2013) <i>Proportion of online shoppers who have made a purchase in this category</i>
Air tickets (70%)	Clothing, shoes and accessories (65%)	Clothing, footwear, sporting goods or accessories (68%)
Tours/Hotel reservations (69%)	Travel (56%)	Travel products (34%)
Clothes (52%)	Technology and consumer electrics (54%)	Event tickets (31%)
Electronic equipment (26%)	Movies and music (percentage not available)	Food or groceries (15%)
Mobile (26%) phones	Beauty and cosmetics (percentage not available)	Computer equipment or parts (10%)

Teo and Ranganathan (2004) found that a strong champion of B2B e-commerce within a firm, who can lead, advocate and facilitate a firm's B2B's activities, is crucial for take up and successful deployment of B2B, and that B2B adopters also typically had higher level of support from top management than non-adopters. The need for a strategic commitment to develop e-commerce activities and the appropriate support is likely to remain critical for successful e-commerce adoption.

Online retailers aiming to offer differentiated services

In light of the apparent preference of Singaporeans for in-store shopping, online retailers – especially the pure-play firms – are developing business models offering shoppers a differentiated experience that is intended to be superior to shopping in store. These include subscription-based models, personalised shopping experiences and social commerce.

Another popular driver of e-commerce sales aimed at encouraging more shoppers to go online for lower prices are flash sales, sometimes associated with events such as Black Friday or Cyber Monday in the US and Singles Day in China. In Thailand last year, mobile app LINE launched the LINE flash sale in collaboration with aCommerce. Such events seem to be successful in luring shoppers online even in Singapore. SP eCommerce (2014) notes that "from the period of Thursday (Thanksgiving Day) through to Cyber Monday (in 2014), its participating sites saw a 10 fold increase in order numbers, 11 times increase in revenue and over 5 times more visitors, compared to the same period in 2013." Similarly, Visa noted a 250% increase in transactions in Singapore on Singles Day in 2014 compared with

2013.⁶⁶ These events have been so successful that in 2015, such traditional one day events are being turned into a 'festival' taking place over multiple days – in February 2015, Google, SP eCommerce and DBS organised the Great Online Shopping Festival, a three-day online flash sale event where one can even get a new broadband connection, on sale.

Growth in online sales is expected to be fuelled by more consumers going online and more time being spent online as social habits change. Take up of m-commerce is also expected to rise as the costs of smartphones fall and the shopping experience on mobiles become more user-friendly.⁶⁷ The take up of smart technology and the Internet of Things (where appliances and everyday devices used by consumers, from fridges to air conditioning units, are connected to the internet) are expected to be a major driving force for e-commerce (for both consumers and businesses) as processes such as grocery shopping become automated. Concerns over payment security faced by consumers are expected to ease with increasing use of online channels.⁶⁸

⁶⁶ Visa Consumer Payment Attitude Survey 2014:

http://www.visa.com.sg/aboutvisa/mediacenter/NR_SGP_201114.html

⁶⁷ However, IDA's 2013 survey indicates that the top reason for businesses not using mobile services to engage customers or to adopt e-payments is the perceived lack of need and the nature of business not being a good fit for e-payments respectively.

⁶⁸ ECAS views expressed in an interview with DotEcon on 13th Jan 2015; see also The Business Times, 22 September 2014, *More Singaporeans Turn to Virtual Stores for Shopping*: <http://www.businesstimes.com.sg/top-stories/more-singaporeans-turn-to-virtual-stores-for-shopping>

Drivers of take up of online shopping in different sectors

For general online retail, our interviews with B2C marketplace operators suggest that key factors that are likely to drive take-up of online shopping by consumers in Singapore are:

- a wider range of products available online;
- competitive prices (including delivery costs);
- the convenience offered to customers; and
- a reliable delivery service.

The case of online groceries shopping is a good example.

The preference for one-stop-shopping makes the availability of a wide range of products a key driver for take up. For instance, RedMart noted, "*[I]f you have a limited selection, they [customers] can't find a lot of their products so they have to go to the grocery store anyway, and if they have to go anyway they pick up some stuff that we sell. We think the biggest conversion rate improvement is adding more range, making it a one stop shop*".⁶⁹

Convenience is another important driver for the take-up of online grocery shopping. Customers can shop outside traditional opening hours, can have groceries delivered to their home and they may benefit from time-saving features such as saved shopping lists. Home delivery may of course not be convenient for all customers, but would certainly seem to appeal to stay-at-home parents or those with large families. In particular, the convenience of home delivery is especially high for bulky and heavy items. Obviously, the convenience benefits require delivery to be reliable, both in terms of the punctuality of the service and the handling of the products to ensure quality.

On the other hand the preference for buying fresh produce in store rather than online (looking at or touching the physical product is the main way of ascertaining the quality of fresh produce) means that consumers are not readily turning to online channels to purchase fresh produce.

Convenience also appears to be a major factor in relation to travel services. Interviews with industry players suggest that searching for flights and hotels online has become commonplace amongst travellers, in particular with the younger generation. Keeping up with market and social trends, travel service providers are increasingly offering their services through multiple online channels differentiated by the devices used for access. Online travel agent (OTA) Expedia, for instance, launched its app for the Apple iWatch in late April 2015.⁷⁰

⁶⁹ TradeGecko, 20th May 2014, *Are e-Commerce businesses turning into logistics companies? - an interview with RedMart's CEO on the operations backend*:

<http://www.tradegecko.com/blog/ecommerce-businesses-turning-logistics-companies-interview-redmarts-ceo-operations-backend>

⁷⁰ See: <https://www.apple.com/watch/app-store-apps/>

2.2.3 Barriers to e-commerce adoption in Singapore

Reasons for slow take-up of online shopping

Strong preference for shopping in store

The IDA's annual survey of infocomm usage by households and individuals, undertaken since the late nineties, has consistently found that the primary reason why consumers do not want to shop online is a strong preference for looking at the physical product when shopping. The two top reasons for not shopping online in the 2011, 2012 and 2013 surveys were that respondents "*prefer to shop in person or deal personally with a service provider*" and "*lack of interest*".

As noted in Section 2.1.2, Singaporeans appear to use e-commerce channels to compare prices and gather information, but prefer to purchase from physical retail outlets. The CBRE survey conducted in August 2014 indicated that 93% of respondents prefer to shop at malls for non-food items.⁷¹ Euromonitor (2014a and 2014b) suggests that this trend may be particularly relevant for big-ticket items for which consumers tend to do research online before purchasing in a physical store.

This may be a function of Singapore's small geographical size and its mall culture. Buying offline in Singapore is quite convenient.⁷² It is generally easy and quick to get to stores or malls and even suburban malls have a good range of shops and product availability.⁷³ Stores also typically close late – around 10pm for most, with several supermarkets staying open 24-hours, allowing shoppers to shop after work. In addition, shopping is a national pastime, a social activity, often enjoyed by most rather than considered a chore.

Foreign retailers take lion's share of online sales in Singapore

Online shopping therefore tends to focus on purchasing from foreign rather than local retailers, who take the lion's share of online retail sales. Euromonitor (2014b) found that Amazon and eBay who have been long established in the market take more than half of online retail sales amongst the top five online retailers in Singapore (Euromonitor, 2014b), and the president of the Singapore Chinese

⁷¹ The Straits Times, 12th March 2015, *More buy in-store than online: Survey*: <http://women.asiaone.com/women/shopping/more-buy-store-online-survey>

⁷² This view was supported by ECAS in our interview with the association.

⁷³ In a Straits Times article on the 9th June 2015 discussing why online retail only makes up a small proportion of total retail, sales the article made reference to Singapore being a compact place where people can get around easily for shopping. - The Straits Times, 9th June 2015, *SMEs get help to tap China's e-market platforms*: <http://business.asiaone.com/news/smes-get-help-tap-chinas-e-market-platforms>

Concerns regarding product compatibility, shipment times and payment security when shopping online remain

Chamber of Commerce and Industry noted that local shoppers tend to turn to Amazon and eBay when making purchases online.⁷⁴

Consumer concerns associated with online shopping include concerns regarding product incompatibility (particularly for electronics purchased from foreign retailers), lost or delayed shipments (Euromonitor, 2014b) and security and trust in the seller.

In particular, payment security is an issue that concerns customers. A survey by Nielsen (2014) for instance found that two in five consumers were concerned about providing credit card information online. With regard to overseas transactions, a survey by PayPal revealed that online shoppers were concerned about payment security, identity theft and also currency fluctuations. Nine out of ten respondents were concerned about the amount of financial information they shared online while just over half of respondents did not feel comfortable sharing their credit card details online (Payvision, 2013).

In another survey by PayPal (2011), 60% of respondents indicated that increasing credit and debit card safety measures for online transactions would convince them to spend more online. Shoppers using their mobile devices expressed similar security concerns, with almost 40% of mobile shoppers saying that mobile transactions are not safe enough.⁷⁵

Therefore, the general consensus is that people often prefer to buy in store rather than online, in particular big-ticket items or fresh grocery produce. It takes no more than an hour, and the goods are immediately available with no need to make or worry about delivery arrangements.

⁷⁴ The Straits Times, 9th June 2015, *SMEs get help to tap China's e-market platforms*: <http://business.asiaone.com/news/smes-get-help-tap-chinas-e-market-platforms>

⁷⁵ In addition, the lack of user-friendliness (small screen and slow mobile internet connection) is a main barrier to consumers shopping via mobile devices.

Click-and-mortar companies in Singapore are in a strong market position relative to pure-play firms compared with other countries in the region

The preference for offline shopping may give a particular advantage to click-and-mortar business models. In order to assess the relative strength of pure-play players versus click-and-mortar business, UBS (2014) compared the ratio of web traffic attracted by these parties. The relative website hit ratio of traditional businesses (click-and-mortar firms) versus pure-play online firms (TvO ratio) for Singapore was 6.4%.⁷⁶ This is much higher than the average for key ASEAN markets of 2.4%⁷⁷ and suggests that click-and-mortar businesses are stronger in the e-commerce field in Singapore than their counterparts in ASEAN in terms of the web traffic they receive relative to pure-play operators.

The TvO rate in Singapore is, however, much lower than the US rate of 18.5% where click-and-mortar retailers such as Costco, Walmart and Home Depot are dominant, national players. Share of web traffic is however only one measure, and in terms of revenue, pure-play firms in the US appear to be overtaking click-and-mortar businesses: according to Internet Retailer "*web sales of web-only e-retailers [pure-play firms] surpassed web sales by retail chains [in 2011]*". The gap has continued to widen as the web sales of pure-play retailers grow at a much faster rate than (click-and-mortar) retail chains (Figure 7).⁷⁸

⁷⁶ This 'Traditional businesses (click-and-mortar) versus Online platform' website traffic ratio (TvO ratio) compares the number of visitors to traditional retailers' websites versus traffic to e-tailers or online platforms. It is calculated by examining monthly traffic data of the top 10,000 shopping sites in a country (adjusted for the rate at which users are directed to a site but do not browse it). A TvO of 6.4% in Singapore indicates that pure-play retailers in Singapore get 15.6 times more visitors to their websites than traditional click-and-mortar retailers.

⁷⁷ China's TvO ratio is 2.5%. China has no established, large, national click-and-mortar players. Its online retail market is dominated by pure-play firms like Alibaba, JD and Daminwang.

⁷⁸ Internet Retailer, *E-Retailers Charts & Data*:
<https://www.internetretailer.com/trends/e-retailers/>

Figure 7: Retail Chains vs Pure-plays in the US: The sales figures and Compound Annual Growth Rate (CAGR) of pure-play (Web-Only) retailers compared to retail chains.



Source: <https://www.internetretailer.com/trends/e-retailers/>; sales figures cover online sales of the top 500 online retailers, of which 159 are retail chains (see Top 500 Guide – Annual Ranking, 2014, http://www.top500guide.com/assets/1/7/2014_Top500_Insights.pdf); sales figures in \$bn

Barriers faced by businesses

Technical challenges and privacy and security concerns hold back business adoption

The slow take up of online shopping by consumers has undoubtedly provided little impetus for retailers to develop online channels as there is little perceived need for e-commerce.

Other barriers to adoption of e-commerce by businesses in Singapore, identified on the basis of surveys across a number of academic studies⁷⁹, include:

- the lack of an e-commerce strategy;
- lack of budget and resources;
- the lack of top management support particularly when the benefits from e-commerce appear to be insufficient to justify the cost of the investment;

⁷⁹ See Goh (2005), SAP and SAP and Hybris Software (2014), Teo et al (2006) and Teo and Ranganathan (2004).

- technical issues with the integration of new and old systems and ensuring interoperability throughout; and
- privacy and security concerns associated with opening corporate systems to customers and suppliers (the latter being specific to B2B).

Older studies such as Wong (1996, 2003) suggest that local businesses were reluctant to invest in e-commerce systems because of the risks associated with recouping such investments from a small domestic market, not least in the face of rapid technological progress that could render the investment obsolete within a short period of time. Having to keep pace with rapid technological changes such as shifts in trends of interfaces or payment systems adopted by consumers continues to be a hurdle for the adoption of e-commerce by local retailers.⁸⁰ Overcoming these barriers was the aim of many government initiatives (see Annex C), but similar hurdles appear still to be present today.

The Singapore Chinese Chamber of Commerce and Industry (SCCCI) suggests that e-commerce platforms could allow local SMEs to overcome the constraints of a small domestic market by tapping into foreign markets such as China. However, small, local businesses lack the know-how to take up e-commerce, in selecting an appropriate platform to reach customers, managing logistics and payment aspects when selling to foreign consumers.⁸¹

An ECAS survey from 2010 indicated that only 25% of respondents' website support shopping cart functions and just 15% supported online payment with online payment being the feature indicated by most respondents (26%) as requiring enhancement on their websites (ECAS, 2010). ECAS suggests that the small domestic market and a lack of a vibrant manufacturing sector mean that there are few push factors for innovative e-commerce systems to be developed and adopted.

For major departmental stores in Singapore who have traditionally been focused on their brick-and-mortar business, "*licensing issues and worries of cannibalising sales at their physical stores*" have been

⁸⁰ The Business Times, 2nd December 2013, *E-commerce gets boost from IDA*: <http://www.businesstimes.com.sg/technology/e-commerce-gets-boost-from-ida>

⁸¹ The Straits Times, 9th June 2015, *SMEs get help to tap China's e-market platforms* (<http://business.asiaone.com/news/smes-get-help-tap-chinas-e-market-platforms>) and Channel News Asia, 9th June 2015, *Singapore-China Business Forum spotlights e-commerce in China* (<http://www.channelnewsasia.com/news/business/singapore/singapore-china-business/1900950.html>).

reported as factors slowing forays into e-commerce.⁸² Further the IDA notes that the launch of its e-commerce Call For Collaboration in 2014 is to help local retailers who, traditionally, have been focused on their brick-and-mortar strategy to "build up an e-commerce presence effective to compete with their overseas competitors".⁸³

Most of the local online marketplace platforms (such as Omigo, ShopAbout, and the local sites of Lazada and Rakuten) launched in the past two years.⁸⁴ While local retailers could have used foreign platforms, language barriers, lack of integrated payment systems or logistics services compatible with local systems may have posed non-trivial barriers to businesses adopting e-commerce.

Similar concerns appear to be the top barriers in relation to m-commerce and e-payment adoption as indicated in IDA's 2013 survey on infocomm usage by enterprises (summarised in the table below). The top two reasons for not using mobile services to engage customers or e-payments have not changed between 2011 and 2013.

Table 2: Reasons for not using mobile services to engage customers and e-payments

Position	Mobile services	E-payment
1	No requirement for mobile services	Nature of business not a good fit for e-payment
2	Lack of resources to implement mobile services	Cost of transaction fees to implement e-payment
3	Implementation cost of mobile services are too high	Unsure of e-payment benefits
4	Unaware of benefits	Poor awareness of e-payment systems
5	Unable to find suitable solution for business need	Limited resources to adopt and operate e-payment systems

Source: IDA, 2013, *Infocomm Usage by Enterprises*

Looking ahead, some of these barriers may be overcome through the efforts of the government and a shift in market sentiment. For instance, the PIC+ and enhanced iSPRINT grant schemes launched by the government in 2014 (see Annex C) can be expected to address budget issues to some extent. However, any long term plan for e-commerce – and in particular the transformative deployment of e-

⁸² Today, 21st March 2015, *Trouble ahead for stores as e-shopping bug bites*: <http://www.todayonline.com/singapore/trouble-ahead-stores-e-shopping-bug-bites>

⁸³ The Business Times, 2nd December 2013, *E-commerce gets boost from IDA*: <http://www.businesstimes.com.sg/technology/e-commerce-gets-boost-from-ida>

⁸⁴ At the same time, the ECAS 2010 report noted that B2B platforms are not popular in Singapore, with less than 20% of businesses surveyed using any B2B platforms.

commerce tools – is likely to have to be part of a company’s strategic focus.

ECAS notes that while the government schemes have been successful in enabling companies to engage in e-commerce by subsidising IT equipment and development costs involved in doing so, further assistance on educating businesses on e-commerce systems (in particular on how to set up or integrate e-commerce processes into their businesses) is required for more widespread adoption of e-commerce.⁸⁵

With regard to the perceived limitations of a small domestic market, investments may be recouped over a potentially much larger international market particularly as the Singapore government aims to transform Singapore into a regional e-commerce hub (see Annex C). Foreign e-commerce heavyweights such as Rakuten and Taobao (popular online marketplaces) having set up their respective regional headquarters in Singapore in 2013 should provide a clear signal to local businesses wishing to expand their e-commerce activities that Singapore’s relatively small domestic market is not a major deterrent. Table 3 shows that many popular e-commerce sites⁸⁶ launched operations in Singapore in the past five years.

⁸⁵ ECAS expressed this view in an interview with DotEcon on 13th Jan 2015.

⁸⁶ Popular e-commerce sites sourced from as well as more recent news – Tech In Asia, 6th May 2015, *14 popular ecommerce sites in Singapore*: <https://www.techinasia.com/14-popular-ecommerce-sites-singapore/>

Table 3: Examples of e-commerce entry into Singapore market

Year of market entry	Firm	Industry
2009	Reebonz	Luxury products and services
2010	Qoo10	B2C Marketplace
	Clozette	C2C marketplace
	Luxola	Beauty and cosmetics
	Groupon	Marketplace for daily deals from group discount buying
	Deal.com.sg	Marketplace for daily deals from collective buying
2011	NoQ Store	Books
	Bellabox	Cosmetics Groceries
	Vanity Trove	Beauty (subscription based)
2012	Kwerkee	Home and lifestyle
	Zalora	Fashion marketplace
	Carousell	C2C marketplace
	Food Panda	Food
2013	Taobao	B2C and C2C marketplace
	HipVan	Home furnishing, fashion accessories, art and collectibles
	Omigo	B2C marketplace
2014	Rakuten	B2C marketplace
	Lazada	B2C marketplace

Source: DotEcon research

These foreign e-commerce players cite the country's strong IT infrastructure, its high levels of digital adoption, entrepreneurial climate and proximity to neighbouring countries as the major factors that make Singapore an ideal test-bed location to design and launch new e-commerce services before rolling them out in the more populous markets in the rest of the region.⁸⁷

In relation to barriers faced by local business in finding the appropriate e-commerce service provider when trading overseas, various industry associations including ECAS and SCCCI are stepping

⁸⁷ The Business Times, 24th September 2014, *More Singaporeans turn to virtual stores for shopping*: <http://women.asiaone.com/women/shopping/more-singaporeans-turn-virtual-stores-shopping>

up efforts to provide local businesses with the relevant information required. SCCCI for instance has launched an information-sharing website on e-commerce related issues for its members.⁸⁸ In addition, e-commerce firm Alibaba is rolling out its Merchant Delivery Scheme to provide logistics solutions and consulting services to local businesses as well as its Trade Assurance Scheme to offer local businesses buyer protection when trading with suppliers from China.⁸⁹

⁸⁸ The Straits Times, 9th June 2015, *SMEs get help to tap China's e-market platforms*: <http://business.asiaone.com/news/smes-get-help-tap-chinas-e-market-platforms>

⁸⁹ Economic Development Board, 16th June 2015, *Alibaba: Leveraging Singapore to help businesses reach a global audience*: <https://www.edb.gov.sg/content/edb/en/news-and-events/news/singapore-business-news/Partnership/alibaba-leveraging-singapore-to-help-businesses-reach-a-global-audience.html>

3 E-commerce and competition

Adoption of e-commerce potentially affects markets in a variety of ways. In the subsections below, we will examine how e-commerce affects the options and capabilities available to both firms and consumers. In turn, we then consider how market boundaries, market structure and competition could change as a result. Finally, we focus on the issue of vertical restraints in relation to e-commerce.

Overall, we find that e-commerce adoption:

- can lower distribution cost and transform supply chains;
- enables the provision of entirely new services (online subscription models, cross-company taxi bookings, click-and-drop laundry, etc.);
- reduces search costs and aid price comparisons, though firms may try to limit this effect by obfuscating prices;
- widens the geographical market, subject to external constraints (e.g. trading restrictions, cultural differences);
- exposes brick-and-mortar firms to cost-efficient competition, but also offers an opportunity for such firms to reap benefits of online expansion;
- relies on the development of multi-sided platforms through which buyers and sellers interact, which are subject to network effects;
- facilitates personalisation and price discrimination; and
- affects firms' incentives to use vertical restraints, e.g. to protect non-price dimensions of competition (such as provision of in-store advice).

3.1 What changes with e-commerce?

In this subsection, we look first at the potential impact of e-commerce adoption on supply chain and distribution mechanisms, and then consider the possible informational effects of e-commerce.

- On the supply side, e-commerce can increase the efficiency of the supply chain and create new ways for firms to interact with consumers and to distribute goods.
- On the demand side, e-commerce can change buyer behaviour because of the wealth of information that is available online and the ease at which it can be accessed.

As we discuss in more detail in the remainder of this subsection, the extent to which these changes occur is likely to depend on market-specific factors.

3.1.1 Supply chain and distribution effects

E-commerce can alter the supply chain and significantly reduce distribution costs, both for physical products and for intangible goods or services (e.g. digital products). Falling distribution costs may fundamentally change the ways in which suppliers, intermediaries and buyers interact.

Below we consider how e-commerce can:

- improve efficiency in the supply and distribution of different types of goods;
- increase the variety of goods supplied;
- enable the development of omni-channel business models; and
- change the role of intermediaries, e.g. by eliminating the need for certain types of intermediaries or by enabling the emergence of new types of intermediaries.

Cost savings and supply chain efficiency

Improved co-ordination between manufacturers, wholesalers and retailers can create efficiencies

In the supply of physical products, the improved communication and co-ordination between manufacturers, wholesalers and retailers in an e-commerce environment can substantially reduce distribution costs, for example through practices such as 'drop-shipping'. Drop-shipping refers to a distribution model where a retailer does not itself keep products in stock, but rather passes the customer order on to wholesalers who will then fulfil the order. In Singapore, Blogshop Singapore and Cleocat-fashion offer drop-shipping services for women's fashion. SingPost launched a new order-fulfilment service for SMEs in April 2015, providing everything from warehousing to shipping via its Ezycommerce platform.⁹⁰ This allows SMEs to outsource the backend of their online retailing business.

Reducing the need for retailers to hold inventories increases the efficiency of the supply chain overall, as less capital is tied up in inventories, product specifications may be changed more quickly, and production may more closely match demand profiles.

The reduction in distribution cost, coupled with the low costs that may be involved in creating and running a website as opposed to a

⁹⁰ SingPost Press Release, 18th March 2015, *SingPost to launch Ezycommerce to help SMEs sell online, scale and enhance productivity*: <http://www.singpost.com/media-centre/news-releases/565-singpost-to-launch-ezycommerce-to-help-smes-sell-online-scale-and-enhance-productivity.html>

physical store (in the case of pure-play firms) can be a crucial factor that allows pure-play firms to compete effectively against brick-and-mortar retailers. These efficiency gains can help online sellers offer consumers a competitive alternative to shopping in store, even if purchases are made over a large geographic distance. Delivery and logistics costs may be falling further as increased demand for logistics services might allow logistics providers to exploit economies of scale and scope, and deploy new technologies.⁹¹

E-commerce can also result in cost savings for services

Such efficiency gains are not specific to the supply of physical products. Even for services, new distribution systems with a network of smart lockers or home delivery/collection providing 'local access' of services to consumers can allow a service provider to provide a local service remotely. Laundry Box for instance is a new on-demand laundry service launched in Singapore where users may order online, drop their dirty laundry in a Laundry Locker located nearby, or arrange for a pick up from their home and receive clean laundry back in the locker or delivered to their home. Laundry Box indicates that the cost savings from not having a shop front or frontline service staff provides significant advantages over traditional brick-and-mortar business models. These efficiency gains are passed on to consumers in the form of lower prices. Laundry Box claimed that its customers pay approximately 30-40% less than those using typical storefront laundry shops that offer a similar type and quality of service.⁹²

Even greater efficiencies may be achieved in the supply of digital goods and services

In markets for goods and services that can be delivered electronically, such as software, audio-visual content, financial services and travel bookings, the reduction in distribution costs can be even greater than is possible with tangible goods. As a result, e-commerce adoption appears to be particularly strong in these sectors and may be expected to largely displace traditional forms of distribution going forward.

⁹¹ Amazon's current experimentation with drones to offer same-day delivery – though perhaps intended more to grab attention than establish a viable delivery platform – suggests that firms are exploring new ways of bringing down distribution costs and improve delivery times (For example, The Guardian, 12th November 2014, *Amazon to begin testing same-day delivery drones in Cambridge*: <http://www.theguardian.com/technology/2014/nov/12/amazon-drones-cambridge-prime-air-testing>).

⁹² Vulcan Post, 30th September 2014, *My Laundry Box Refreshes S'pore's Jaded Laundry Industry With Mobile Tech!*: <https://vulcanpost.com/36621/my-laundry-box-singapore/>

As noted in Section 2, travel is the largest e-commerce sector in Singapore, and 80% of travellers surveyed by GfK⁹³ indicated that they obtain their travel information online. As more consumers turn to the internet for their travel needs, flights and hotel bookings will become increasingly commoditised, leaving little scope for traditional travel agents (TAs) to value add and draw customers to their service (see Annex A.2).

Increased product variety

E-commerce supports a greater variety of products and customisation

Lower distribution costs and streamlining of the supply chain may not only lead to lower prices, but may also have implications for the product variety available to buyers. A classic example is Dell's business model, which was founded on disintermediation, automated processes and real-time production. Building to order allowed Dell to offer a wide range of product customisation options to online shoppers, which would not have been possible in a brick-and-mortar store that stocked ready-made products for immediate sale.

More generally, sellers may be better able to promote and sell a wide variety of products through the online channel, including niche products that could not feasibly be supplied by brick-and-mortar stores as the cost of stocking and displaying any products for which there is a relatively low level of demand is often prohibitive. Singaporean pure-play grocery retailer RedMart noted that *"it is easier ... to have a wider variety of products than brick and mortar supermarkets because the company operates out of a warehouse organized for the logistics of delivery."* The business focus of pure-play versus brick-and-mortar outfits is very different as a result: *"[o]ur [RedMart's] management team is all about technology and logistics whereas traditional brick and mortar stores are set up for maximizing profit per square foot of retail space."*⁹⁴ Indeed, going forward, RedMart aims to differentiate itself from traditional supermarkets by offering a more comprehensive product range. Stocking a sufficiently wide range of products to offer customers a one-stop-shop experience to rival traditional supermarkets means that efficient warehouse management is vital. RedMart for instance invested in a specialist supply chain solution that increased its

⁹³ GfK Singapore, April-May 2014, *Travel Bookings Survey*, see summary at: <https://www.gfk.com/sg/news-and-events/press-room/press-releases/Documents/SG%20Travel%20Infographic.pdf>

⁹⁴ Informerly, *Groceries Go Digital in Singapore*: <http://originals.informerly.com/post/77204235976/groceries-go-digital-in-singapore>

warehouse efficiency by more than 50% (see Annex A.1 for more details).⁹⁵

Brynjolfsson et al (2009) found that in the clothing industry, brick-and-mortar stores competed strongly with online retailers in the provision of mainstream product, but struggled to compete effectively with in the supply of niche products. A likely explanation is that clothing retailers are able to offer a wide variety of clothing lines online without being confined to a limited rack space. For example, UK-based online fashion retailer ASOS supplies over 75,000 products covering over 800 brands, ranging from every day brands to niche designers.⁹⁶ ASOS is able to add new styles at a phenomenal rate, with 2,750 new styles going live on their website on a weekly basis.⁹⁷

Consumer benefits from increased variety and greater choice may be substantial. Brynjolfsson et al (2003), using data on books offered by Amazon, found that the increase in consumer surplus from wider product variety available online was up to ten times the benefit that customers enjoyed from lower prices.

Omni-channel business models

Click-and-mortar business models combine the benefits of offline and online retailing

For the reasons outlined above, adopting e-commerce can create substantial efficiency gains for firms. These efficiency gains provide an incentive for brick-and-mortar stores to expand online, combining the cost savings in the online channel with the inherent advantages over pure online offerings, such as an established market presence and the ability to offer customers the option to look at physical products in store. At the same time, the benefits from having a physical retail presence may also drive online retailers to build a physical presence. As shoppers increasingly shop across multiple channels, click-and-mortar firms may become ever more prevalent, allowing retailers to offer the best of both worlds. Indeed, there are predictions that retailers will converge towards so-called omni-channel strategies, trading and interacting with consumers through multiple channels in innovative ways (see, for example, Brynjolfsson et al, 2013). In Singapore, more and more traditional retailers

⁹⁵ Enterprise Innovation, 13th January 2014, *Singapore's online grocer increases fulfilment capacity*: <http://enterpriseinnovation.net/article/online-retails-big-challenge-increasing-fulfillment-capacity-237859010>

⁹⁶ ASOS, 2014, *Annual report and accounts*: http://asosplc.com/~media/Files/A/ASOS/results-archive/ASOS_Report_2014%20FINAL.pdf

⁹⁷ Ibid.

including Watsons, Charles and Keith and Uniqlo have launched online portals; even major departmental stores such as Tangs and Robinsons who once feared that going online would cannibalise sales from their physical stores are gradually joining the e-commerce bandwagon.⁹⁸

Not only have most large retailers established an online presence, but some pure-play firms are also moving in the other direction and investing in physical retail space. For example, sports retailer Decathlon entered the Singapore market in 2013 as a pure-play retailer, but later announced that it would open its first physical store in Singapore and planned to open further stores, citing the benefits of being able to display physical products and advise customers in person.⁹⁹ Similarly, consumer electronics retailer Challenger notes that, "[o]nline exists as an omni-channel approach and we see the trend of offline to online. So what happens is that a lot of Challenger customers go online to browse, find the information and the price... But they come in store to actually test the product itself. We find that with a lot of Challenger's customers, they still prefer to shop in the familiar layout of our stores." In response, Challenger has invested in developing a mobile application to aid online browsing as well as opened two new outlets in sub-urban malls at the end of 2014.¹⁰⁰

Omni-channel retailing can create seamless integration of sales channels

Where retailers offer both online and offline sales channels, creative and innovative applications of technology may increasingly blur the distinction between those channels. For example, an in-store sales representative might be able to assist a customer who is seeking a product that is out of stock, by ordering the product online for delivery to the customer's home, allowing the customer to pay in store.¹⁰¹ There are various examples of seamless cross-channel flexibility in practice. Decathlon pursued a strategy of integration of its online channel with the physical store by not having cashier staff and requiring customers to log on to the e-commerce platform before making a purchase. Some firms, such as grocery retailer RedMart, may offer the option to buy online but pick up from a

⁹⁸ Today, 21st March 2015, *Trouble ahead for stores as e-shopping bug bites*: <http://www.todayonline.com/singapore/trouble-ahead-stores-e-shopping-bug-bites>

⁹⁹ Channel News Asia, *Omni-channel marketing*: <http://www.channelnewsasia.com/news/business/singapore/omni-channel-marketing/1492972.html>

¹⁰⁰ Channel News Asia, *Brick and mortar shops*: <http://www.channelnewsasia.com/news/business/singapore/brick-and-mortar-shops/1539540.html>

¹⁰¹ For example, footwear brand Soletrader uses this practice in the UK. The Guardian, 18th July 2013, *The future of the high street lies in 'connected retail'*: <http://www.theguardian.com/media-network/media-network-blog/2013/jul/18/future-high-street-connected-retail-me-tailing-burberry>

physical location; others allow customers to buy in store but initiate a refund process online. Female fashion retailer 'Love, Bonito' has set up multiple temporary 'pop-up' shops that allow its customers to shop in a brick-and-mortar environment while placing orders via iPads in store. Fashion retailer, Zalora also launched a temporary 'pop-up' store towards the end of 2014 with multiple 'touch points' (computers and tablets) set up in store to allow customers to browse Zalora's full product range online.

Disintermediation and emergence of new platforms

Supply chain changes by removing existing intermediaries

E-commerce may substantially change supply chains by removing existing intermediaries or reducing their importance, and sometimes enabling the emergence of new ones. An example is the travel sector, where customers can purchase e-tickets directly from airline websites and where, for many consumers, aggregator and comparison websites provide an effective alternative to brick-and-mortar travel agents, whose role has been radically diminished.

For example, Lieber and Syverson (2012) note that the number of travel agency offices in the US approximately halved between 1997 and 2007, "accompanied by a large increase in consumers' propensity to directly make travel arrangements—and buy airline tickets in particular—using online technologies." During that period, airlines' commission rates to travel agents fell considerably, likely reflecting the fact that the possibility of direct sales to the consumer reduced airlines' reliance on sales through travel agents (Goldmanis et al, 2010). In Singapore, local brick-and-mortar travel agencies are similarly struggling to survive, with five outfits that were interviewed by the Straits Times indicating that, "they have seen demand slashed by up to a third in the past year [2014] alone, due to the growing popularity of budget airlines and flight-booking websites".¹⁰² Over time, the market share of travel agents is expected gradually to fall as consumers continue to turn to online alternatives for their travel booking needs (see box below and Annex A.2).

¹⁰² The Straits Times, 24th October 2014, *Travel agents get creative in Web age as competition increases*: <http://www.stcommunities.sg/travel/south-east-asia/singapore/news/travel-agents-get-creative-web-age-competition-increases-o>

Disintermediation in the travel sector in Singapore

The travel sector is a clear example of disintermediation caused by e-commerce. Whilst the traditional travel agents (TAs) continue to play a role, this role seems to be much diminished – in Singapore as much as in other countries. As more consumers turn to the internet for their travel needs and make bookings themselves, the scope for TAs to add value shrinks.¹⁰³

Goldmanis et al (2010) examined the impact of e-commerce on market structure in the US using data from 1994-2003.¹⁰⁴ During that period, consumers increasingly shifted to buying airplane tickets online. Airlines reduced the commission rates paid to TAs or ceased paying commission altogether, and the number of TAs fell by 35% between 1997 and 2003. Increases in online purchasing were associated with a particular reduction in the number of small TAs (as measured by the number of employees in each establishment). This suggests that e-commerce has driven consolidation in the brick-and-mortar segment of the market as larger TAs were better able to survive, with some of them introducing online portals that contributed to the decline of their smaller competitors.

There is evidence of a similar trend in Singapore. Traditional TAs have struggled to compete against both online TAs (OTAs) and airlines and hotels selling direct to customers who often offer lower prices.¹⁰⁵ Specifically, Asia Travel, a local OTA notes, *“many OTAs are managed from outside Singapore, allowing these portals to avoid local taxation and offer services at lower prices”*. Local TAs find it hard to compete and to survive, and must differentiate their services and develop a niche in order to provide greater added value to their customers.¹⁰⁶ The National Association of Travel Agents Singapore (NATAS) has stated that, although it works with hotels and airlines to try to secure special rates and commissions for TAs, *“typically commissions and special rates are only granted to large TAs as they are able to bring in larger groups of customers, and smaller TAs are often left out of the picture”*.¹⁰⁷

For online customers, price comparison websites and aggregators will become the most valuable tools. Meta search engine Wego, for example, noted that the *“meta search model has a lot more value to consumers in Asia Pacific than in the US or Europe due to the lack of price parity in the marketplace. In most of our markets, there are more suppliers, more independent hotels, vibrant low cost carriers and more comparison shopping is needed”*.¹⁰⁸

See Annex A.2 for more details.

¹⁰³ This view was expressed by industry players interviewed by DotEcon.

¹⁰⁴ Lieber and Syverson (2012) later extend the analysis to 2007, confirming the original study's findings.

¹⁰⁵ Towkay Zone, 6th February 2014, *OTAs or TAs? NATAS' Ms. Anita Tan Shares Insights on the Travel Landscape*: <http://www.towkayzone.com.sg/content/654-OTAs-or-TAs-NATAS-Ms-Anita-Tan-Shares-Insights-on-the-Travel-Landscape>

¹⁰⁶ *ibid.*

¹⁰⁷ *ibid.*

¹⁰⁸ Web In Travel, 25th June 2013, *US\$17m richer, Wego aims to become top online travel brand*: <http://classic.webintravel.com/news/us17m-richer-wego-aims-to-become-top-online-travel-brand-3837>

New intermediaries may emerge in the online world

In other sectors, there are many examples of new online intermediaries that have emerged and grown rapidly – from financial trading platforms such as Phillips' Online Electronic Mart System for online share trading in Singapore to on-demand film, TV and music services such as Toggle.sg, which offers on-demand TV and film content. Some platforms, such as online financial trading platforms, offer improved, more efficient versions of services that were previously offered (e.g. via telephone); other platforms, such as Toggle, reflect entirely new business models that have been enabled by technology.

Innovative online platforms can alter the ways in which buyers and sellers interact. Platforms that provide access to near-instant services like Uber and GrabTaxi, which offer taxi-booking services, connecting commuters and taxi drivers from a range of taxi companies, have been gaining popularity within a short period of time. In Singapore, as in many other cities, a comparable taxi booking service was unavailable previously as in-house booking systems offered by the taxi companies only allowed users to book a taxi from that company. An online poll by the Straits Times conducted towards the end of 2014 indicated that GrabTaxi was the most popular taxi booking app with 45% of votes – more than double that of incumbent taxi company Comfort Del Gro's in-house app which attracted 21% of votes.¹⁰⁹

These new platforms may reduce the cost of entry for sellers. Using platforms such as eBay or Amazon Marketplace allows small sellers to access a substantial customer base at little initial cost. Another low-cost route to entry is the use of blogging platforms to set up an online presence provides a low-cost route to entry. Fashion retailer 'Love, Bonito', for example, started in this manner (as 'Bonito Chico').

While these platforms may lower barriers to entry, selling via a marketplace is not without its challenges and may pose non-trivial growth barriers for firms. The most popular platforms may charge sellers high fees, creating challenging competitive conditions for sellers to thrive. For instance, Amazon.com charges sellers a commission rate of between 6%-20% for most product

¹⁰⁹ The Straits Times, 17th December 2014, *GrabTaxi, Comfort Del Gro flagged as most popular Straits Times online poll*:
<http://www.straitstimes.com/news/singapore/transport/story/taxi-app-poll-singaporeans-flag-grabtaxi-comfortdelgro-most-popular-2>

categories¹¹⁰; in comparison Rakuten charges 8%-15%, while Qoo10 charges 7%-12% and eBay, 10% (see Annex A.3).

Cambini et al (2011) note that several studies have shown that a retailer's reputation is arguably more important in e-commerce than traditional retail – "*brand, trust and awareness really matter in electronic markets*" where sellers may be foreign and/or distant. However, selling through B2C platforms may make it difficult for firms to invest in reputation and establish a brand identity that is distinct from the reputation of the platform. Mechanisms such as seller rating systems may help to some extent, but if seller ratings are not easily transferable to alternative platforms, they may have the effect of increasing switching costs for sellers.¹¹¹ Not being able to carry over an existing brand or reputation to a new sales channel means that sellers may be tied to platforms.

C2C may compete with B2C

In addition, new intermediaries in the C2C space have emerged to provide services that compete with those offered by traditional businesses. Airbnb, for instance, connects homeowners with people looking for short-term lettings and travellers increasingly use the service as an alternative to hotels or serviced apartments. Pawshake, a C2C pet-sitting marketplace, connects dog owners looking for a pet-sitter or dog walker to locals in the community who would provide such a service either at the home of the owner or with a host family, competing with commercial pet-sitting or boarding services. Helping, SendHelper and ProperHands are marketplaces for on-demand household services such as cleaning services.¹¹² These platforms provide customers with an alternative to using professional cleaning agencies.

¹¹⁰ The commission rate for the product category of 'Amazon Device Accessories' is 45% and that for 'Independent Design' is 25%. Amazon, *Fees and Pricing*: <http://www.amazon.com/gp/help/customer/display.html?nodeId=1161240>

¹¹¹ For example, eBay's user agreement prohibits the transfer of an eBay account (including feedback) and user ID to another party without eBay's consent. eBay, 12th August 2014, *eBay user agreement*: <http://pages.ebay.com/help/policies/user-agreement.html>

¹¹² Helping entered the Singapore market by acquiring local player Spickify in March 2015 while ProperHands launched in December 2014 and SendHelper in May 2015.

Infrastructure requirements

E-commerce in many cases requires an enabling infrastructure

Many of the supply chain and distribution effects discussed in this section generally depend on the availability of an underlying infrastructure.

First, a suitable telecommunications infrastructure and systems to support secure online transactions are a prerequisite. The lack of such an infrastructure may have been an issue in the early days of e-commerce, but adequate systems are now in place in many countries. In Singapore, internet penetration in 2014 was 82% and almost 90% of the adult population access the internet using a smartphone, so potential e-commerce users are well-connected.¹¹³

Second, a supporting physical infrastructure is crucial to many business models that revolutionise the supply of physical products. Delivery services and logistics play an important role in ensuring fulfilment of orders placed online, or the delivery of services such as the one offered by LaundryBox.

Singapore has one of the best logistics network in Asia and we have discussed above that this is likely to improve further as online retailers such as Rakuten and Lazada develop their own logistics networks. Other pure-play retailers such as RedMart and Zalora are tying up with retailers such as convenience store chain 7-Eleven to offer a 'click-and-collect' service. In 2015, SingPost expanded its suite of e-commerce services to provide a centralised warehouseshipping service at its network of 'Lock+Store' warehouses as well as its Ezycommerce platform to cater to the e-commerce needs of small businesses. Retailers may utilise SingPost's warehouse as well as shipping services available directly at the warehouse to manage inventory and distribution.

While the mature logistics market in Singapore means that most online retailers should be able to rely on a third-party logistics provider there are certain sectors that pose specific logistical challenges. Grocery distribution is particularly demanding, as each order typically contains a large number of products, including fresh produce that has to be delicately handled, and chilled or frozen produce that requires an unbroken cold chain. The choice of logistics providers capable of providing an unbroken cold chain is limited in

¹¹³ Internet penetration data is sourced from World Bank's World Development Indicators Database (<http://data.worldbank.org/indicator/IT.NET.USER.P2>) and data on smartphone usage is from Google, The Connected Consumer Survey (<https://www.consumerbarometer.com/en/>).

Singapore – at the time of writing, only Ta-Q-Bin is believed to have the infrastructure to offer this service.¹¹⁴

Given the importance of the delivery service, many grocery retailers that sell online have invested in their own delivery network.

According to RedMart, “[g]roceries is the only product category with sufficient volume and frequency of ordering to be worth having your own fleet and utilize the capacity on that fleet to pay for it.”¹¹⁵

RedMart has also invested in technologies to improve operational efficiency, such as an Uber-style app to optimise delivery routes for its fleet of vehicles. See Annex A.1 for a more in-depth discussion.

Third, an e-payments system is required for financial transactions to be made. An effective payment system needs to have a minimum efficient scale in terms of its users (merchants, consumers and banks) and has to be compatible with local systems and culture. In Singapore, the majority of local shoppers pay for online purchases with a credit (71%) or debit card (27%).¹¹⁶ By contrast, Lazada notes that in Indonesia where banking penetration is very low, cash-on-delivery is the most popular payment method for orders from its site.¹¹⁷ In the Philippines, customers often ‘pay by convenience store’ – making an order online, and then paying for that order at a convenience store such as 7-Eleven.¹¹⁸ Adapting to local payment preferences is a key challenge for online retailers.

As trust in the security of the payment system is a key factor in the take-up of e-commerce, consumers must have confidence in the payment systems offered by online retailers. The Singapore government has put in place several policies and schemes since the late nineties to establish trust in payment schemes to alleviate security concerns over online transactions (see Annex C for more details).

¹¹⁴ This view was expressed by one of the industry players we have interviewed.

¹¹⁵ Tradegecko, 20th May 2014, *Are e-Commerce businesses turning into logistics companies? – an interview with RedMart’s CEO on the operations backend*: <http://www.tradegecko.com/blog/ecommerce-businesses-turning-logistics-companies-interview-redmarts-ceo-operations-backend>

¹¹⁶ IDA, Annual survey of infocomm usage by households and by individuals in 2013.

¹¹⁷ Tech in Asia, 28th October 2013, *6 facts you should know about cash-on-delivery in Indonesia*: <https://www.techinasia.com/facts-cash-delivery-indonesia/>

¹¹⁸ See Annex A.2.

3.1.2 Informational effects

The adoption of e-commerce can substantially affect the information available to buyers. On the one hand, comparing products and prices online is very easy, and buyers can also benefit from information available on blogs, reviews, forums and so on. On the other hand, firms might use strategies that make it more difficult for buyers to access relevant information, and certain product characteristics may be more difficult or impossible to communicate effectively online compared with in store.

Reduction in search costs

Better information and reduced search costs have been examined closely in the literature

The informational effects of e-commerce have been an area of great interest in the economic literature. The general view is that e-commerce has the potential to deliver substantial economic benefits by reducing buyer search costs and improving the information available to buyers. Of course, the extent to which this effect is material depends on the specific market, as the potential for savings is related to the product value. Relatively inexpensive goods – often bought on impulse - attract relatively little search and thus reductions in search costs are less important. On the other hand, in many markets for relatively expensive goods or markets with repeat purchasing, the propensity to search is higher and the benefits from a reduction in search costs should be larger (Baye et al, 2006 and Brynjolfsson and Smith, 2009). Also, the way in which products are purchased matters, as the example of grocery shopping shows.

The impact of e-commerce on search costs for groceries

Even though comparing prices of individual products online may be somewhat easier than in store, the impact of this reduction in search costs may be limited because grocery shopping generally involves purchasing multiple items and consumers are unlikely to compare prices of each good across different retailer's websites. There is little evidence to suggest that customers are more likely to purchase from multiple retailers online, picking the cheapest supplier for individual products. The preference for one-stop-shopping is likely to remain strong in the online world, as industry players in our interviews have highlighted.

Aggregator websites that facilitate comparisons of the prices of baskets of products across retailers – such as Mysupermarket in the UK – may provide a solution, but such aggregator sites may face limitations, for example where the range of products stocked by different retailers differs or where the (perceived) quality of different retailers' own-label brands differs. Such aggregator sites are not available in Singapore yet.

Moreover, although e-commerce has significant potential to reduce search costs, some of the associated benefits may remain unrealised as firms might respond by engaging in price obfuscation or other strategies that distort the information available to buyers. We discuss strategies that deliberately seek to make comparing prices more difficult in Section 3.3.1.

Price transparency can lower search costs, but some search costs typically remain

In the case of homogeneous goods, the internet has greatly facilitated price comparisons.¹¹⁹ For example, comparing prices from different online retailers – including through comparison or aggregator websites such as pricepanda.com.sg or priceme.com.sg – should typically be much easier and less costly than in the brick-and-mortar world where the time needed to visit multiple retail outlets is substantial. The ‘shoe leather’ cost savings available through online price comparisons are substantial. Price comparison sites may not only cover online suppliers, but may also extend to include offerings from offline retail channels. For instance, in Singapore, Tripzilla, a comparison website for tour packages and budget flights, covers offerings of both offline and online retailers.

Nevertheless, the literature suggests that non-trivial search costs remain. Even though price comparisons may be straightforward, comparing retailers and making purchase decisions requires additional information as non-price characteristics such as a quality (potentially signalled by a retailer’s brand) and the pre-sale or post-sale services offered (e.g. refunds policy) may be important to consumers. Brynjolfsson et al (2010a) show that, even for identical goods (books), some consumers remain sensitive to retailers’ non-price characteristics (brand, range of services, etc.).

The prevailing view is that e-commerce adoption has created benefits by facilitating price comparisons, though information remains ‘imperfect’ even online. The effectiveness of price comparison websites and aggregator sites in creating benefits depends of course on their impartiality, ease of use and scope of offers covered. Where the selection of offers is limited and the comparisons (or their presentation) are not objective, consumers may be misled and suffer harm.

Buyers may have access to more information about products and sellers

Though comparing the non-price characteristics of different offers can be inherently less straightforward than comparing prices, the internet has the potential to improve prospective buyers’ access to information about product quality and retailer characteristics, for example, through reviews and ratings. There is a large volume of information and opinions available online, including blogs, forums, specialist websites and mechanisms such as online review systems. Making use of this information, buyers may be better informed about the quality of services and goods than they would be in the offline world, where they might have to rely on personal experience,

¹¹⁹ Though price transparency can reasonably be seen as a desirable market characteristic overall, one possible caveat is that it may facilitate collusion by making it easier for firms to observe any deviations from explicit collusive agreements, or to signal price points to other firms with the aim of establishing a tacitly collusive outcome. The possible competitive impacts of e-commerce are discussed separately in Section 3.3.

reputation and word of mouth. For example, Luca (2011) presents empirical evidence to support the idea that online reviews improve the availability of information about experience goods in the case of restaurants. In particular, reviews by other customers appear to be effective – in Singapore, two out of three consumers are likely to trust reviews by fellow consumers more than those by professionals (Payvision, 2013).

However, certain types of behaviour might weaken this positive effect. For example, 'review spam' – including 'promotional' or 'fake' reviews – seems to be commonplace on some websites (see e.g. Nitin and Liu, 2008). The Competition and Markets Authority (CMA) in the UK has noted that sites such as TripAdvisor (travel reviews and opinions website) and Checkatrade (tradespeople directory) have been accused of having misleading or fake reviews (CMA, 2015b). Certain review systems may be particularly conducive to spam, for example by allowing anyone to post a review, rather than restricting this to those users known to have purchased the product or service (see e.g. Mayzlin et al, 2014). The presence of reviews that are not genuine can undermine the effectiveness of review systems. The CMA's findings confirm the existence of 'review spam' and raise concerns over the potential negative effects of sponsored content and paid endorsements, if consumers are not aware that payments have been made (CMA, 2015b).

Some product characteristics are inherently difficult to convey online

Regardless of how effective review systems and other website features are, some information about physical products may remain difficult to convey online. The preference of Singaporeans for shopping in store rather than online suggests that sometimes there is no substitute for personally checking the physical product.¹²⁰ Being able to examine and test products will provide information about product quality, for example, that may be more difficult or impossible to obtain in advance of purchase when shopping online. Audio-visual consumer electronics or fragrances are typical examples of product categories where online information appears to be a poor substitute for direct checking.

Online firms strive to find ways to mitigate this problem. For example, eBay's Fashion allows customers to try on clothing virtually (Brynjolfsson et al, 2013). However, some informational barriers are likely to remain. Where some of the purchase-relevant information is not available or difficult for sellers to communicate to potential buyers, e-commerce could lead to an outcome where the average quality of goods offered for sale through e-commerce channels is relatively low (see Lieber and Syverson, 2012).

¹²⁰ ECAS expressed similar views in its interview with DotEcon on 13th Jan 2015.

Retailer characteristics can also be difficult to convey

There may also be informational asymmetries between buyers and sellers in relation to seller characteristics. Buyers may be more concerned about the trustworthiness of sellers when buying online, for example because of concerns about the security of online financial transactions (Lieber and Syverson, 2012). It may be more difficult to deal with product defects or resolve delivery issues (including non-delivery). For example, foreign retailers selling consumer electronics online may not provide a local warranty. Reassuring potential buyers that they are trustworthy and reliable trading partners may be particularly difficult for pure-play sellers or for individuals selling on C2C platforms, who lack the reputation that established click-and-mortar sellers may have.

Mechanisms that seek to address this informational asymmetry and improve the information available to buyers have emerged. In some cases, online transactions may be covered by protection schemes¹²¹ that shield buyers and/or sellers from the risk of undesirable outcomes (e.g. fraud or non-payment). This can resolve some of the trust issues arising from asymmetric information. Such schemes, if effective, should ensure a minimum level of confidence, but the difficulties faced by retailers in signalling quality and reliability above this minimum baseline remain.

Other mechanisms, such as feedback systems, may be used so that buyers have access to more information about sellers and sellers are able to build a positive reputation. The effectiveness of such systems has however been the subject of some debate. In particular, eBay's feedback system has been studied extensively. Some studies provide evidence of informational benefits, but others suggest that the system's design might discourage negative ratings, leading to the equivalent of 'grade inflation'. This is because feedback is provided sequentially by the buyer, then by the seller, creating scope for 'retaliation' in response to a low rating. Indeed over 98% of all feedback ratings on eBay are positive, which arguably gives them little informational value (Levin, 2010).

Vetting of sellers by the platform, potentially based on customer feedback received, may be another option, though this could give rise to concerns about discriminatory access and would need to address the self-selection bias that might typically be observed in customer responses. In practice, vetting is likely to take place primarily on the basis of criteria such as creditworthiness, compliance with platform terms and conditions, and fulfilment of any relevant qualification conditions set by the platform (e.g. based on quality or reliability). Ashton and Pressley (2007) surveyed 90 e-

¹²¹ For example, as offered by PayPal - *PayPal, Buyer Protection*:
<https://www.paypal.com/uk/webapps/mpp/paypal-safety-and-security>

Falling search costs might increase product variety or create 'superstars'

marketplaces and found that 21% of them stipulated some form of qualification criteria of this sort.

The reduction of search costs and the greater ease with which products can be found could also have implications for the composition of demand. The long tail that has been observed in the online world is not only the result of changes in the supply chain that support a greater variety of products, but also driven by the reduced search costs. In particular, the long tail also requires mechanisms that make it much easier for buyers to find niche products online. Brynjolfsson et al (2011) show how the use of search and recommendation systems supports a broader range of products purchased online compared with traditional catalogue sales and provide empirical evidence of a long tail for women's clothing. A similar effect is reported by Brynjolfsson et al (2010c) in relation to the books market, where the share of sales attributable to niche products appears to have grown significantly over time.

However, depending on the specific context, there may be the opposite effect where e-commerce tends to create 'superstars' by channelling consumers towards a relatively small group of popular products – for example, in the context of audio-visual content, where review or recommendation systems might direct the majority of users towards the most popular content (see Brynjolfsson et al, 2010b for a comprehensive overview). This effect may become more pronounced where online reviews have a 'snowball' effect, i.e. where positive reviews increase the number of customers who then post more reviews.

Online data collection and use

Gathering customer data is much easier in an online environment

E-commerce not only provides an opportunity for buyers to learn more about the range of products available and their sellers – it also allows sellers to gather detailed information about their customers. The collection and use of customer data is another widely discussed topic in relation to e-commerce concerns.

Collecting information about customers is by no means a new trend, but the internet has significantly reduced the costs of data collection (in some cases, virtually to zero), broadened the scope and volume of information that can be collected, and increased the precision with which actions can be associated with specific internet users (Tucker, 2010). Grunes and Stucke (2015) note that in 2013, 90% of the world's data had been generated in the preceding two years, while current forecasts predict that our data output will double every two years.

Using customer data can create substantial benefits ...

Online firms may use the data in a variety of ways, with both potential benefits and potential costs for consumers. It can help firms improve the design and functionality of their website, or help them make better business decisions. For example, browsing data could assist firms with forecasting future demand and making decisions about wholesale purchasing and warehouse stocking.¹²²

Online advertising, which has been studied extensively in the literature, can be targeted in ways and with a degree of precision not previously feasible using 'traditional' media. For example, ads delivered to users of search engines can be linked to the user's search terms and search history. In fact, it may be argued that consumer data collected by two-sided platforms, such as search engines, has become a key component of their business models, helping them to offer attractive targeting options to advertisers, which fund free services offered to consumers.¹²³

Various other forms of personalisation are possible online, leveraging the data that firms collect on user characteristics, either directly or through third party 'data brokers'.¹²⁴ Online services, content, search results and recommendations may all be tailored according to user characteristics, such as geographic location, or personal interests inferred from a user's browsing history. These activities are not limited to B2C markets – B2B companies are also planning to invest in data analytics to improve their services, in particular "to break down channel silos and provide personalized experiences and product recommendations" in order to match the B2C-like shopping experiences that consumers currently enjoy (Forrester, 2014a).

¹²² For example, Retail Week, 10th October 2013, *Analysis: How Tesco and Otta are using data to forecast demand*: <http://www.retail-week.com/topics/analysis-how-tesco-and-otto-are-using-data-to-forecast-demand/5053784.article>. Again this is not a completely new trend, but e-commerce can increase the volume and range of data that can be collected, and the ease at which it can be collected and analysed.

¹²³ Grunes and Stucke (2015) argue that "many online companies have adopted business models that rely on personal data as a key input. One common business model involves two-sided markets, where companies offer consumers free technologies, services, and products with the aim of acquiring more valuable data from these consumers to assist advertisers to target the right audience".

¹²⁴ The US's Federal Trade Commission defines data brokers as "companies whose primary business is collecting personal information about consumers from a variety of sources and aggregating, analyzing, and sharing that information, or information derived from it, for purposes such as marketing products, verifying an individual's identity, or detecting fraud". Federal Trade Commission, May 2014, *Data Brokers: A Call for Transparency and Accountability*: <https://www.ftc.gov/system/files/documents/reports/data-brokers-call-transparency-accountability-report-federal-trade-commission-may-2014/140527databrokerreport.pdf>

... but potentially also result in detrimental effects on customers

Whilst more targeted advertising and the delivery of information that is more closely tailored to suit the customer's needs can create substantial user benefits, there are also concerns that such information may be used to the detriment of customers. For example, detailed user information may increase the scope for price discrimination and enable price discrimination directly targeted at narrowly defined customer groups or potentially even individual customers.¹²⁵

Price discrimination can have the (economically beneficial) effect of expanding supply and increasing welfare and may thus be beneficial for both firms and consumers overall. However, the net effect on consumers depends on the nature of competition in the market, the interaction between firms and customers, and the sophistication of price discrimination techniques (OFT, 2013). In any case, price discrimination is likely to be resisted by those customers who would have been served in any case but end up paying more. Public opinion often rejects economic arguments in support of price discrimination on the basis of a perceived inherent unfairness (Odlyzko, 2003). For example, when Amazon in 2000 charged different customers different amounts for movie DVDs – supposedly in order to undertake a 'price test' that would help it to determine an optimal price point for the goods – it caused public uproar and was forced to stop its tests and refund customers.¹²⁶ Despite the backlash it experienced, Amazon did not rule out carrying out similar pricing tests in the future and has been accused of price discrimination since.

Evidence of price discrimination in practice is limited

Empirical evidence of straightforward price discrimination is however relatively limited – some firms may discriminate, for example, on the basis of geographic location or by charging lower prices to customers who have registered or subscribed. For example, Hannak et al (2014) found that online retailers Cheaptickets and Orbitz offered reduced prices on hotels to their members.

Studies by Mikians et al (2012 and 2013) examined the pricing practices of online retailers and found no evidence of price

¹²⁵ This could be considered as imperfect first-degree price discrimination or sophisticated third degree price discrimination. First degree, or perfect price discrimination describes the case where a supplier is able to extract the full willingness to pay from each customer by setting the price for each customer to the customer's reservation price. Second-degree price discrimination refers to cases where prices vary according to certain purchase parameters – quantity discounts are a typical example. Third degree price discrimination implies charging different prices to different customer groups, allowing customer self-selection (e.g. by offering a menu of tariffs).

¹²⁶ For example, CNN, 24th June 2005, *Web sites change prices based on customers' habits*: <http://edition.cnn.com/2005/LAW/06/24/ramasastry.website.prices/>

discrimination on the basis of technology differences (browser and operating system) or on the basis of different browsing histories that corresponded to different 'personas' ('affluent' and 'budget'). However, the 2012 study found some cases where lower prices were offered to users that were re-directed from an aggregator website, and significant price differences across different geographical locations (both across different countries and across different states within the US).¹²⁷ Similarly, the studies undertaken by the UK Office of Fair Trading in 2010 and 2013 found that sophisticated price discrimination based on previous behaviour was then more of a theoretical possibility than a reality, though discounts targeted at particular users were fairly common (e.g. users who have been inactive for a period of time).

The limited evidence of direct price discrimination might reflect that the true extent of online price discrimination is inherently difficult to observe. Odlyzko (2003) predicted that the internet would increase firms' incentives and abilities to price discriminate, but because of public opposition to this practice firms would be likely to conceal it by moving away from simple cash pricing and discriminating through avenues such as bundling, which is much more difficult to detect. Membership arrangements may similarly be used to promote price discrimination. For example, in 2014, an Amazon Prime member filed a class action suit against Amazon alleging that it encourages third-party retailers to charge Amazon Prime members a higher base price to cover shipping cost. Amazon Prime members pay an annual subscription to Amazon and enjoy free shipping for certain purchases as part of their Prime membership perks.¹²⁸

There is however evidence of other forms of personalisation, such as personalised search results, recommendations, or 'price steering' that seeks to direct certain subsets of users towards more expensive options. Hannak et al (2014) found evidence of price steering for hotel bookings on Expedia and Hotels.com as well as personalised search results for mobile users (Home Depot and Travelcity) and based on a user's history of clicks and purchases (Priceline).

¹²⁷ The authors note however that there may be various explanations for geographic price differences such as, for example, different degrees of competition geographically.

¹²⁸ Law360, 19th February 2014, *Amazon Hit With Class Action Over 'Hidden' Shipping Costs*: http://www.law360.com/articles/511518/amazon-hit-with-class-action-over-hidden-shipping-costs?article_related_content=1; in December 2014 Amazon obtained a ruling requiring the plaintiff to submit to arbitration in line with the arbitration provisions in Amazon's clickwrap agreements (Law360, 10th December 2014, *Amazon Wins Bid To Send Hidden-Charge Suit To Arbitration*: http://www.law360.com/articles/603562/amazon-wins-bid-to-send-hidden-charge-suit-to-arbitration?article_related_content=1).

Evaluating the impact of online data collection and use needs to take account of customer awareness

Evaluating the economic impact of online data collection and use is not straightforward. Apart from the potential concerns about firms using the information to the customer's detriment, there may be other costs associated with data collection, such as the loss of privacy or the risk of data security breaches that might result in misuse of the information collected. Arguably, this would not be an issue if customers made well-informed choices about whether they consent to information about them being collected. However, internet users may often not be aware of the data that is being collected about them and how it is used or shared with third parties.¹²⁹ They may not be empowered with appropriate mechanisms to control the level of data collection, or opt-out (Tucker, 2010). In this case, the extent of data collection and its use does not fully reflect the associated costs.

Possible sources of consumer harm might depend on the specific use of consumer data. For example, Newman (2014) argues that targeted advertising based on behavioural profiling *"is used by especially seedy companies to target a variety of financial and economic scams at vulnerable populations"*, such as in the case of subprime mortgage advertising based on racial and economic profiling, and that the data broker industry *"even has a term – sucker lists – for the poor, old and less educated groups that they compile for such unethical marketers."*

In summary, whilst targeted advertising and other forms of personalisation may be beneficial to both firms (e.g. by improving advertising efficiency) and consumers (e.g. by reducing search costs, providing internet users with tailored services, more interesting content and recommendations), public opinion often finds such strategies objectionable. Privacy is a key concern for many internet users, and online firms are sometimes accused of deliberately concealing the fact that content has been personalised based on user data (Mikians et al, 2013).

Public opposition to online data collection and use could have knock-on consequences. In a 2013 report on online personalised pricing, the UK Office of Fair Trading (OFT)'s most significant concern was that fears about online price discrimination (whether genuine or misplaced) would lead to a reduction in consumer trust of online markets, which may itself cause harm to consumers if online channels are ultimately under-used (OFT, 2013). The OFT responded

¹²⁹ For example, in the UK it seems that *"[a]wareness of data collection and use by government and companies is quite high, but the level of understanding of what this means in practice is much lower"*. Sciencewise Expert Resource Centre, 2014, *Big Data: Public views on the collection, sharing and use of personal data by government and companies*: <http://www.sciencewise-erc.org.uk/cms/assets/Uploads/SocialIntelligenceBigData.pdf>

to this concern by writing to around 60 leading online businesses to advise them to be more transparent about their practices.

The collection, use, disclosure and care of personal data by companies in Singapore are governed by the Personal Data Protection Act (PDPA), which may offer consumers some basic level of data protection and prevent misuse of personal data (i.e. data from which an individual can be identified). However, this does not completely rule out potential harm from the collection of data described above, in particular when there is a degree of ambiguity in privacy policies. In any case, collection of non-personal data that may also be used by firms to the detriment of consumers (such as pseudonymous or aggregate data) is not governed by the PDPA.

Even where data protection legislation is effective, the collection and use of data may increasingly cause competition concerns if it has the potential to affect the efficiency of market outcomes. A study by the UK Competition and Markets Authority published in June 2015 has considered this possibility (CMA, 2015a) and the European Commission's Digital Single Market strategy also raises a concern about lack of transparency with regard to online firms' use of information that they acquire (EC, 2015).

3.2 The impact of e-commerce on market boundaries

The effects on the supply chain and the changes in search costs associated with e-commerce may affect market boundaries, in terms of product market as well as geographically. The general presumption would seem to be that e-commerce expands markets. However, there may be instances where online channels do not compete sufficiently strongly with the offline channel to justify including both in the same relevant market, or where an increased level of product differentiation may result in market fragmentation. Geographic market boundaries may continue to be restricted by existing barriers that limit trade over significant distances or across borders.

3.2.1 The relevant product market

Substitutability of online and offline channels and the role of omni-channel retailing

When goods and services are available through both offline and online channels, an obvious question is whether both channels are part of the same product market. As we have discussed above, there are potentially substantial differences between the two channels in terms of shopping experience, information, trust and security concerns. Standard considerations of demand-side substitution are therefore relevant. These considerations apply potentially not only

to online and offline channels, but also to different online channels (e.g. access via mobile versus desktop), where service aspects such as the ability to offer location-based services for instance, might be significantly different. Equally important is the question whether suppliers using one channel can quickly and easily expand into the other (i.e. whether there is supply-side substitution).¹³⁰ The trend towards omni-channel retailing strategies suggests that – at least for some customers – the different channels may be complementary as they use both when making a purchase (e.g. inspecting products in store but then ordering online, or using online channels to gather product information and compare prices but then buy in store).

*Evidence of
online/offline
substitutability*

Empirical studies on the extent to which online and offline channels are substitutable and compete with each other have mostly been carried out in the US. Evidence to support the view that the channels occupy the same product market has been found in retail industries for various products, including clothing, books, diapers, computer equipment and cigarettes (for a brief overview see Goldfarb and Tucker, 2010). In such markets there may be particular reasons why consumers consider shopping online as an alternative to shopping in a brick-and-mortar store. Buyers may benefit from a much wider choice of books and clothing by shopping online, rather than in their local store; or they might stand to save money if they find relatively low prices online for computer equipment (a relatively expensive purchase), or for cigarettes or diapers (repeat purchases).

On the other hand, consumers may be more likely to differentiate between online and offline shopping where there are significant advantages to shopping offline (e.g. personal advice provided to match a product to an individual, as in the supply of skincare or make up, or the ability to examine physical product quality, or the ability to buy from a well-known, trusted retailer). What matters for competition in these cases is the extent to which online retailers can make up for not being able to match these non-price aspects. For instance, Luxola, an online provider of beauty products in Singapore is aiming to build its reputation as a reputable provider of authentic beauty products by working directly with international brands and authorised distributors. It also seeks approval from the Health Science Authority in Singapore on all of its products to ensure that all their products are authentic.

¹³⁰In general, any such extensions of supply should be carried out within a relatively short time frame (within a year as a general rule though this would depend on market characteristics) without substantial sunk cost involved. Reconfiguration of supply in the longer term should be considered under the context of new entry rather than as supply side substitution under the heading of market definition.

*The impact of
increased product
variety*

As discussed above, e-commerce can support a greater variety of products and allow suppliers to create new services that might plug gaps in the chain of substitution. As a simple example, Laundry Box's service and price range may place the offer somewhere in the middle of self-service laundrettes and premium laundry services. Whilst users of self-service laundrettes might not consider premium laundry services as a sufficiently close substitute to give rise to a competitive constraint (and vice versa), there might be a sufficient number of customers in either segment that consider Laundry Box's service as a substitute. The new service may then connect the formerly separate markets.

At the same time, the greater choice available from online retailers may make them less susceptible to offline competition. Brynjolfsson et al (2009) present empirical evidence based on industry data for women's clothing showing that brick-and-mortar stores are better placed to compete with online sellers when selling mainstream products, but online sellers are "*virtually immune*" from offline competition when selling niche products. This result may simply reflect that certain niche products may not be available in many brick-and-mortar stores, such that there are high search costs offline that are vastly reduced when shopping online.

*Implications of
price
discrimination*

Last but not least, while e-commerce may well widen the scope of markets, the extent to which it leads to price discrimination could have the effect of segmenting markets. With price discrimination, the presence of a sufficiently large group of customers who would be prepared to switch to another product is no longer effective in protecting infra-marginal customers from facing increases in prices, and the notion of a single 'market price' on the basis of which a market definition exercise would be undertaken may no longer be appropriate. We will discuss the implications of this for competition policy in the next section.

In summary, the extent to which offline and online channels are substitutes is likely to depend on specific market conditions, and can be expected to change as retail strategies develop. For example, the French Competition Authority (the Autorité de la Concurrence, ADC) found in its opinion on competition in electronic commerce that online channels increasingly exert competitive pressure on offline channels as a growing number of consumers use the two channels interchangeably, but that it does not currently see the two channels

as “systematically” occupying the same market.¹³¹ However, the ADC recognises that this will vary from one market to another, and that the two channels are likely to become more interchangeable over time (Autorité de la Concurrence, 2012).

The trend towards omni-channel retailing would support the idea that, increasingly, different sales channels lie in the same product market. Remarks made by the UK CMA’s Inquiry Chair Philip Marsden in a personal capacity are in line with this view: “[t]o consumers, online and offline aren’t really separate. Many shopping journeys do take place purely along one of those channels; but increasingly the line is blurring. [...] To the consumer then, online and offline options are merging; and firms are experiencing this too, moving towards providing service in both channels to meet growing customer expectation”.¹³²

3.2.2 Geographic market

E-commerce can expand geographic market boundaries

Where product markets include both offline and online channels, the adoption of e-commerce has the potential to expand the geographic scope of a market. Similarly, where offline and online product markets are deemed separate, the online market may be wider geographically. This is because the cost for consumers to visit a website is independent of its geographic location, which is not the case for brick-and-mortar stores. Distribution costs and other barriers to trade of course still matter, but efficiency savings in distribution (such as drop-shipping) would seem to have increased the geographic area from which supplies of a particular product can feasibly be obtained. Cheaper and faster shipping clearly reduces barriers associated with buying from retailers located further away. For digital goods and services that can be delivered electronically the effect is likely to be even more pronounced.

¹³¹ This is because in the ADC’s view the majority of consumers remains attached to one of the two channels and does not view them as close substitutes, e.g. because of in-store services and advice provided in store that are not available when shopping online. It is of course well understood that two products need not be substitutable for all customers in order to compete with each other and be included in the same market. What matters is the size of the group of customers who would be prepared to switch between the two channels (marginal customers) compared to the group of customers who do not consider the two channels to be substitutable (infra-marginal customers), and the extent to which suppliers can discriminate between the two types of customers.

¹³² Philip Marsden, 10th September 2014, *Speech at the 11th Baltic Competition Conference*: <https://www.gov.uk/government/speeches/philip-marsden-speaks-about-competition-enforcement-in-online-markets>

In some cases, changes in the relevant geographical market and the relevant product market may be closely interlinked as the example of online grocery supplies shows.

The impact of e-commerce on market definition in the groceries sector

Investigations of the grocery sector by competition authorities around the world traditionally distinguished between supermarkets that offered a wide range of products (typically in excess of 10,000) that act as a 'one-stop shop' for consumers, and convenience stores that are typically considered as part of a separate market (Competition Commission UK, 2008). Relevant geographic markets for groceries were often deemed to be local – typically defined as drive times of five to fifteen minutes between stores.

Home delivery of groceries bought online may widen the relevant geographic market as a greater choice of suppliers is available to consumers. Indeed, in the UK, the Competition Commission (CC)'s investigation of the groceries market in 2008 noted that a future expansion of online grocery retailing – which has since been observed to some degree – might alter the assessment of the relevant geographic market (Competition Commission UK, 2008).

At the same time, online grocery suppliers, being able to offer a wide range of products, may compete with both supermarkets and local convenience stores. Pozzi (2011) provides some empirical evidence supporting the existence of such an effect in the US. Pozzi notes that large supermarkets are usually located in suburban areas, which "leaves smaller retailers a chance of shielding themselves from competition by locating more conveniently". However, a strong take-up of online grocery shopping has the potential to erode the importance of location and consequently to blur the relevant product market differentiation between one-stop-shopping in supermarkets and shopping in geographically close convenience stores. The empirical results indicate that the introduction of online grocery availability in a particular area by large click-and-mortar chains is associated with a reduction in the number of small stores and to market consolidation.

Singapore's small geographic size and high density of shops means that this effect might be less pronounced, but market structure may nonetheless change with increasing take up of online grocery shopping. See Annex A.1 for more details.

Traditional geographic barriers may still have an impact

The most obvious remaining limits to the geographic expansion of markets are likely to be traditional barriers to cross-border trades such as selective distribution agreements in particular geographic regions, any differences in the applicable law that may create contractual risks, and the costs associated with cross-border payments, currency movements or import duties. Therefore, geographic expansion is likely to be more limited where delivery costs or transaction costs (e.g. in the form of currency exchange fees) are high as a proportion of the value of the product. Even in markets where delivery costs are very low, such as markets for audio/visual content in digital form, there may be other barriers to geographic expansion, such as legal restrictions related to intellectual property rights.

The Australian Competition and Consumer Commission (ACCC), for example, notes that, while e-commerce is "breaking down the traditional boundaries within which competition occurs and increasingly exposing Australian manufacturers and retailers to

competition from overseas online suppliers”, in some instances “trade restrictions and control of intellectual property rights may support suppliers’ ability to segment geographic markets and practice international price discrimination”, such as in the case of digitally delivered audio-visual content (Australia submission, OECD, 2013).

There may also be concerns about firms engaging in practices that are aimed at geographic market segmentation by limiting the extent of cross-border trading. The launch of a sector inquiry by the European Commission in May 2015, aiming to address contractual arrangements and technical practices which limit cross-border transactions¹³³, is an expression of these concerns, though clearly this also relates to the political ideal of a single European market which is specific to that jurisdiction.

Overall, there is consensus in the academic literature and among competition authorities that e-commerce has widened geographic markets, though it is equally clear that there will often be limits to this trend because of market-specific characteristics:

- Lendle et al (2012) present empirical evidence of expanding geographic boundaries and of residual barriers, based on analysis of cross-border eBay transactions. They find that distance still matters in the online channel, but significantly less so than offline. For eBay ‘Powersellers’ (with a high volume of positive reviews), distance matters significantly less, suggesting that geographic market boundaries can be widened more easily when there are mechanisms for sellers to establish a good reputation and overcome trust barriers.
- Blum and Goldfarb (2006) find evidence that geographical distance across countries is still a barrier to trade for ‘taste-dependent’ products such as music and games, where nearby countries may share similar tastes, whereas distance does not matter for less taste-dependent products such as software or financial information.
- In a similar vein, Martens (2013) argues that significant barriers exist within the EU where there are significant linguistic and cultural differences between countries.
- The evidence of geographic price differentiation found by Mikians et al (2012) suggests that local competitive conditions may still have a large impact on prices.

As in the case of product market definition, there is therefore no general rule that would suggest that geographic markets have become wider in all cases. Cultural and other trade barriers may be

¹³³ EC, 6th May 2015, *Commission launches e-commerce sector inquiry*. Press release: http://europa.eu/rapid/press-release_IP-15-4921_en.htm

less relevant for Singapore than for many other countries given Singapore's tradition as a trading hub and its small geographic size. Indeed, as we have noted above, according to SP eCommerce (2014), 40% of e-commerce transactions in Singapore are cross-border, with foreign websites accounting for 60% of the online sales.

3.3 The impact of e-commerce on market structure and competition

This sub-section discusses the impact of e-commerce on the nature of competition and the possible effects on market structure.

Where e-commerce lowers search costs and increases the efficiency of supply chains, it may be expected to enhance competition as the market moves closer to a frictionless ideal. However, firms may be able to respond in ways that soften competition and limit the extent to which these potential benefits can be realised.

Network effects, present in some markets where e-commerce activity takes place predominantly over third party platforms, have particular implications for competition and market structure, as they might result in tipping effects that result in very asymmetric market shares. Nevertheless, market-specific factors can mitigate the influence of network effects.

3.3.1 Impact on price competition

In theory, the lowering of search costs, in combination with cost savings through improvements in the supply chain, can have significant pro-competitive effects.¹³⁴

Online competition may knock out less efficient brick-and-mortar firms

Where online channels compete effectively with offline channels, cost savings from a streamlined supply chain should be passed on to consumers. If the emphasis is on price competition, less-efficient brick-and-mortar firms may be forced out of the market. Goldmanis et al (2010) examine the impact of e-commerce adoption on market structure in three retail industries where search costs are thought to have been reduced by e-commerce – namely travel agencies, bookstores and new car dealers. In all three markets they find that growth in online shopping is associated with a reduction in the

¹³⁴ It is worth noting, however, that more intense price competition may not always be desirable if it comes at a cost of reduced welfare-improving investment made in the longer term (OECD, 2013).

number of small brick-and-mortar stores (which the authors consider likely to be relatively inefficient), such that market shares in the offline channel shift in favour of larger brick-and-mortar stores.

In the case where firms compete on both price and non-price terms, competition between brick-and-mortar and online firms is less clear-cut. Cross-channel competition may be strong if e-commerce firms are able to signal non-price aspects such as product quality, service quality or their reputation as a retailer, or if e-commerce firms have a competitive advantage in offering niche products or innovative services. In this case, firms that are unable to provide a comparable offering (say in terms of quality-adjusted price) may be forced out.

At the same time, prices can be more easily changed online (i.e. online retailers face lower menu costs), which means that price adjustments are likely to be more frequent and smaller in magnitude. This reduces price stickiness (i.e. a reluctance to change posted prices because of the cost of doing so). Cambini et al (2011) report the results of empirical studies that indicate that prices change more frequently online than in the brick-and-mortar world and that price adjustments turn out to be up to 100 times smaller than those of conventional retailers. This may reflect stronger competition amongst online firms, which increases the relative benefit from adjusting prices promptly.

In order to ascertain how prices change with e-commerce, two hypotheses about the impact of e-commerce on price competition have been studied extensively in the literature:

- average prices will fall with the increasing adoption of e-commerce; and
- price dispersion (the variation in prices posted by different sellers for the same item) will fall with the adoption of e-commerce.¹³⁵

E-commerce adoption often lowers average prices...

Though both of these effects can reasonably be expected to vary across markets, the first hypothesis is generally supported by the empirical literature, for example in relation to the price of books, CDs, cars, life insurance and airline tickets (Lieber and Syverson, 2012 and Brynjolfsson and Smith, 2000). Consistent with this, some studies have found a high level of price elasticity for products sold

¹³⁵ Depending on whether online and offline sales are considered (a) separate, or (b) part of the same market, these hypothesis have two possible interpretations: (a) there are higher average prices and higher price dispersion offline than online, or (b) average prices and price dispersion in the overall market are reduced as e-commerce gains traction.

online, e.g. Grandos et al (2012) in relation to airfares, or Ellison and Ellison (2009) in relation to low-quality computer parts.¹³⁶

This effect should not necessarily be expected in all markets, however, as e-commerce is not always associated with low search costs and distribution costs. For example, in the groceries market, pure-play retailers face substantial logistics and distribution challenges related to stock picking and delivery, which brick-and-mortar retailers generally avoid. Consumers may have little scope for online search, if purchasing a large and varied basket of goods, and limited ability to examine product quality online compared to in store (e.g. for fresh produce). Indeed, Cambini et al (2011) reviewed several studies and found that online grocery shoppers are less price-sensitive than offline shoppers (see Annex A.1 for a more in-depth discussion).¹³⁷

...but substantial price dispersion still exists

While prices are often lower in markets where e-commerce should intuitively reduce search and distribution costs, empirical evidence in relation to price dispersion is mixed. In the case of consumer electronics, Baye et al (2006) found that price dispersion for particular products was indeed lower when the number of online sellers was higher. Other studies indicate that e-commerce reduces price dispersion in markets for goods that are relatively expensive or that are bought frequently where a reduction in search costs may be expected to have a large impact. In the case where platforms are able to impose price parity clauses on sellers, this should result in greater uniformity in prices across platforms.

Nevertheless, there is also evidence that price dispersion can be greater online than offline. Overall, price dispersion should not be expected to disappear with the adoption of e-commerce (see Baye et al, 2006, for a comprehensive overview).

The persistence of price dispersion can be explained by a number of factors:

- Buyers may be sensitive to differentiation between sellers (e.g. brand and ancillary services) and non-price attributes such as delivery times, which would explain different prices for slightly different products or services.

¹³⁶ However, Cambini et al (2011) noted that studies in the late nineties found that prices were higher in electronic markets for books, CDs and software (Bailey, 1998) and second-hand cars (Lee, 1998), suggesting that price reductions are less likely to materialise in the early stage of e-commerce adoption.

¹³⁷ The result might indicate that online retailers are not necessarily focused on price competition, but may leverage other advantages (e.g. the convenience of online grocery shopping for a stay-at-home parent).

- A 'digital divide' may cause dispersion between (lower) online prices and (higher) offline prices with a substantial proportion of buyers continuing to purchase at higher prices from brick-and-mortar sellers. This might be because some customers do not have access to the internet, are particularly concerned about security or the reputation of sellers, are wedded to particular shopping habits, or place great value on pre-sales services offered by brick-and-mortar sellers. This would be reinforced by the difference in menu costs and the more frequent (but small) online price adjustments.
- Switching costs may lock buyers to certain online sites (e.g. because of their familiarity with the site's layout and functions, or because they have established a reputation as a reputable buyer who pays on time which cannot be transferred to a different platform). These factors increase a buyer's stickiness to a particular platform, allowing sellers to charge higher prices without losing demand.
- Firms may be able to price discriminate more effectively with the collection of data online.
- Firms may deliberately engage in price obfuscation or differentiation with the aim of dampening price competition.

Firms may adopt strategies to soften online competition

The last of these factors has been explored in more detail, and there appear to be a number of ways in which firms can reduce the amount of search undertaken by customers, reduce its effectiveness or exploit behavioural biases.

In general, the way in which price information is displayed might be used to inhibit search, even when price comparison websites or shopping bots (which automatically gather price information) are available. Providing 'headline' prices that do not include shipping costs or applicable taxes, for example, could be used to undermine the effectiveness of price comparison websites or shopping bots, as customers are typically reluctant to go back and re-start their search once they have started to proceed with a particular purchase.

Einav et al (2011) and the studies cited therein (Tyan, 2005; Hossain and Morgan, 2006; and Brown et al, 2010) find evidence that buyers on eBay do not fully internalise the cost of shipping. Sellers might exploit this by setting low headline prices for the products and charging inflated shipping costs.

A similar tactic is 'drip' or component pricing, where parts of the total price that is ultimately charged to buyers are revealed only late in the shopping process, through the introduction of additional mandatory or optional components. Competition authorities have taken an interest in such practices, particularly in the context of airline pricing. The UK OFT found that this pricing practice had the potential to mislead consumers and reduce the amount of searching, which would in turn weaken the pro-competitive effects associated with reduced cost of online searches (see OECD, 2014b, and OFT,

2010b). In response, airlines changed their practices, for example by removing surcharges for debit card payments and improving transparency on their websites (OFT, 2012). The ACCC noted that although it has achieved some positive changes for example by requiring that advertised fares include all mandatory surcharges, it *"remains concerned that some airlines are using drip pricing practices to mislead consumers and distort competition"* and it continues to seek to improve compliance in this area as a matter of priority (OECD, 2014a).

Drip pricing may have harmful effects because it:

- directly increases search costs as the prices of some components are only revealed once the customer has initiated a purchase process, and trying to compare full prices would require additional time.
- reduces the amount of search undertaken, by exploiting the manner in which buyers go about their decision-making processes. Specifically, buyers may be attracted initially by low prices and then discouraged from further search (OECD, 2014b).
- can create additional complexity, e.g. if some optional components are automatically pre-selected, which some consumers might not realise (OECD, 2014a).

Ellison and Ellison (2009) use data on online sales of computer parts sold by several similar small retailers, who relied on price comparison sites for traffic. The study tests the hypothesis that firms attract traffic by posting very low prices for low-quality goods, which then achieve a high ranking on the comparison website, and then charge substantial mark-ups for add-ons or upgrades (e.g. full warranty) once users are on their website. In theory, the margin earned on high-quality versions might be competed away by intense price competition on the low-quality product as firms try to attract customers. However, if such price competition attracts predominantly customers with a relatively weak preference for high quality, who are therefore unlikely to upgrade, this effect is diluted. In this case, retailers may deliberately use strategies that are aimed at increasing the propensity to upgrade, e.g. taking a low-cost, high-value feature out of the low-quality version, such that very few consumers would ultimately opt for that version, and making it available in the high-quality version. The study suggests that retailers did follow the latter strategy, exploiting the fact that the comparison website mainly facilitated the comparison of low-quality products and therefore substantial search costs remained in relation to the upgrades or add-ons.

The sale of add-ons was also a concern in the UK CMA's investigation of the private motor insurance sector, where the use of price comparison websites again is widespread. The CMA found that consumers' ability to compare total prices (including add-ons) on the price comparison websites was limited; the informational

Increased transparency can increase the risk of collusion

asymmetry between insurers and consumers with respect to add-ons resulted in a weakening of competition (CMA, 2014).

Another dimension to the price transparency offered by online searches is that it may help firms to sustain collusion as monitoring or matching prices set by competitors becomes easier (Lieber and Syverson, 2012; Varian, 2000). This is a particular concern in relation to online marketplaces that, in addition to offering a variety of products for sale, also provide a one-stop-shop for prices from different retailers to be monitored (for a discussion see CCP, 2007).¹³⁸

Mehra (2015) and Ezrachi and Stucke (2015) note that the likelihood of tacit collusion may be (further) increased by the growing use of 'robo-sellers' – systems that use pricing algorithms in combination with extensive market data to make pricing recommendations or even delegated pricing decisions. Such systems are more likely to use the available information in ways that facilitate tacit coordination. For example, Mehra notes that they may be better at recognising deviations from the tacitly collusive outcome and trigger punishment strategies. This eliminates the upside of deviating from a tacitly collusive outcome as such attempts would be detected with a high probability and very quickly and thus gains would be short-lived. Robo-sellers would be less tempted than their human counterparts by short-run gains. Mehra (2015) and Ezrachi and Stucke (2015) also note that exchange of information between robo-sellers might not be captured by US antitrust law as explicit co-ordination requires an agreement and intent – concepts which may not easily be applicable to software systems to which pricing decisions may be delegated.

These concerns may be strongest where the focus of competition is on price. Where online firms compete to a sufficient extent on non-price aspects such as quality and reputation, price transparency should raise fewer collusion concerns. Online collusion appears not to have been a key concern for competition authorities in the past. However, the prosecution of an art seller on Amazon Marketplace who used pricing algorithms to co-ordinate prices with other art sellers by the US DOJ in April 2015¹³⁹ and the investigation by the

¹³⁸ This potential adverse effect might be amplified where one platform is used by the majority of buyers and sellers and where the platform uses price parity (or most favoured nation) agreements that prevent participating sellers from offering lower prices elsewhere. These agreements are discussed later in the context of vertical restraints.

¹³⁹ Department of Justice, 6th April 2015, *Former e-commerce executive charged with price fixing in the antitrust division's first online marketplace prosecution*: <http://www.justice.gov/opa/pr/former-e-commerce-executive-charged-price-fixing-antitrust-divisions-first-online-marketplace>

UK Gas and Electricity Markets regulator (Ofgem) launched in June 2015 on potential price fixing by energy price comparison websites indicate that this may be changing¹⁴⁰.

3.3.2 Platforms, network effects and market structure

In general, the effect of e-commerce on entry barriers is ambiguous

A common perception is that online trading favours larger firms, because "*network externalities [may make it] harder for new firms to enter electronic markets and thus e-markets tend to be more concentrated*" (OECD, 2013). At the same time, for a small competitor the cost of creating and maintaining a website can be significantly lower than what would have to be invested in order to establish a presence in the brick-and-mortar world. Even so, these investments (in website design, the creation or integration of payment and inventory systems, and advertising to address informational asymmetries) are sunk, and may constitute significant barriers to entry.

For businesses that require delivery of goods to buyers, investing in an end-to-end logistics network and warehouse space are major investments. For instance, in the case of B2C marketplaces in China, JD.com, whose business model is based on buying goods from manufacturers and distributors directly and selling on to consumers, has invested US\$1.5 billion into building and leasing warehouse and logistics for order fulfilment. JD.com started to build an integrated logistics network in 2007 and is unlikely to break-even before 2017.¹⁴¹

On the other hand, entry cost can be substantially reduced through the use of platforms that provide a readily usable framework for allowing buyers and sellers to interact. B2C marketplaces such as eBay, give small and large sellers alike exposure to a vast group of potential buyers without the need for these individual firms to create their own independent websites or to advertise. Alibaba founder Jack Ma claims that "*[o]ur proposition is simple: we want to help small businesses grow by solving their problems through Internet technology*". Marketplaces also facilitate entry of small retailers by providing them with the necessary infrastructure to launch e-commerce activities (including payment processing, customer

¹⁴⁰ Western Morning News, 4th June 2015, *Comparison website Moneysupermarket.com gives data to Ofgem probe*: <http://www.westernmorningnews.co.uk/Comparison-website-Moneysupermarket-com-gives/story-26636397-detail/story.html>

¹⁴¹ The Straits Times, 28th January 2015, *China's retail goliath JD.com delivers the goods – with costly strategy*: <http://www.straitstimes.com/st/print/3377148>

service, fraud protection and branding to boost buyer confidence; see Annex A.3 for more detail).

Once in the market and having established a sizable user base, e-commerce players might face lower barriers to expansion compared with brick-and-mortar businesses. As Alibaba's Jack Ma, talking about Alibaba's global expansion plans, explained to a Walmart executive, "[i]f you want to have 10,000 new customers, you have to build a new warehouse, this and that. For me, two servers".¹⁴²

E-commerce markets exhibit network effects, favouring larger platforms

However, as noted above, network effects (or externalities) can affect platforms such as Amazon because sellers benefit from an increase in the number of potential customers, and buyers benefit from the increase in the range of sellers. As a result, large e-commerce platforms may deliver significantly greater value to users than smaller competitors. The services provided by online platforms may also improve with increasing use of the platform, making it more difficult for rival platforms to compete. This could lead to markets tipping in favour of a small number of firms, or even a single dominant platform. Haucap and Heimeshoff (2013) note that a highly concentrated market structure is common amongst internet platforms – the likes of Facebook, Google and YouTube arguably dominate their relevant markets, leaving room for only a thin competitive fringe.

Whilst platforms may facilitate small-scale entry, it may become more difficult to trade outside of a platform once it becomes widely used, or to establish a competing one. With strong network effects, new entrants would have to establish a critical mass of users on both sides to compete effectively with the incumbent. This may be difficult, if not impossible, even where the new entrant deploys better technology or is more efficient than the incumbent. Thus, while e-commerce platforms may play an important role in facilitating competition amongst their users, they may raise competition concerns of their own.

Firms might therefore compete 'for the market' and their behaviour at that stage can have long-lasting effects

For markets with network effects (in particular in cases where a leading firm has not yet been established), competition may be *for* the market rather than taking place within the market and firms may have incentives to engage in penetration pricing strategies or attempt to use exclusive dealing arrangements in order to drive competitors from the market.

During the period in which firms compete vigorously for expansion, genuine competitive behaviour may be difficult to distinguish from

¹⁴² The Straits Times, 24th Jan 2015, *Founder Jack Ma wants Alibaba to serve 2 billion clients*: <http://www.straitstimes.com/the-big-story/asia-report/china/story/founder-jack-ma-wants-chinas-alibaba-serve-2-billion-clients-2>

predatory or exclusionary anti-competitive behaviour (CRA, 2002). As network effects might eventually reward the 'winning' firm with a large and durable market share, it is possible that early anti-competitive behaviour that has the effect of shaping market structure could have long-term consequences (Frontier Economics, 2000). Therefore, it is important to monitor developments in such markets even before an obvious competition issue has developed, though detecting, investigating and judging anti-competitive behaviour could be challenging at the infant stages of market development.

B2C marketplaces in Singapore

In Singapore, the websites most used for online shopping include several B2C marketplaces. Amazon, Qoo10 and eBay are currently the most popular and appear to have similar shares of website visits (UBS, 2014). In terms of online retail sales, Amazon, eBay and Rakuten feature in the top ten online retailers in Singapore in 2013.

New marketplaces catering specifically for the region have entered in the past couple of years – Rakuten's Singaporean website opened in January 2014, Taobao launched its South East Asian site in September 2014 and Lazada launched its .sg site in May 2014. Rakuten, Qoo10 and Taobao all host a significant number of foreign sellers from Japan, South Korea and China respectively, who are seeking to supply consumers in Singapore as well as the rest of South East Asia (SEA). These platforms often see Singapore as a test bed location for expanding operations to the rest of SEA.

There are also a number of local marketplaces such as ShopAbout and Omigo, which are used mainly by local retailers. More specifically, ShopAbout works mainly with local brick-and-mortar retailers who wish to establish an online presence.

The international marketplaces offer a much wider range of products and lower prices compared with local marketplaces. This is likely to reflect the significantly larger number of sellers on these platforms, with sellers being 'higher up' the supply chain so that their prices include fewer mark-ups by distributors. In addition, many of the local click-and-mortar retailers may be concerned about undercutting the prices they charge in their brick-and-mortar business.¹⁴³ Whilst local retailers trading on online marketplaces may not necessarily be as price-competitive as their foreign counterparts, they tend to offer better ancillary services, such as local warranties on consumer electronics, repair services or the option to pick up an order in store. Purchasing from local retailers also offers consumers greater certainty that the product will be suited for local use, for instance with regard to electrical appliances.

Many of the retailers, including the major department stores in Singapore such as Robinsons, Tangs and Isetan, are currently looking at launching their own e-commerce site or improving their existing e-commerce offering, which means that online sellers using B2C marketplaces may face additional competition from direct online retail channels going forward.¹⁴⁴

The presence of multiple online marketplaces and volume of new entry in Singapore

¹⁴³ These views were expressed by industry players in our interviews.

¹⁴⁴ Today, 21st March 2015, *Trouble ahead for stores as e-shopping bug bites*: <http://www.todayonline.com/singapore/trouble-ahead-stores-e-shopping-bug-bites>

suggest that concerns about market tipping could be premature. Multi-homing is common for both buyers and sellers, and competition is fierce.¹⁴⁵ Rather, given network effects, platforms may compete fiercely to acquire users through the use of penetration pricing strategies or offering inducements to sellers in order to attract traffic. However, when commission rates charged to sellers are below costs, other marketplaces that are no less efficient may be forced out of the market, to the detriment of competition in the longer term. See Annex A.3 for more details.

Market-specific factors can still enable entry and expansion

The extent to which network effects give rise to market power depends on various market-specific factors that can have a countervailing effect, such as the ability to multi-home, the heterogeneity of user preferences and the scope for innovation. The rapid decline in the market share of social network MySpace and the growth of Facebook and Twitter may be seen as an example of this (Levin, 2010), though it is far from clear that Facebook would be similarly vulnerable given its current position. The rapid rate at which WhatsApp, founded in 2009, expanded its global user base is another relevant example. Various messaging services were already in existence, but where multi-homing of customers on either side of a platform is an option, innovative new entrants may be able to challenge the incumbent(s) and multiple platforms may co-exist.

Similarly, where consumer preferences are heterogeneous, platforms may offer differentiated services. For example, the existence of network effects has not necessarily led to the establishment of dominant players over a sustained period of time in the case of online real estate agents, online travel intermediaries or dating websites, showing how factors such as platform differentiation and multi-homing may mitigate the effect of network externalities on market concentration.

Other countervailing effects may be the presence of capacity constraints or the negative externalities generated on one side of the market. For example, whilst sellers may prefer platforms with a larger number of potential customers, they might be discouraged from joining a platform where too many other competitors limit their ability to stand out with a distinct offering.

Vertical integration may affect competition

Vertical integration of online retailers along the e-commerce supply chain might also affect competition. For instance, more and more online B2C marketplaces such as Lazada and Rakuten are looking to develop their own in-house logistics networks rather than relying on traditional logistics providers. At the same time, logistics firms such as SingPost are launching their own B2C marketplaces. This might simply reflect the efficiency benefits of a tight integration of platforms and the providers of ancillary services required by the

¹⁴⁵ This was the view expressed by industry players in our interviews.

platform's users which might not be achievable through contractual arrangements. This would suggest that competition takes place between vertically integrated providers on the one hand, and suppliers covering individual stages of the value chain on the other, which means that attention might need to be given to potential leveraging strategies.

Platforms may be able to leverage market power into new areas

A separate competition concern arises where a platform that has attained significant market power may try to leverage this into adjacent markets, which may create economies of scope. This strategy has been described as 'platform envelopment' by Eisenmann et al (2011), who argue that an established platform can profitably enter a new platform market even without high efficiency or innovation, by "*leveraging shared user relationships and common components in a multi-platform bundle*". Similarly, at OECD hearings on the subject of the digital economy, there was an emerging view that "*[b]undled product offerings are common in digital markets that are already subject to network effects, which raises barriers to entry further, although these markets remain competitive for now*" (OECD, 2012).

Related competition concerns have been raised in one of the most high-profile competition cases in the digital economy, namely Google's involvement in many online markets in connection with its dominance in the market for online search.¹⁴⁶ Picker (2008) observes that Google's business model, based largely on advertising revenue, "*has no obvious boundaries. The limit seems to be the content or services that can be supported by advertising and might be as large as anything mediated by a display screen*". Eisenmann et al (2011) also consider Google as a key example of platform

¹⁴⁶ See the EC's investigation into Google's search practice (http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=1_39740) as well as the EU Parliament's vote in 2014 for structural separation of Google's search engine from the rest of its business (BBC, 27th November 2014, *Google should be broken up, say European MPs*: <http://www.bbc.co.uk/news/technology-30228279>). In the US, the FTC conducted a 20-month investigation on Google's search engine practices between 2011 and 2013, with Google making voluntary commitments to alter some business practices (FTC, 3rd January 2013, *Google Agrees to Change Its Business Practices to Resolve FTC Competition Concerns In the Markets for Devices Like Smart Phones, Games and Tablets, and in Online Search*: <https://www.ftc.gov/news-events/press-releases/2013/01/google-agrees-change-its-business-practices-resolve-ftc>). A subsequent investigation on Google's display-ad business was launched just months later (The Wall Street Journal, 24th May 2013, *FTC Begins Probe of Google's Display-Ad Business*: <http://www.wsj.com/articles/SB10001424127887323975004578501730525128870>). In March 2015, US Senator Mike Lee was reported to be launching an inquiry into a series of meetings between Google and government officials that took place during the FTC investigation (The Wall Street Journal, 30th March 2015, *Key Senator to Take Closer Look at FTC-Google Meetings*: <http://www.wsj.com/articles/key-senator-to-take-closer-look-at-ftc-google-meetings-1427737873>).

envelopment strategies: “Google has entered many platform markets by linking new products to its search platform, including online payment services (Google Checkout), productivity software (Google Docs), web browser software (Chrome), and mobile phone operating systems (Android)”.

3.3.3 Effects of online data collection and use

In Section 3.1.2 we discussed the role that consumer data can play for firms, for instance in enabling targeted advertising and providing a personalised customer experiences.

Data could be a source of competitive advantage...

It has been argued that being able to make use of large volumes of detailed customer data may in some cases give rise to a competitive advantage and potentially market power. For example, in relation to the motor insurance market, it has been claimed that “[c]ompanies with access only to smaller data pools, or those that have inferior analysis techniques, will increasingly find themselves at a disadvantage”.¹⁴⁷ Data might also work to reinforce market power – in relation to the market for online search, Haucap and Heimeshoff (2013) argue that “the wealth of its historic search data gives Google still a major advantage for further improving its search algorithm”. Data concentration was considered by the European Commission in its investigation of the merger between WhatsApp and Facebook, though the type of data held by WhatsApp was not deemed to be sufficiently valuable for Facebook’s purposes to cause concerns.¹⁴⁸

While buyer data may be more valuable in some markets than others, in general an understanding of buyer preferences and responses to particular offers and incentives clearly gives established firms an advantage, but the key question is to what extent this protects them from competition from newcomers.

In some industries, the use of pricing algorithms or robo-sellers can increase the extent to which information about customers and market conditions can feed into pricing. Mehra (2015) notes that Uber’s pricing algorithm increased prices by six to seven times on New Year’s Eve, and airlines increase fares to Colorado ski destinations based on availability of snow. Having access to larger

¹⁴⁷ Financial Times, 1st February 2015, *Democratising finance: Big data homes in on insurance*: <http://www.ft.com/cms/s/0/0e19375c-a316-11e4-9c06-00144feab7de.html>

¹⁴⁸ European Commission, 3rd October 2014, *Case No COMP/M.7217 – FACEBOOK/WHATSAPP. REGULATION (EC) No 139/2004*: http://ec.europa.eu/competition/mergers/cases/decisions/m7217_20141003_203103962132_EN.pdf

amounts of data may allow robo-sellers to gain a better understanding of market conditions and more effectively set prices that maximise profits taking account of specific conditions at the time.

...but some benefits could be available to many firms

On the other hand, some commentators argue that these fears are overstated; for example, Lerner (2014) recognises that “*the collection of user data is generally valuable for online providers*”, but argues that it is not a fundamental driver of competitive success in most cases, and that many types of data are accessible through various sources on a non-exclusive basis, since data is fundamentally non-rivalrous (use of data by a firm does not diminish availability of data to other users). Indeed, data brokers are playing an increasingly important role in many markets, enabling firms to improve the efficiency of their marketing, consumer insight and fraud detection processes. One view holds that the widespread availability of data and so-called “*big data analytics*” is actually “*levelling the playing field between online retailers and brick-and-mortar stores*”.¹⁴⁹

The US FTC examined the role of data brokers in 2014. It did not highlight any competition concerns, however, it found that consumers lacked awareness of their data being collected and traded, leading the FTC to call for greater transparency and accountability (FTC, 2014). If these concerns eventually limit the dissemination of customer data, this might create stronger asymmetries between new entrants and incumbent firms who can draw on data collected from their customers.

3.4 Vertical restraints

Vertical restraints are agreements between firms at different levels of the supply chain (i.e. between upstream and downstream firms) that specify terms under which the parties may purchase, sell or resell certain goods or services.¹⁵⁰ Such agreements have been relatively prevalent in e-commerce markets and have been the subject of scrutiny in various cases. This sub-section examines the possible rationales behind such agreements and their implications for competition.

¹⁴⁹ Renee Boucher Ferguson, 26th August 2013, *Omnichannel Retailing and Data Analytics: Leveling the Playing Field*: <http://sloanreview.mit.edu/article/omnichannel-retailing-and-data-analytics-leveling-the-playing-field/>

¹⁵⁰ This is a similar definition to that in the European Commission’s Guidelines on Vertical Restraints.

*Vertical restraints
can promote
efficiency*

Vertical restraints may have a positive economic impact by addressing inefficiencies that might otherwise result from vertical externalities. For example:

- Vertical restraints may address concerns about the under-provision of ancillary services that might otherwise result from free riding. Distributors may have an incentive to free ride on pre-sales services (such as advice and demonstration) offered by others through cutting back on such services and then undercutting their competitors. Upstream firms may use exclusive distribution agreements or minimum requirements on distributors to avoid such an undesirable outcome.
- Similarly, an upstream firm may be interested in ensuring that its distributors invest in the quality of their store or website because such investment may be essential for establishing or maintaining brand value.¹⁵¹ Again, vertical restraints may be needed in order to ensure that such investment takes place.
- There may be concerns about 'double marginalisation' – the application of a mark-up by the downstream firm that results in an inefficiently high retail price suppressing demand and harming the upstream firm.

Various types of vertical agreements potentially address these inefficiencies by internalising the externalities. These include nonlinear price contracts, selective or exclusive distribution, most favoured nation clauses and franchising or branding agreements.

*Vertical restraints
may harm
competition*

However, such agreements can also have anti-competitive effects. They often restrict downstream competition in some dimension in order to create the right incentives for investment. Vertical restraints might make entry more difficult at all levels of the supply chain, for example where exclusive dealing between incumbent firms limits a potential entrant's access to distributors. They might facilitate collusion, for example through ensuring a stable relationship between wholesale and retail prices, which are more easily observed than wholesale prices.

¹⁵¹ Conversely, a lack of investment by retailers might decrease demand by undermining the value of a brand, an argument that has often been made in the context of vertical restraints on the sale of luxury brands.

3.4.1 Vertical restraints on online sales

Use of vertical restraints in e-commerce markets has been relatively common and the topic has received considerable attention (see e.g. UK and Canada submissions, OECD, 2013). One of the main topics is the use of vertical restraints to restrict online sales. Manufacturers could use vertical restraints specifically to limit the ability of online retailers to compete with brick-and-mortar retailers e.g. by charging higher wholesale prices to online retailers, or by banning online sales outright. In specific cases, it may be that incumbent brick-and-mortar retailers hold sufficient bargaining power, either individually or collectively, to induce a manufacturer to impose such restraints. Nevertheless, there may be valid efficiency arguments to support the use of vertical restraints on online sales. *“Whether such limitations are generally pro- or anti-competitive was a hotly contested issue”* at a OECD Roundtable in 2013 (OECD, 2013).

The argument for vertical restraints on online sales

In support of such restraints one may argue that online retailers are especially likely to free ride on investments made by their brick-and-mortar competitors in providing ancillary services (e.g. sales advice or product demonstrations) and that in some cases they may simply not be able to provide certain services that are available in retail stores and that the manufacturer considers important. Vertical restraints on online sales might then be necessary to ensure that brick-and-mortar firms can continue to offer such services to those consumers that wish to make use of them.

It is, however, far from clear that free riding by online retailers occurs to a substantial extent in practice. The effect largely will depend on the importance of in-store services in a particular market and whether any claims that similar services cannot be provided online are substantiated. Notably there are also indications that customers often use e-commerce sites in order to learn about products, gather information and read reviews, before eventually making a purchase in store. Therefore, a countervailing free riding effect can also occur and offline sellers might benefit from the stimulation of demand and the development of innovative services flowing from the growth of e-commerce.

Vertical restraints may cause harm by impeding e-commerce adoption

Vertical restraints could be harmful when restricting online sales. In general, firms using such agreements may not take into account the full extent of economic benefits that might be realised by a faster and fuller adoption of e-commerce. Germany’s Federal Cartel Office, Bundeskartellamt, has been a proponent of this view, arguing that *“some vertical restraints imposed on internet sales have the clear aim to delay or soften the dynamic changes to the supply chains*

induced by the internet” and that “*intervention may be necessary to protect the dynamism and the new opportunities of the digital economy*” (German submission, OECD, 2013).¹⁵² The German authority has also examined restrictions on online sales of household products, garden equipment and sportswear, and in several cases imposed fines on manufacturers and/or required their restrictive practices to cease.¹⁵³

Vertical restraints on online sales might also restrict or delay the development of innovative services. Norway’s Competition Authority for example has expressed concern that vertical restraints in the market for books might have favoured incumbent publishers and inhibited the development of new e-book products and platforms. Similarly, Canada’s Competition Bureau has challenged the behaviour of TREB, a real estate board that used rules that prevented innovative and new online uses of its database.

3.4.2 E-commerce platforms and vertical restraints

Two-sided platforms may use ‘most favoured nation’ clauses (MFNs)

As a separate issue from restraints on online sales, the use of vertical restraints by multi-sided online platforms has been a particular area of concern for some competition authorities. The reason is that many platforms (such as price comparison websites) have required its participating sellers to commit to not offer lower prices on any other website. These price parity agreements or most favoured nation clauses (‘MFNs’) raise concerns that are similar to those arising from other price agreements, such as resale price maintenance (RPM), which are almost always illegal in the EU, or best-price guarantees, because they may soften competition or facilitate collusion. The ACCC has noted that the use of MFNs seem to be particularly prevalent among online travel agencies (Australian submission, OECD, 2013), and the use of MFNs by hotel booking platforms, for example, has been widely scrutinised by competition authorities, for example in the UK, France, Austria, Sweden, Italy and

¹⁵² In a specific case in Germany a retailer had published online prices for hearing aids that undercut other retailers, who then complained to the manufacturer. The manufacturer subsequently refused to supply to the price-cutting retailer and was subsequently fined by the German Federal Cartel Office, who believed that its conduct deliberately eliminated the only source of genuine price competition (Germany submission, OECD 2013).

¹⁵³ Jones Day, May 2014, *European Commission Launches E-Commerce Sector Inquiry*: <http://www.jonesday.com/european-commission-launches-e-commerce-sector-inquiry-05-14-2015/>

Germany.¹⁵⁴ The EU has also launched an investigation in June 2015 on the use of MFNs by Amazon in relation to the distribution of e-books.¹⁵⁵

In particular, 'wide' MFNs which require a service provider to offer a platform trading terms no less favourable than those offered on all other sales channels, including other platforms and direct sales have generally been judged to be anti-competitive. On the other hand, 'narrow' MFNs that only restrict a service provider to offer a platform terms that are no less favourable than those it offers to its own end-customers have been allowed by some competition authorities.

MFNs may strengthen incumbent platforms

MFN clauses raise particular concerns because platforms are often gatekeepers in relation to access to purchasers, and sellers may thus have little choice but to accept these clauses. For example, the UK CMA found that in the private motor insurance (PMI) market each of the four price comparison websites (PCWs) "*appeared to enjoy a significant degree of market power against PMI providers because a proportion of the customers of each PCW did not shop on other PCWs*" (CMA, 2014).

Wide MFNs tend to bring about greater price uniformity in the market, making it more difficult for a new or existing platform to compete and capture market share from the incumbent(s), even if it has cost advantages or innovative features.

Moreover, the arrangement may contribute to the platform's incentives to increase the commission fees that it charges to its sellers, which may then be used to fund benefits for buyers in order to entice buyers to use the platform. Under an MFN clause, this will not result in a competitive disadvantage in terms of the price levels offered on the platform. Edelman and Wright (2015) model the effects of such price parity clauses and find that they inflate retail prices, result in over-investment of buyer benefits by the intermediary and excessive use of intermediaries' services by buyers, and lower consumer surplus overall.

These results are not dependent on the intermediary being a monopoly, but arise when there are 'competitive bottlenecks' because sellers can access a certain group of buyers only through the intermediary. Provided that buyers do not multi-home, such

¹⁵⁴ See e.g. EC, 15th December 2014, *Antitrust: Commission announces the launch of market tests in investigations in the online hotel booking sector by the French, Swedish and Italian competition authorities* (http://europa.eu/rapid/press-release_IP-14-2661_en.htm) and CMA, 10th September 2010, *Hotel online booking investigation* (<https://www.gov.uk/cma-cases/hotel-online-booking-sector-investigation>).

¹⁵⁵ EC, 11th June 2015, *Antitrust: Commission opens formal investigation into Amazon's e-book distribution arrangements*: http://europa.eu/rapid/press-release_IP-15-5166_en.htm

intermediaries may thus have a low to moderate market share but possess market power. In fact, the presence of multiple intermediaries may only magnify the distortions highlighted above as price parity clauses prevent price competition and instead drive intermediaries to compete on investments in buyer benefits.

Competition authorities such as the UK OFT and the German Federal Cartel Office have investigated such arrangements by Amazon Marketplace. In response to the investigation by the German competition authority (the Bundeskartellamt), Amazon announced that it would stop using MFNs.¹⁵⁶

In June 2015, the European Commission launched an investigation into Amazon's business practices in Europe that closely resemble the use of MFNs. The European Commission aims to assess whether terms and conditions for publishers, which require sellers to inform Amazon of the different terms offered by competitors and may prohibit sellers from offering better terms to Amazon's competitors, are anti-competitive.¹⁵⁷

Other types of vertical restraints have seen less attention

While MFNs have received a great deal of attention, platforms may also use other types of vertical restraints such as agreements that force sellers to conduct all or a certain percentage of their business through a specific platform, or that discriminate against or exclude particular sellers. For example, in South Korea, Gmarket, an online auction and shopping platform, discouraged sellers from making transactions through rival platform 11st by threatening to exclude them from a Gmarket promotional event (see Annex A.3 for more information).

It is worth noting that Pressey and Ashton (2007) found little evidence of such practices when analysing a sample of B2B e-marketplaces. In particular, there was no evidence of exclusivity or volume agreements. In some cases, platform membership could be restricted on the basis of a firm's credit history or other qualification criteria, but in general this was unlikely to be a concern. It is unclear whether this suggests that the use of vertical restraints has become more prevalent over time, or that such restraints are more likely to be used by B2C marketplaces than in a B2B environment.

¹⁵⁶ Bundeskartellamt, 27th August 2013, *Amazon announces end to price parity*: http://www.bundeskartellamt.de/SharedDocs/Meldung/EN/Pressemitteilungen/2013/27_08_2013_Amazon-Preisparit%C3%A4t.html

¹⁵⁷ EC, 11th June 2015, *Commission opens formal investigation into Amazon's e-book distribution arrangements*. Press release: http://europa.eu/rapid/press-release_IP-15-5166_en.htm

4 Implications of e-commerce for competition policy in Singapore

As we have discussed in the previous section, e-commerce can lower distribution cost and transform supply chains, enable entirely new services, reduce search costs and facilitate personalisation and price discrimination. E-commerce platforms create digital marketplaces with potentially strong network effects. Customer data becomes an increasingly important asset.

In this section, we consider what implications these changes have for competition policy and the way in which it should be applied.

Overall, we find that although the potential competition issues raised by e-commerce do not require any substantively different treatment, some aspects may require particular attention.

Specifically, we consider that:

- the multi-sided nature of e-commerce platforms and the interdependence of demand from distinct customer groups give rise to indirect network effects that need to be taken into account when defining relevant markets, assessing market power, looking at the impact of agreements and considering the counterfactual market developments in merger assessments;
- the ability to gather and process much more detailed information about demand and competitors' behaviour in combination with the use of algorithmic pricing may create specific concerns about tacit co-ordination and may support price discrimination that would have to be considered when defining relevant markets;
- the increasing importance of customer data needs to be factored into the assessment of market power, and may also give rise to competition concerns in relation to conglomerate mergers that are similar to portfolio market power concerns;
- there is a potentially greater need to look at the competition impact of vertical agreements, in particular MFNs, even in the case where none of the parties involved is dominant in its respective market.

We also briefly consider the implications of our findings for the advocacy function performed by the CCS.

4.1 Defining a relevant market

4.1.1 The approach to market definition

The two key issues that have been discussed in the literature and have been considered by competition authorities are whether online and offline sales channels compete with each other and are part of the same market, and the extent to which geographic markets become wider.

The concept of the HMT remains suitable for establishing product and geographic market boundaries

The standard approach to market definition used by the CCS is in principle entirely capable of answering these questions. The conceptual framework of the Hypothetical Monopolist Test (HMT) that considers whether a hypothetical monopolist supplying a particular group of products can profitably sustain a Small but Significant Non-transitory Increase in Price (SSNIP) above the competitive level can be applied without modification:

- If online (offline) retailers providing a particular range of products cannot profitably increase prices above the competitive level because a sufficiently large group of customers would migrate to purchasing offline (online), or offline (online) sellers would commence supply within a reasonably short period (typically less than 12 months), then offline and online channels are part of the same market. On the other hand, if online (offline) retailers can profitably raise prices above the competitive level, then online and offline channels would constitute two separate markets, with click-and-mortar retailers capable of serving both markets.
- Similarly, if domestic firms cannot profitably increase prices above the competitive level because a sufficiently large group of customers would in response purchase from abroad or foreign suppliers would start serving local customers, then the geographic market is wider than national.

One question that might warrant some consideration, however, is the magnitude of the price increase that the hypothetical monopolist would need to be able to sustain. The CCS typically asks whether prices could profitably be raised above the competitive level by 10%, which is a higher threshold than is applied in many other

jurisdictions.¹⁵⁸ Requiring a hypothetical monopolist to be able to sustain a larger price increase tends to result in wider markets.

To test whether e-commerce effectively reduces search costs and sharpens price competition, it might be prudent to err on the side of caution and use a smaller price increment when checking whether offline and online channels are part of the same market and to assess the extent to which geographic markets should be widened.

In practice, the information for a straightforward application of the HMT may not be readily available, and “*defining a market in strict accordance with the test’s assumptions is rarely possible*” (CCS, 2007a). Evidence about the likely level of substitution amongst customers in response to a price change may be drawn from a number of sources, and may need to be complemented with an assessment of patterns of price changes, switching costs and product characteristics.

More data about consumer behaviour should facilitate quantitative analysis

Generally, one should expect that more information about customer behaviour is available in markets where e-commerce is widely used, given that suppliers tend to collect ever more detailed information about their customers and their purchasing behaviour. Where this data is accessible and tractable, it should provide more robust evidence and in principle facilitate quantitative analysis. For example:

- Davis and Garcés (2009) note that a data set that is useful for market definition “*would contain individual level data with actual choices from a list of options that each consumer faced. Ideally, we would have information on all the relevant dimensions of choice: product characteristics, price, and location. Finally, we would want to have the customers’ characteristics that may determine preferences such as age or income or indeed consumer’s location.*” Individual-level data collected by online firms about their customers and their purchasing patterns might facilitate the estimation of individual-level demand equations and their associated substitution patterns. Online data collected by a Price Comparison Website (PCW) over a long period of time and across very many sellers may also make it easier to carry out price correlation exercises often used in market definition with greater accuracy and breadth.

¹⁵⁸ The International Competition Network noted that a 5% increase has been a popular benchmark used for the SSNIP test, though in several jurisdictions including Canada, the UK and the US, authorities note that a higher or lower price increase may be appropriate depending on market conditions (<http://www.internationalcompetitionnetwork.org/uploads/library/doc562.pdf>).

- Similarly, Davis and Garcés (2009) note that “[e]mpirical strategies that have been used to determine the effects of vertical arrangements include regression analysis, particularly fixed-effects regressions, natural experiments, and event studies ... such methods can only potentially help solve identification issues when there are data available on the situation with and without the practice.” The fact that consumer, purchasing and price data is continuously being collected online while agreements are introduced, abandoned, etc. potentially facilitates this kind of analysis.

There are however countervailing concerns related to the complexity of quantitative methods in multi-sided markets: the risk that firms might attempt to obscure matters by providing much data that is of limited relevance, and the general difficulties with making sense of ‘big data’. Indeed, we note that most e-commerce related investigations have in fact stayed away from using quantitative analysis. Therefore, a more qualitative assessment of product characteristics and customer requirements will continue to play a role.

For example, in the SISTIC case the CCS found that online ticket service providers such as Tickets.com considered a physical presence to be important. Even though more and more customers are purchasing tickets online, the majority still collect their tickets at ticket service providers’ physical outlets (CCS, 2010). Therefore, Tickets.com, which does not have the network of physical outlets that SISTIC does, was seen to be unable to offer a comparable service to SISTIC. Similarly, in the Seek Asia/JobStreet merger case, the CCS found a distinct market for online recruitment services (CCS, 2014a). This was because print media were found to have limitations that would prevent job advertisements from acting as a strong and effective constraint, while other offline services (e.g. traditional recruitment agencies) were either poor substitutes for online services or involved higher costs and would therefore not exert a significant competitive constraint on online portals.

Separating general trends from responses to price changes is important

When looking at shifts in demand over time, it is important to distinguish between general trends and competitive interaction. For example, the growing use of online advertising has been accompanied by a decline in offline advertising across many developed economies, and this might seem to indicate substitutability between the two forms of advertising. However, although it is plausible that the pricing of online advertising is partly responsible for this trend and some empirical studies suggest that offline marketing can discipline online marketing (e.g. Goldfarb and Tucker, 2010), the trend might also be explained by the relative increase in the size of online media audiences, with advertising simply following the move of the target audience (Ratliff and Rubinfeld, 2011; Thépot, 2013). Indeed, different media are often

considered complementary by advertisers (Ratliff and Rubinfeld, 2011).

In practice, competition authorities have tended to regard online advertising markets as separate. For example, in the Google/DoubleClick case both the FTC and the European Commission found a separate market for online search advertising, distinct from other forms of online advertising and from advertising in other media, based on different characteristics of the online market (e.g. differences in the scope of potential target audiences, advertising effectiveness and pricing mechanisms).¹⁵⁹ However, others have argued that the Commission did not take into account the potential substitutability and competition constraints (Manne and Wright, 2010 and Thépot, 2013).

Online and offline channels may be substitutable for each other even if there are substantive price differences. For example, in the case of *Ashish Ahuja vs Snapdeal and Scandisk*, the Competition Commission of India (CCI) judged that even though *"in terms of discounts and shopping experience"*, there were substantive differences between the on- and off- line channels, both channels were in the same market in relation to the sale of memory drives, flash drives and memory cards. Specifically, the CCI noted that *"buyers weigh the options available in both markets and decide accordingly. If the price in the online market increase significantly, then the consumer is likely to shift towards the offline market and vice versa. Therefore, the Commission is of the view that these two markets are different channels of distribution of the same product and are not two different relevant markets."*¹⁶⁰

Price
discrimination
might complicate
market definition

One particular issue that might become more relevant in the case of e-commerce markets, however, is the extent to which suppliers can personalise offers and engage in price discrimination. As set out in the CCS market definition guidelines, *"[w]here a hypothetical monopolist is able to charge different prices for captive and non-captive buyers, separate relevant markets could be created"* (CCS, 2007a). Identifying price discrimination and incorporating it into a market definition exercise may in practice often be challenging, and the best approach may vary from case to case. Again, however, there may be greater scope for quantitative analysis drawing on the much richer set of information about customer behaviour and price data that might be available in e-commerce markets.

¹⁵⁹ FTC, *Statement of FTC concerning Google/DoubleClick*:
https://www.ftc.gov/system/files/documents/public_statements/418081/071220goolעדc-commstmt.pdf

¹⁶⁰ Competition Commission of India, *Case No. 17 of 2014, Order*:
<http://www.cci.gov.in/May2011/OrderOfCommission/262/172014.pdf>

4.1.2 Market definition in the case of platforms

Multi-sided platforms such as price comparison websites, B2C or B2B marketplaces or aggregator websites are a common feature in the e-commerce world. Such platforms pose particular challenges because they serve distinct customer groups and are subject to network effects. Establishing the degree of competition between such platforms is potentially much more complex as the impact of these network effects needs to be taken into account.

Many of the most widely used online services (e.g. email, search, video and music streaming) are being offered via multi-sided platforms and are being used predominantly for free by consumers. Where services are offered for free on one side of the platform, any application of a percentage-based SSNIP test is obviously not possible. Markets such as online search and email services may also be considered as having no geographic boundaries.

Focusing on one group of users is in most cases inappropriate

There may be a temptation for competition authorities to focus on the side of the market, where financial transactions take place (e.g. the supply of online advertising space). Doing so may be appropriate under some conditions (see below), but these are not linked to the absence of a price being charged to some customers. It is also important to recognise that there is still potential for consumer harm on the 'free' side of the market, e.g. in terms of reduced choice, less innovation, over-exposure to advertising or the requirement to provide personal information which might be seen as a form of 'currency' that is exchanged for these 'free' services (European Data Protection Supervisor, 2014). The European Data Protection Supervisor has argued that, in the European Commission's investigation of Google/DoubleClick, the search side of the market was effectively disregarded, so that any effects on consumer welfare – including in relation to the merged entity's ability to collect and use consumer data – were not considered.

Whilst some competition authorities (such as the ACCC, New Zealand Commerce Commission (NZCC) or the OFT – now the Competition and Markets Authority) tend to define separate markets for each user group,¹⁶¹ it is generally acknowledged that the focus should be on ensuring that *"the linkages between the two sides, and the complexity of the interrelationships among customer groups, are taken into account. Mechanical market definition exercises that exclude one side usually lead to errors"* (OECD, 2009).

¹⁶¹ For instance, in the case of the merger between Online Travel Agents (OTAs) Expedia and Wotif.com in New Zealand, the NZCC defined the consumer side and the travel service provider side of the markets as two distinct markets (NZCC, 2014).

Distinguishing whether users on different sides of the platform interact with each other is important when defining the relevant market in multi-sided markets

Filistrucchi et al. (2013) provide a number of suggestions on how markets should be defined in the case of multi-sided platforms, suggesting that the nature of the platform matters. Specifically:

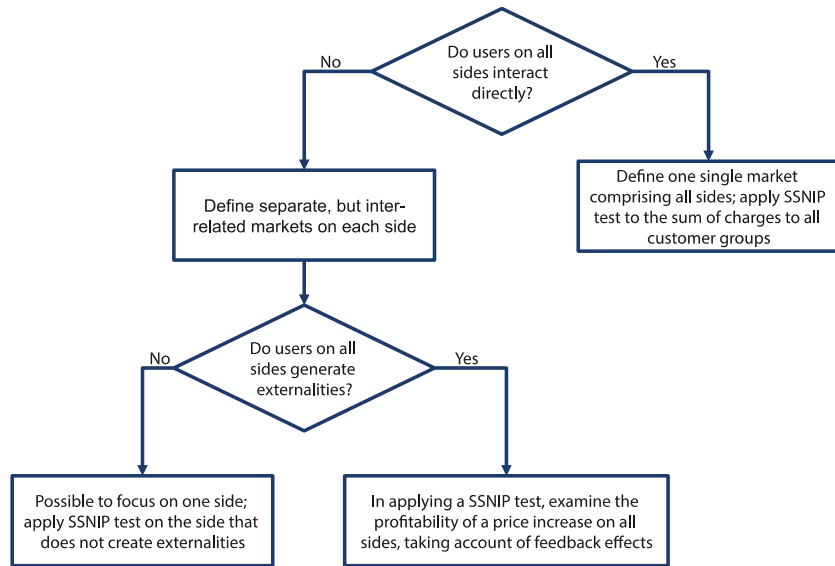
- Where users from the different groups interact with each other (e.g. buyers and sellers on an auction platform), a single market should be defined. Regarding the application of the HMT/SSNIP test, the relevant price would be the total price charged to all users, always assuming that the hypothetical monopolist would optimally adjust the price structure following an increase.¹⁶²
- Where there is no direct interaction (e.g. between advertisers placing banner ads and web site visitors), separate but interrelated markets should be defined. In some cases it may be possible to focus on one market only - namely where one side does not exert any externalities on the other.¹⁶³ On the other hand if users on each side do generate externalities on the other, the interaction between the different sides still needs to be taken into account (i.e. the feedback effects that arise from the value of the platform to users on one side being affected by the number of users on the other side need to be included in any assessment). In this case, the HMT can be undertaken by looking at the profitability of a price rise on either side of the market, through taking into account the feedback effects that come from the network effects. As a result of these feedback effects, the short-run price elasticity may understate the true impact of a price increase to customers on one side (Evans and Schmalensee, 2012).

This framework for defining the relevant market is summarised in Figure 8 below.

¹⁶² Emch and Thompson (2006) have proposed a similar approach in relation to payment card markets, where the relevant price would be the sum of charges to merchants and cardholders.

¹⁶³ The example given is advertising where advertisers benefit from an increase in the readership of a newspaper, but readers are not affected by advertisers, and where it might therefore be possible to ignore the reader market when looking at advertisers. However, because advertising revenue affects the cover price of the newspaper, it is unclear to us that the assumption of a unidirectional externality is justified.

Figure 8: Proposed framework for defining relevant markets in the case of multi-sided platforms

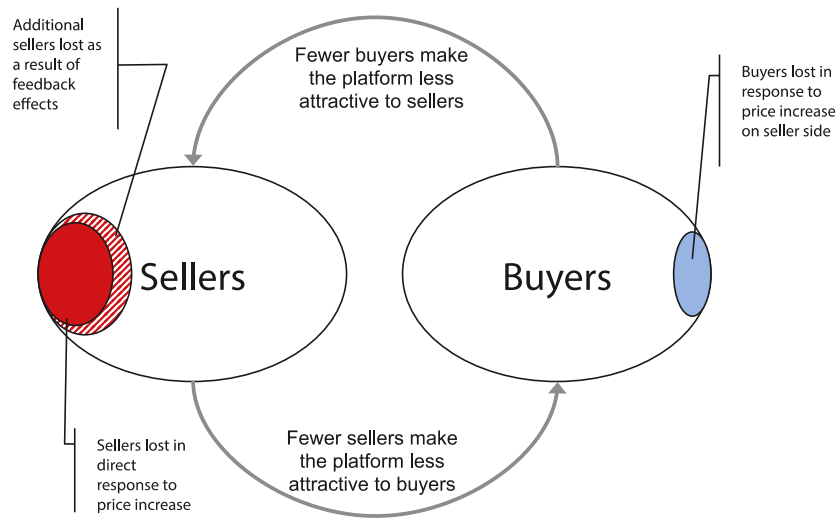


Based on Filistrucchi et al (2013)

Where separate but interrelated markets are defined and users on different sides impose externalities on one another, ignoring the feedback effects and applying a single-sided SSNIP test may still provide evidence on the lower bound to the relevant market. Because the feedback effects reinforce the effects of a price increase, looking only at the immediate impact of an increase in price by the hypothetical monopolist understates the loss in profits that would ultimately follow such a price increase.

Figure 9 provides an illustration, showing how feedback effects in the case of a B2C platform would increase the impact of a price increase to sellers. The profitability of the price increase would have to be assessed taking into account not only the loss of revenues from sellers moving to another platform in direct response to higher charges, but also the loss of revenues on the buyer side (if buyers also pay charges) and the additional loss of revenue from sellers leaving as a result of buyers moving away. Therefore, a price increase by a hypothetical monopolist that looks profitable when considering only the direct loss of sellers (and the associated revenue loss) might not be once all the feedback effects having worked their way through the system are considered. A platform (or a group of platforms) might therefore be considered to form the relevant market whilst the market is actually wider.

Figure 9: Feedback effects and the SSNIP test in multi-sided markets



Source: DotEcon

Noel and Evans (2009) show how these feedback effects could be incorporated through adjustments of the formula used for the critical loss analysis that implements the HMT by comparing the actual demand reduction that a hypothetical monopolist would experience in response to a price increase with the percentage loss that would render such a price increase unprofitable. However, as Filistrucchi et al. (2013) note, these adjustments do not allow the hypothetical monopolist to adjust its price structure and thus may overstate the reduction in profitability from a price increase and result in a market definition that is too wide. Filistrucchi (2008) develops adjusted formulas for the critical loss analysis that include optimal adjustment of price structure by the monopolist.

Filistrucchi et al. (2013) examine a number of competition cases decided by competition authorities in Europe and the US, and find that *“while in a couple of cases competition authorities correctly acknowledged the implications of using traditional single-sided formulas, so far none of the competition authorities appear to have applied a specific two-sided market formula to perform the SSNIP test.”*

4.2 Assessing market power

The assessment of market power is an important element of competition policy, both in terms of establishing whether an undertaking holds a dominant position and analysing the impact of agreements or proposed mergers.

When assessing dominance for the purpose of the Section 47 prohibition, the CCS looks at the constraints exercised by existing competitors, potential competitors and other factors that might

constrain the firms under investigation (such as regulation or buyer power).¹⁶⁴ There are no market share thresholds for defining dominance, but the market share of an undertaking is an important factor, and the CCS will consider a market share in excess of 60% as an indicator of dominance.¹⁶⁵ It will also assess the development of market shares over time and consider that dominance is more likely to exist where a firm has enjoyed a persistent high market share over time whilst competitors are relatively weak.

However, market shares are only an initial screen, and the CCS will look at other factors that affect competitiveness, such as entry barriers, the role of innovation, whether the market is a natural monopoly, product differentiation and the response of buyers and competitors to price changes. Market shares may in any case be difficult to calculate where online services are offered for free and there is no natural metric for volumes (European Data Protection Supervisor, 2014).

In its consideration of entry barriers, the CCS will look at sunk costs, limited access to key inputs and distribution outlets, regulation, scale economies, network effects and potentially exclusionary behaviour by incumbents. Buyers being well informed about alternative sources of supply or being able to self-supply, exercise countervailing buyer power or structure purchase processes so as to intensify competition amongst sellers would be other mitigating factors.

The CCS also considers that undertakings may be collectively dominant where there is tacit co-ordination, e.g. where firms might adopt the same pricing policy without any explicit agreement.

Existing framework is well-suited to deal with market power in e-commerce markets

This framework is in principle well suited to deal with the challenges that may arise in the context of e-commerce markets, in particular in relation to the network effects that are characteristic for e-commerce platforms. It is worth noting however, that these network effects may themselves result in fairly concentrated market

¹⁶⁴ For a detailed discussion see CCS (2007c). A similar approach is taken when looking at market power in the context of the Section 34 Prohibition – see CCS (2007b), Annex B.

¹⁶⁵ Market shares are used as indicators also in the case of agreements and mergers. Agreements between competitors are generally considered not to have a appreciable adverse effect on competition if the aggregate market share of the parties to the agreement does not exceed 20%, or in the case where the agreement involves parties operating in different markets, where each of the parties holds no more than 25% in each of the affected markets (CCS, 2007b, paragraph 2.19). Mergers are considered not to give rise to competition concerns unless the combined market share of the merging parties would be in excess of 40% or the merger would create an undertaking with a combined market share between 20% and 40% in a market where the three largest firms hold 70% or more (CCS, 2007d, paragraph 5.15).

structures with very few competitors being sustainable. The key issue is then the extent to which competition between these platforms can be considered to be effective. The magnitude of switching costs and whether multi-homing is possible (and common) matters in this regard. Small differences between platforms in terms of their size may be sustainable, but there may well be concerns if differences become too large and there is a risk of market tipping. At the same time, platforms should have a strong incentive to compete for attracting and retaining customers, but perhaps also to engage in strategies that make switching and multi-homing more difficult.

Therefore, factors affecting the level of network effects may well be highly relevant when assessing market power. These (discussed in Section 3.3.2) include:

- whether customers on (at least) one side are multi-homing and the scope for innovative new entrants to come into the market in spite of being disadvantaged as a result of a small platform size;
- heterogeneity in user preferences and the scope for platform differentiation;
- capacity constraints faced by platforms and the presence of negative externalities generated by the expansion of membership or usage of the platform on some users; and
- whether there are barriers to switching between platforms.

The CCS has considered some of these issues in the context of the Seek Asia/JobStreet merger, and found that low switching costs and the use by customers of multiple platforms added to the dynamism of the market (though the CCS was unable to conclude that this dynamism would provide a sufficient constraint on the merging parties post-merger). The CCS expressed concerns, however, that the merger may allow the merged firm to lock-in customers and prevent switching to other platforms or using multiple platforms given that the merging parties were each other's closest competitor. A commitment offered by the merging parties not to enter into exclusive agreements with employers and recruiters for a period of three years was considered to be effective in retaining the ability of customers to multi-home and thus to maintain the competitive constraints that flowed from multi-homing.

Whilst there are sound reasons why barriers to entry are potentially lower in an e-commerce environment, they are not negligible. The need to establish trust and a reputable brand is perhaps greater in the online, than offline world. Even though small-scale entry may be possible through the use of existing platforms, such new entrants may then face substantial barriers to expansion, not least because building trust and reputation while trading through a third-party platform may be difficult. For example, while the CCS was assessing the Seek Asia/JobStreet transaction, the CCS noted that there had

been a number of new entrants (including Jobs Bank, a Singapore government sponsored job portal), but that these new entrants were unlikely to be effective competitors.

Another important consideration when assessing market power in e-commerce markets is the dynamism of the market. On the one hand, the substantive changes that we have observed over the last few years in terms of the development of new business models and technological and service innovation might suggest that e-commerce markets are fluid, that market power may be transitory and that the period over which an innovative firm appears to be almost unassailable is the necessary reward for the risks taken. On the other hand, as Grunes and Stucke (2015) note, "*online industries are frequently characterized by both switching costs and lock-in*". Network effects create potentially strong and long-lasting first-mover advantages. The challenge for competition authorities will be to take an appropriate long-term view, preserving the incentives to invest and innovate whilst curbing potential abuses of market power that may more frequently result from success in online markets than in a traditional market environment.

Customer data may become an important source of market power

One key asset that is likely to become ever more important and that new entrants may find difficult to replicate is information about customers and their purchasing behaviour, which incumbents will have collected in the course of their normal business activity. Market power may depend in part on a firm's ability to collect and retain customer information. Incumbents may have incentives to deny rivals access to information, for example on (alleged) data protection grounds (European Data Protection Supervisor, 2014). In particular, in markets where firms adopt data-driven strategies and data is costly to acquire, firms might attempt to preserve their competitive advantage in data by preventing rivals access to data or foreclosing opportunities of rivals to procure data (Grunes and Stucke, 2015).

Grunes and Stucke (2015) take the US DOJ's enforcement action against a merger between the two largest online ratings and review providers (Bazaarvoice and Power-Reviews¹⁶⁶) as a point in case: in this case, "*the court highlighted a document prepared by Bazaarvoice for the investor roadshow before its IPO. Among other things, this document talked about the company's ability to 'leverage the data from its customer base' as 'a key barrier [to] entry.'* At trial, Bazaarvoice tried to walk away from these characterizations, saying it really was talking about the company's competitive advantages, and real economic barriers were minimal. The court disagreed: 'Much of

¹⁶⁶ United States v. Bazaarvoice, Inc., Case No. 13-cv-00133-WHO, 2014 WL 203966, at *50 (N.D. Cal. Jan. 8, 2014).

what Bazaarvoice refers to now as its 'competitive strengths' it used to call, accurately, significant barriers to entry."

While one might argue that such information collected by incumbents could constitute an 'essential facility' and be considered an entry barrier by competition authorities, classification of facilities as absolutely essential are rare in practice, as acknowledged by the CCS.¹⁶⁷

On the other hand, advantages enjoyed by incumbents from holding large amounts of consumer data may be neutralised by big data analytics being performed on a wealth of information about consumers in general and on data generated and collected outside of traditional transactional relationships. Such information may be accessible to potential new entrants and incumbents alike. As Lerner (2014) notes, "[d]ata brokers provide a variety of data collection, ad targeting, and demographic marketing services to clients, which may include large online providers like Facebook, small websites, and brick-and-mortar firms."

Overall, the extent to which incumbents' access to consumer information might give rise to market power should be assessed against the extent to which alternatives accessible by new entrants can act as cost-effective substitutes.

E-commerce markets may be more susceptible to tacit co-ordination

Concerns about the potentially higher risk of tacit co-ordination through increasing reliance on algorithmic pricing and the greater transparency that results from being able to collect and process a wealth of information about the offers of competitors are well covered through the concept of collective dominance. Perhaps the main issue in this context is the ease with which such tacit co-ordination can be identified, and the standard or proof that is required to establish collective dominance and prove the intent of undertakings to change market dynamics through collective dominance.

4.3 Assessing agreements

Agreements between firms and concerted practices (i.e. informal co-operation without any formal agreement or decision) that have as their object or effect the prevention, restriction or distortion of competition are prohibited under Section 34 of the Competition Act.

The prohibition does not apply to agreements that do not have an appreciable effect on competition (indicated by the fact that the

¹⁶⁷ Paragraph 4.7 of CCS (2007e).

combined market share of the parties is below a certain threshold level (see footnote 165), or fall within certain categories set out in the Third Schedule to the Competition Act (CCS, 2007b).¹⁶⁸ This includes vertical agreements¹⁶⁹, which are generally considered to have pro-competitive effects that more than outweigh the potential anti-competitive effects. Agreements may be permitted even if they have the effect of restricting or distorting competition if their operation creates a net benefit, which must be based on objective efficiencies causally linked to the operation of the agreement, provided that the agreement does not impose restrictions that are indispensable for the achievement of these benefits and does not afford the firms involved the possibility of eliminating competition in respect of a substantial part of the market.

This framework would seem to be largely appropriate for an e-commerce environment. Agreements that relate to information sharing between online platforms, for example, would fall squarely within the scope of Section 34. Agreements between firms not to engage in practices that may be detrimental to customers in relation to data collection (e.g. agreements to comply with a common code of conduct) may be beneficial, and would be considered to be unlikely to have an appreciable effect on competition under the CCS guidelines.¹⁷⁰

Collusion with the help of algorithms may pose a problem

It is however unclear to what extent the inclusion of concerted practices would cover the case of tacit co-ordination of behaviour through the use of common algorithms for pricing, for example, that is facilitated by greater ease with which information can be collected and processed in an e-commerce context. The requirement that firms enter knowingly into such practical co-operation or that it results from contact between firms would seem to suggest that such outcomes might not easily be captured by the prohibition of concerted practices (CCS, 2007b, paragraph 2.17).

¹⁶⁸ Annex C of the guidelines sets out in detail the approach taken by the CCS to implement the net benefit test.

¹⁶⁹ Vertical agreements are defined as agreements entered into between two or more undertakings that operate at different levels of the production or distribution chain. Singapore Government, *Competition Act, Third Schedule, Exclusions from Section 34 Prohibition and Section 47 Prohibition*: <http://statutes.agc.gov.sg/aol/search/display/view.w3p;ident=38d6c0b2-9078-4922-9f6f-af53b4e8f50f;page=0;query=Id%3A%22939df5e8-5983-4347-8e6c-41c88caa8db6%22%20Status%3Ainforce;rec=0#Sc3->.

¹⁷⁰ Annex A of CCS (2007b) sets out that agreements that establish codes of conduct are less likely to have an appreciable effect on competition "[i]f the structure of the market is competitive, and the code does not deal with prices or involve any element of market sharing or customer sharing".

It is noteworthy that online collusion has not appeared to be a key concern for competition authorities until fairly recently. The US DOJ's decision of April 2015 against an Amazon Marketplace seller of art who used an algorithm to fix prices for certain posters with rival sellers was the department's first criminal prosecution targeted at e-commerce.¹⁷¹

It is unclear to what extent this case is a bellwether of collusive behaviour supported by the use of computer algorithms becoming more prevalent in the future. However, it is clear that the increasing use of algorithms and robo-sellers could bring substantial challenges to the application of competition policy, not least because effectively dealing with such risks appears to be difficult under the existing framework. Ezrachi and Stucke (2015) suggest that where an agreement or intent to act anti-competitively is absent or hard to prove, uses of algorithms that result in anti-competitive outcomes "are not likely to be challenged under current laws" and "policymakers must recognize the dwindling relevance of traditional antitrust concepts of 'agreement' and 'intent' in the age of Big Data and Big Analytics".

The general exemption of vertical agreements may be problematic in relation to e-commerce platforms

Another possible concern, is the general exemption of vertical agreements under the Competition Act in Singapore. Many of the agreements that have been considered by competition authorities in other jurisdictions when looking at e-commerce cases are between firms at a different level of the production or distribution chain relating to conditions under which the parties may purchase, sell or resell certain products.

In the EU, for example, the Commission has set out in the guidelines¹⁷² accompanying the block exemption for vertical restraints¹⁷³ that it considers any outright prohibition to sell or advertise a product over the internet as a hardcore restraint that would automatically void the exemption under the Regulation. Similarly, restrictions on how a distributor can sell through the internet are hardcore restraints if they limit the distributor's ability to make unsolicited sales. For example, geo-blocking of websites or refusing transactions based on the customer's location would be a hardcore restraint, as would be charging a higher price for

¹⁷¹ Department of Justice, 6th April 2015 press release, *Former e-commerce executive charged with price fixing in the antitrust division's first online marketplace prosecution*: <http://www.justice.gov/opa/pr/former-e-commerce-executive-charged-price-fixing-antitrust-divisions-first-online-marketplace>

¹⁷² EC, 10th May 2010, *Guidelines on Vertical Restraints* (2010/C 130/01): <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2010:130:0001:0046:EN:PDF>

¹⁷³ EC, 20th April 2010, *Commission Regulation (EU) No 330/2010*: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:102:0001:0007:EN:PDF>

merchandise that is then sold online.¹⁷⁴ The launch of an e-commerce sector inquiry in May 2015 aims to address business practices that restrict online cross border sales.¹⁷⁵ Although the European Commission is strongly guided by its single market objective and is therefore more concerned about behaviour that undermines market integration, similar restrictions would seem to be equally problematic for Singapore as they can have the effect of limiting supply or raising prices for consumers.

However, these guidelines on vertical restraints also make clear that an outright ban on internet sales, or differential pricing might be objectively justified, opening up the possibility for parties to offer an efficiency defence for hardcore restrictions. Also the guidelines make clear that a supplier may impose quality criteria on internet sellers and may require its distributors to have a physical retail presence in order to be able to join a distribution system. Any differences in criteria applied to offline and online sales channels *"must be justified by the different nature of these two distribution modes."*¹⁷⁶

It is unclear whether the prohibition of agreements that apply *"dissimilar conditions to equivalent transactions with other trading parties, thereby placing them at a competitive disadvantage"* that is in place under Section 34 of the Competition Act in Singapore would have a similar effect; given the exemption on vertical agreements, this prohibition would only seem to be triggered when the agreement in question is made between direct competitors or firms operating in different markets, but not between suppliers and distributors.

Vertical agreements may of course be targeted under Section 47 of the Competition Act where they involve a dominant undertaking, but the question is whether such agreements may have detrimental competition effects even if they involve undertakings that are not dominant.

¹⁷⁴ The Guidelines promote the principle that *"every distributor must be allowed to use the internet to sell products"* (paragraph 52) and therefore any measures that dissuade online selling – for example by limiting the percentage of sales made through an online channel or by charging a higher wholesale price for the online channel – are viewed as hardcore restrictions. See EC, 10th May 2010, *Guidelines on Vertical Restraints* (2010/C 130/01): <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2010:130:0001:0046:EN:PDF>

¹⁷⁵ EC, 6th May 2015, *Commission launches e-commerce sector inquiry*. Press release: http://europa.eu/rapid/press-release_IP-15-4921_en.htm

¹⁷⁶ EC, 10th May 2010, *Guidelines on Vertical Restraints* (2010/C 130/01): <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2010:130:0001:0046:EN:PDF>, paragraph 56.

The use of MFNs may be problematic even when entities are not dominant

Price parity clauses and MFN clauses have been assessed in a number of cases in Europe (hotel bookings in various countries, Private Motor Insurance in the UK and the distribution of e-books in the EU) and the US (e-books), and competition authorities have tended to find against the use of such clauses, in particular wide MFNs (see Section 3.4.2). These assessments have been conducted on a rule-of-reason basis, with competition authorities considering whether the anti-competitive effects of such agreements may be outweighed by efficiency benefits. One particular issue with wide MFNs is that their impact on competition extends beyond the firm involved, and may thus be much wider than that suggested by any individual firm's market position or market share.

More generally, concern about the anti-competitive effects of such agreements is generally linked to market power enjoyed by the parties involved. Such market power may exist where platforms are 'competitive bottlenecks' (Edelman and Wright, 2015) – holding substantial market power even with a low market share that could be well below the threshold that would be associated with a finding of dominance. Such bottlenecks arise if users of the platform do not or cannot readily switch between platforms. This may be because platforms are differentiated and users may have strong preferences for particular platforms and do not multi-home, often because platforms may adopt strategies that make such multi-homing unattractive.¹⁷⁷ There may also be barriers to switching (e.g. because of registration processes that are time-consuming, or an inability to migrate user data from one platform to another), which would mean that platforms with smaller market shares may hold considerable market power.

For instance, in CMA's examination of MFN clauses imposed by Price Comparison Websites (PCWs) on Private Motor Insurers (PMI), the CMA found that the four major PCWs in the UK had similar market shares and that consumers often multi-homed, using on average 2.2 PCWs. However, this was not true for all consumers – *"PCWs appeared to enjoy a significant degree of market power against PMI providers by virtue of their single-homing consumers. These consumers appeared to be accessible to PMI providers only through each specific PCW"* (CMA, 2014). This market power allowed PCWs to negotiate effective MFN clauses, which made entry and expansion more difficult. In such cases, detriment may also result from subtle changes to the incentives faced by platforms, for example if there is

¹⁷⁷ Haucap and Heimeshoff (2013) suggest that users multi-home when it is not too costly for them to do so, i.e. when switching costs are low and tariff structures are based on usage rather than a high fixed fee upfront. This is likely to be the case for instance in relation to the use of online travel agents or social media platforms such as Facebook.

over-investment in buyer benefits ultimately funded through higher retail prices (Edelman and Wright 2015).

In another case, the US e-books investigation considered the MFN clause imposed by Apple on the six largest publishers of general interest books, where Apple was a new entrant in the e-books market dominated by Amazon. A US District Court Judge deemed that the clause was anti-competitive, since it effectively granted additional bargaining power to book publishers who had already been fighting for the freedom to set their own (higher) prices through Amazon, eventually resulting in substantially higher prices for consumers overall.¹⁷⁸

Last but not least, it is important to recognise that with multi-sided platforms the analysis of restraints would need to take account of the impact of restraints on the incentives faced by platform users. For example, MFNs may reduce incentives for buyers to multi-home, which could then reduce competition between platforms on dimensions other than price.

The requirement to use a common pricing algorithm may also be problematic

The effects of requiring all users of a platform to comply with certain requirements (e.g. use the same pricing algorithm) may lead to effective co-ordination. As Ezrachi and Stucke (2015) note, the pricing algorithm provided by Uber to its drivers “has been referred to as ‘algorithmic monopoly’ as it is controlled by Uber and may mimic a perceived competitive price rather than the true market price”. Whilst “[t]he presence of a vertical agreement between the algorithm developer and user is not contested. The competitors – while agreeing to use the algorithm – did not necessarily agree to fix the prices for taxi services, etc. It is the parallel use of the same algorithm which may give rise to concerns.”

These examples demonstrate that the use of vertical restraints (such as MFN clauses) by entities that would not typically be judged to be dominant could still be problematic. In Singapore (as in many other jurisdictions), the notion of collective dominance would apply if the parties involved were acting in a co-ordinated manner. However as noted above, tacit agreement to adopt a common policy may be difficult to prove to the required standard, and this would apply in a similar fashion the common use of vertical agreements, not least because some of the conditions that are usually associated with markets being susceptible to tacit co-ordination (namely product homogeneity and stable demand) may not hold in online markets.

¹⁷⁸ “Trade books consist of general interest fiction and non-fiction books”. US District Court Southern District of New York, 7th October 2013, *USA v Apple Inc. et al, The State of Texas v Penguin Group Inc. et al*: <http://www.justice.gov/atr/cases/f299200/299275.pdf>

Overall, this suggests that the wide-ranging exemption of vertical restraints that is currently in place in Singapore might mean that some potential competition issues are difficult to address. We note that the Competition Act provides that the Minister for Trade and Industry may, by order, specify that the section 34 prohibition shall apply to vertical agreements that are considered to have the potential of adversely affecting competition, and this might provide a way of identifying certain types of vertical restraints that might be problematic below the threshold of dominance.¹⁷⁹ However, such an approach has not been taken to date.

4.4 Dealing with abusive behaviour

Section 47 of the Singapore Competition Act (‘the section 47 prohibition’), prohibits the abuse of a dominant position by one or more undertakings in a market in Singapore.¹⁸⁰ The section 47 prohibition also applies to undertakings in a dominant position outside Singapore, which abuse that dominant position in a market in Singapore.

Annex C of the CCS’s section 47 guidelines lists (non-exhaustively) categories of conduct that could constitute abuse, including predatory behaviour, pricing below cost, discount schemes that harm competitors, price discrimination, margin squeeze, vertical restraints that are aimed at foreclosing market entry (such as exclusive purchasing, quantity forcing, full-line forcing or tying), refusal to supply and refusal to grant access to essential facilities.

The guidelines make clear that the CCS will pursue a rule-of-reason approach and carefully look at the effects of any alleged abusive behaviour and the efficiency justifications that might exist for firms engaging in such strategies.

This is of particular importance in relation to the pricing decisions of multi-sided platforms. First, as the economic literature on multi-sided platforms makes clear, there are good reasons for pricing structures that involve cross-subsidisation, with prices charged to one particular user group being below average variable costs. The CCS guidelines note that such pricing is unlikely to be rational, though the CCS will consider that there may be objective

Multi-sided platforms may need to set prices that could at first sight look abusive

¹⁷⁹ Section 4.1 of CCS (2007c)

¹⁸⁰ Singapore Government, *Singapore Competition Act*, (Chapter 50B), Section 47 (1): <http://statutes.agc.gov.sg/aol/search/display/view.w3p;ident=b788af85-7261-4dfd-962c-917568a843b8;page=0;query=Id%3A%22939df5e8-5983-4347-8e6c-41c88caa8db6%22%20Status%3Ainforce;rec=0#pr47-he->

justification, for example if there are good reasons for loss-leading, such as when such prices are part of short-run promotions or when losses may be incurred in the short term because a firm maintains its market presence despite an unexpected fall in demand.

The potentially very skewed pricing of multi-sided platforms could in principle be categorised as loss-leading, as a dual-price strategy with cross-subsidisation is optimal because charging one user group very low or even zero prices generates value for the other user group (e.g. Weyl, 2010).¹⁸¹ However, given the prevalence of such pricing structures in e-commerce market, and the fact that setting a very low price to one side goes hand-in-hand with charging prices that might appear to contain a substantial mark-up over costs to the other, it might be appropriate to amend the guidelines to consider explicitly the efficiency defence for prices below average variable costs in the case of multi-sided platforms though such an efficiency defence may be considered under the heading of 'objective justifications' as set out in the section 47 guidelines.

At the same time, we note that excessive pricing as a potential abuse of dominance is not explicitly prohibited under the Competition Act in Singapore. This arguably places greater emphasis on ensuring that the market remains effectively competitive despite the fact that platform markets tend to be more concentrated. In this regard, any attempts to foreclose the market or reduce competitiveness through measures that limit multi-homing or make switching more difficult should be carefully assessed.

Discriminatory behaviour and leverage are potentially important issues

Strategies such as discriminatory behaviour that harms competitors (such as Google's alleged strategy of "systematically favouring its own comparison shopping product in its general search results pages"¹⁸², see Section 3.3.2 for a more in-depth discussion) and the potential for foreclosure through exclusive agreements appear to be well covered by the existing provisions. The section 47 guidelines indicate that the analysis that the CCS will undertake in assessing the effects of such strategies will cover the relevant effects. However, the sophisticated form that suspicious or abusive behaviour can take in an e-commerce environment in practice may pose a challenge to authorities. For example, online ranking or

¹⁸¹ Rochet and Tirole (2003) refer to the fact that many platforms have highly skewed prices, with one side potentially receiving services for free, as the 'topsy-turvy principle' - "a factor that is conducive to a high price on one side, to the extent that it raises the platform's margin on that side, tends also to call for a low price on the other side as attracting members on that other side becomes more profitable".

¹⁸² EC, 15th April 2015, *Antitrust: Commission sends Statement of Objections to Google on comparison shopping service; opens separate formal investigation on Android*, Press release: http://europa.eu/rapid/press-release_IP-15-4780_en.htm

pricing mechanisms may be based on complex and opaque criteria. With the complexity of disentangling the issues involved and establishing their ramifications, investigations of online behaviour risk becoming drawn-out processes that are arguably ill suited to fast-changing markets (which may apply to markets subject to network effects and/or technological advances). We note that the European Commission opened an investigation into four aspects of Google's conduct in November 2010 and only reached preliminary conclusions on one of those in April 2015, continuing to investigate the other three areas of concern. In other cases related to e-commerce, authorities have achieved speedier resolutions by accepting commitments from the firms involved. For instance, the Korea Fair Trade Commission (KFTC) accepted commitments from the two largest online search sites in South Korea, Naver and Daum, within a few months of launching its investigation into these companies' abuse of market power. The KFTC cited the importance of technological innovation in this market as one of the key factors in its decision to accept the commitments.¹⁸³

Existing provisions may not cover price obfuscation strategies

An open question is whether behaviour such as price obfuscation or general strategies that negate many of the potential benefits from lower search costs and improved information that could emerge in an e-commerce context are covered by the existing provisions. For example, strategies such as drip-pricing or quality differentiation aimed at distorting competition may be common in a market and have adverse consequences without any of the firms engaging in such behaviour being individually dominant, and without the tacit co-ordination of behaviour that would be required to sustain the notion of collective dominance.

The problem with these types of behaviour is that competition focuses on particular aspects such as the 'headline' price of an air ticket, say, or the price of the lowest quality item offered by sellers, resulting in sub-optimal outcomes. In these cases, each firm takes the individually rational response to the incentives it faces, without any implicit co-ordination, and it is because of certain frictions or behavioural biases in how consumers make their choices that market outcomes are sub-optimal.¹⁸⁴ The underlying problem is in this case not a lack of competition, but the fact that competition fails to lead to optimal outcomes.

¹⁸³ Kim and Chang, February 2014 Newsletter, *KFTC's First Application of the Consent Decree Process*: http://www.kimchang.com/newsletter/20140226/newsletter_legal_eng_february2014_article01.html

¹⁸⁴ This is similar to the issue of sub-optimal incentives to invest in the provision of consumer benefits identified by Edelman and Wright (2015), which can result in greater detriment in more competitive markets.

Data protection and transparency concerns may be relevant, but not necessarily indicative of low competition

Similar concerns arise in relation to transparency, e.g. with regard to the collection and use of customer data, where consumers may be unaware of the information that suppliers collect as part of their interaction and how this information is shared and exploited.¹⁸⁵ Requirements to provide information about privacy policies, for example, are often ineffective, and consent cannot be always presumed. There is substantive evidence to suggest that the majority of consumers do not read privacy policies and terms and conditions and simply accept potentially wide-ranging permission requests (see, for example, Plaut and Bartlett, 2011). The reasons for this are complex, but there is a presumption that cognitive limitations may constrain the ability of consumers to understand the relevant contract terms because of the extensive use of legal terminology and the inherent difficulty in understanding the implications of information disclosure¹⁸⁶ and that behavioural biases make consumers reluctant to step back and consider alternative options if they are confronted with privacy policies relatively late in the course of a registration process, for example.

However, these problems are not indicative of, or indeed caused, by insufficient competition. On the contrary, vigorous competition in one dimension (e.g. on price) may drive firms towards exploiting certain behavioural biases and prevent the emergence of market-based solutions for overcoming transparency concerns. It is therefore unclear to us whether such concerns could – or indeed, should – be addressed by competition law, or should be left to data protection or consumer protection legislation and potentially regulation.

4.5 Assessing mergers

Section 54 of the Singapore Competition Act prohibits mergers that have resulted, or are expected to result, in a substantial lessening of

¹⁸⁵ Grunes and Strucke (2015) note that the privacy afforded in the context of e-commerce transactions should be regarded as another dimension of product quality.

¹⁸⁶ It may also be highly complex to anticipate the effects of disclosing specific information, exacerbated by the fact that these effects depend on the extent to which data might be cross-linked or combined with other data-set to draw inferences about the individual. Even consumers who are concerned about their privacy and sufficiently expert to understand what the operator of a web site will be able to do with their data under the terms of the privacy might not be aware of the potential for de-anonymising information. The potential for de-anonymisation has been increasingly rapid with technological advances (in both computer power and AI techniques) and the building of large datasets (for example, from social media).

competition and do not create net economic efficiencies ('section 54 prohibitions').¹⁸⁷ Whether a merger results in a substantial lessening of competition is determined by comparing the prospective competitive situation with and without the merger under consideration (the counterfactual). The CCS Guidelines on the substantive assessment of mergers note that "*[I]n most cases, the best guide to the appropriate counterfactual will be prevailing conditions of competition, as this may provide a reliable indicator of future competition without the merger. However, the CCS may need to take into account likely and imminent changes in the structure of competition in order to reflect as accurately as possible the nature of rivalry without the merger*".¹⁸⁸

According to the guidelines, competition concerns from horizontal mergers (mergers between firms competing in the same market) are considered to be unlikely to arise if the market share of the merged entity is below 40% (or between 20% and 40% where the largest three firms have a combined market share of 70%). A substantial lessening of competition may result from non-coordinated effects – i.e. unilateral incentives of the merged entity to raise prices or reduce service quality – or coordinated effects – i.e. the case where the merger increases the likelihood of tacitly collusive behaviour in the market.

The test for a substantial lessening of competition takes into account efficiencies resulting from the merger that might increase the degree of rivalry in the market, such as "*cost savings (fixed or variable), more intensive use of existing capacity, economies of scale or scope, or demand-side efficiencies such as increased network size or product quality*" as well as "*pro-competitive changes in the merged entity's incentives, for example by capturing complementarities such as R&D activity, which in turn increases its incentives to invest in product development in innovation markets*" (CCS, 2007d). Even if a merger were to result in a substantial lessening of competition, it may also be exempt from the section 54 prohibition if it results in efficiencies in terms of lower cost, greater innovation or more choice that outweigh the substantial lessening of competition. These efficiencies need to be demonstrable (i.e. clear and quantifiable and likely to materialise within a reasonable time period) and merger-specific (i.e. result directly from the merger).

¹⁸⁷ Singapore Government, *Singapore Competition Act*, (Chapter 50B), Section 54 (1): <http://statutes.agc.gov.sg/aol/search/display/view.w3p;ident=b788af85-7261-4dfd-962c-917568a843b8;page=0;query=ld%3A%622939df5e8-5983-4347-8e6c-41c88caa8db6%22%20Status%63Ainforce;rec=0#P1III-P24->.

¹⁸⁸ CCS (2007d), Paragraph 4.7

Vertical mergers are generally considered to be pro-competitive unless one of the merging parties enjoys market power at its level of the value chain. In this case, concerns about potential foreclosure effects would need to be considered.

Conglomerate mergers may raise concern if they give rise to 'portfolio power' (i.e. where "the market power deriving from a portfolio of brands exceeds the sum of its parts" (CCS, 2007d)). Such mergers may in some cases facilitate anti-competitive behaviour (such as tying or predation) or increase the potential for coordination.

Where a merger is found to fall foul of the section 54 prohibition, the CCS will have to decide on an appropriate action to remedy, mitigate or prevent the substantial lessening of competition. Remedies may be structural (e.g. divestments) or behavioural, and may be imposed through a CCS direction or in the form of a commitment given by the merging parties.

The merger framework is entirely appropriate for dealing with merger situations in an e-commerce environment, though some aspects may require particular attention.

Pre-merger market structure is not necessarily an appropriate counterfactual in markets with strong network effects

One is the likely counterfactual in markets with strong network effects. In such markets, the pre-merger market structure may not provide a reliable indication of the prospective development of competition in the absence of a merger, as there would be a natural trend towards increasing concentration. A merger may in this case be one particular way of exploiting network effects, and perhaps one that has the least detrimental effect on consumers. Specifically, where otherwise the customers of a shrinking platform may eventually be left stranded, a merger may create incentives for the merging parties to achieve efficient migration of customers to the platform of the merged entity. A merger may also provide opportunities to put in place safeguards in the form of undertakings (e.g. in relation to safeguarding platform access or abstaining from behaviour that would reduce the scope for multi-homing or increase switching costs) that might not be available if the increased concentration were the result of organic growth of the stronger platform driven by network effects. The behavioural undertakings given in the Seek Asia/JobStreet merger, in particular in relation to the commitment not to enter into exclusive contracts with employers and recruiters for a period of three years, are an example of this.

The failing firm defence does not capture the fact that markets might become more concentrated even without a merger

Importantly, these considerations would not be captured by the 'failing firm defence' as currently set out in the section 54 guidelines (paragraph 7.23 - 7.26). This is because even though only one of two platforms intending to merge may ultimately be sustainable, it is not clear at the time of the merger which of the two platforms might be more likely to shrink. The shrinking platform may not meet the criteria that would qualify it as a failing firm/division, in particular it may not be in a situation in which it is unable to meet its financial obligations and likely to exit the market in the foreseeable future in the absence of a merger.

The specific nature of competition in markets with strong network effects may be considered both in terms of the relevant counterfactual, and the potential benefits flowing from a merger (which in this case may straddle the dividing line between benefits that increase rivalry and benefits to customers that arise despite a substantial lessening of competition).

Overall, this would suggest a more permissive attitude towards horizontal mergers between platforms give the potential efficiency benefits that arise as a result of network effects. However, great care would need to be taken to check any claims advanced by the merging parties about the likely increase in concentration in the counterfactual, and the alleged benefits of the merger. Grunes and Stucke (2015) note that any claims of data-driven efficiency resulting in product improvements (as in the case of the Yahoo/Microsoft, Bazaarvoice/Power Reviews and TomTom/Atlas mergers) "*should be evaluated cautiously and critically*". In terms of remedies, it would seem that there is perhaps a greater scope for applying behavioural remedies (e.g. commitments towards open platform access or information provision) than structural remedies, which may be rendered ineffective by network effects. Of course, ensuring that these behavioural remedies are effective remains important.

Vertical mergers are potentially more problematic when platforms are involved

A second aspect is the extent to which concerns about vertical mergers might be heightened in the case of competitive bottlenecks created by platforms. Although such concerns might seem to be captured by the fact that the CCS would look in more detail at vertical mergers where one of the parties (say an e-commerce platform) has substantive market power, there may be subtle changes in the incentives to compete and the ability to distort competition where such market power is only emergent and well below any threshold that would trigger concerns about dominance.

Of particular interest in this regard are the effects that may result from the pooling of information about customers, and the extent to which vertical relationships are transparent. A useful case to illustrate such concerns is the UK CMA's investigation of a merger

between an insurance provider (esure) and an insurance PCW (Gocompare).¹⁸⁹ The CMA identified two theories of harm: customer foreclosure – the PCW might discriminate against esure’s rival insurance providers – and information sharing – esure might gain a competitive advantage by accessing information about rival insurance providers’ pricing models through the PCW. In this particular case, however, countervailing forces led the CMA to conclude that a substantial lessening of competition was unlikely. This was largely because of regulatory oversight of the sector and continuous monitoring by insurance providers of PCW behaviour, which should constrain the merged entity’s ability to engage in customer foreclosure or information sharing.

Information pooling can affect competition even in conglomerate mergers

Market power resulting from the pooling of information may be a bigger concern in the case of conglomerate mergers. Rather than portfolio power at the level of a portfolio of brands, there may be portfolio power in relation to customer information that will provide the merged entity with a much greater ability to engage in anti-competitive practices. For example, in the acquisition by Facebook of WhatsApp, the European Commission considered potential data concentration issues that might strengthen Facebook’s position in the advertising market,¹⁹⁰ having previously argued that “*the commercial value of personal data has grown exponentially*” and “[i]n time, personal data may well become a competition issue”.¹⁹¹ In this case, the Commission noted that WhatsApp did not provide online advertising services or collect data useful for advertising purposes and therefore the merger would not strengthen Facebook’s position in online advertising. Furthermore, there were a number of alternative providers of online non-search advertising.

¹⁸⁹ CMA, 2nd March 2015, Anticipated acquisition by esure Group plc of the remaining 50% of Gocompare.com Holdings Limited’s share capital, Decision ME/6495-14: https://assets.digital.cabinet-office.gov.uk/media/54f43f52ed915d1374000007/Full_text_decision_esure_Gocompare.pdf

¹⁹⁰ The European Commission decided to approve the merger, recognising the role of network effects, but arguing that there were a number of mitigating factors, namely that Facebook and WhatsApp were not close competitors, that the fast-moving nature of the market in short innovation cycles meant that market shares can vary, entry costs for app developers were low and consumers could easily switch and multi-home. The EC also noted that there was no status quo bias as the apps were not pre-installed on devices and no patents or specialist know-how resulted in barriers to entry. There were no commitments made. European Commission, 3rd October 2014, Case No COMP/M.7217 – FACEBOOK/ WHATSAPP. REGULATION (EC) No 139/2004: http://ec.europa.eu/competition/mergers/cases/decisions/m7217_20141003_20310_3962132_EN.pdf

¹⁹¹ Joaquin Almunia, 26th November 2012, *Competition and personal data protection*: http://europa.eu/rapid/press-release_SPEECH-12-860_en.htm

Moreover, information pooling may have a direct detrimental impact on consumers if the level of privacy afforded in the context of online transactions. Grunes and Strucke (2015), referring to earlier assessments of the impact of the Google/DoubleClick merger, note that *"Peter Swire, for example, has argued that a loss of privacy may be viewed as a 'reduction in the quality of a good or service,' especially to consumers who prefer more rather than less privacy. Writing in 2007, at the time of the Google/DoubleClick merger, he noted that the merger would combine Google's 'deep' information about users who are on Google sites with DoubleClick's 'broad' information about where a user goes after leaving Google. He concluded, 'For the many millions of individuals with high privacy preferences, this may be a significant reduction in the quality of the search product ...'"*

At the same time, vertical and conglomerate mergers may create substantial benefits through combining complementary products and services that together are key for an efficient e-commerce market (e.g. combination of logistics, payment services, trading platform, etc.). Ensuring that these benefits can be realised while minimising potentially adverse effects on competition may again make behavioural remedies more attractive.

Last but not least, there may be concerns about the impact of mergers on innovation. These concerns arise from the fact that many e-commerce markets may be typical examples of innovation markets where competition is taking place mainly in terms of research and development. In this case, the defensive acquisition of smaller rivals that might challenge the position of the acquiring firm through innovation and the development of entirely new products or services or improvements, might give rise to concern. The relevant counterfactual in this case would have to take account of the prospect of a fundamental change in the market position of the firms involved in a merger situation.

4.6 Remedies

Under the Competition Act, the CCS has the power to give directions to end an infringement, or to put in place interim measures while an investigation is ongoing. The CCS also has the powers to impose fines on undertakings for infringement of the section 34 or section 47 prohibitions. The CCS may accept informal interim assurances offered by parties under investigation in lieu of interim measures where these assurances, and parties involved in a merger situation can make commitments that the CCS can accept if it is satisfied that these commitments address the competition concerns identified.

There may be specific remedies for concerns related to data collection

Naturally, remedies need to be targeted at the problem identified, and whilst e-commerce activities raise many of the same issues that come up in more traditional markets, there may be a need to think specifically about remedies in relation to problems arising from the collection and use of consumer data where competition problems potentially overlap with concerns about information transparency and consumer protection. Although, as we have noted above, there may be a role for consumer protection or data protection legislation, there would also seem to be remedies that could make competition more effective in terms of promoting consumer awareness and transparency.

For example, requiring firms to provide options for consumers to control the amount of personal information that they surrender as 'currency' may be quite effective. There is some evidence that consumers may be willing to pay a premium in order to protect their privacy if firms were required to provide a paid alternative to the free service, where minimal data is then collected about individuals (see Tsai et al, 2011). Other remedies might include implementing data portability between platforms and imposing strict controls on the purposes for which data can be processed and used.

Behavioural remedies and undertakings may become more relevant

As noted above, in an e-commerce environment, there may be greater scope for behavioural remedies where structural remedies might be ineffective because of network effects in a market creating a natural trend towards increased concentration, or where structural remedies would undermine the efficiency benefits that might result from a merger. On the other hand, behavioural remedies may constrain the ability of firms to respond to changes in market conditions in the future, potentially stifling innovation, generating inefficiencies and distorting competition. They also require ongoing regulation or monitoring to ensure that commitments made have been or will be met. Therefore, the potential costs and benefits associated with imposing behavioural remedies should be considered carefully.

Behavioural commitments have been proposed and accepted¹⁹² in the Seek Asia/JobStreet merger. Specifically, the parties proposed commitments related to exclusivity (an undertaking not to enter into exclusive contracts with employers or recruiters) and pricing (an undertaking not to increase prices in real terms for customers renewing their contracts) for a three-year period.¹⁹³ The response to

¹⁹² This was the first time that the CCS has cleared a merger on the basis of voluntary commitment offered by the merging parties.

¹⁹³ The parties also undertook to divest all assets of Seek Asia's online recruitment aggregator website, jobs.com.sg, within a six month period. The CCS can take legal action to enforce these commitments in court if necessary.

the CCS's market-testing of these commitments indicate that market participants believed that the undertakings were suitable for addressing the competition concerns identified.

However, at present, only commitments accepted by the CCS in merger notifications are enforceable in court. Voluntary commitments made by parties relation to Section 34 and 47 decisions are not enforceable by law. However, the CCS is currently reviewing the legislation and guidelines with a view to potentially allow it to enforce such commitments in court going forward. With the legal authority to enforce voluntary commitments in all competition cases, the CCS may be more willing to accept such commitments in the future.¹⁹⁴ As part of its legislation and guidelines review, the CCS may also implement a settlement program for cartels that would provide greater scope for settlement of cartel cases. Therefore, going forward, the CCS may increasingly accept voluntary commitments from parties (PaRR, 2014). This will of course also raise the issue of how such remedies and undertakings will be monitored and enforced.

More cooperation between competition authorities may be needed as geographic markets widen

Another important issue in relation to e-commerce is related to the extent to which the CCS's enforcement powers can be applied to firms who are not based in Singapore, and in relation to conduct that may affect competition not only in Singapore but also in a wider geographic market. Of course, the potential need to apply remedies to firms that may be based outside of the CCS's immediate jurisdiction also arises in more traditional markets, in particular in the case of Singapore – a small open economy with a strong focus on international trade. However, such cases may become more frequent with the adoption of e-commerce widening in many consumer markets.

The need for such enforcement is well covered by the CCS's extra-territorial powers under the Competition Act¹⁹⁵, which enable the CCS to enforce the Act and take action against foreign undertakings as long as there has been a negative effect on competition within Singapore.

The CCS has exercised its extra-jurisdictional powers under the Competition Act in relation to two cartel cases involving Japanese parent companies with subsidiaries in Singapore.¹⁹⁶ The presence of

¹⁹⁴ In 2014, the CCS introduced a Commitments and Remedies division within the agency, with an aim to improve the authority's efficiency in assessing the appropriateness of any commitments and remedies proposed.

¹⁹⁵ Section 33 of the Competition Act.

¹⁹⁶ In May 2014, CCS took action against a cartel of Japanese ball bearing manufacturers (CCS, 2014b) and in December 2014 against a cartel of Japanese freight forwarding companies (CCS, 2014c).

local subsidiaries in these two cases obviously facilitated the enforcement of remedies, and enforcing remedies imposed solely on foreign undertakings or indeed investigating potential infringements by such parties may present significant difficulties. In these cases, the CCS may have to rely on co-operation with foreign government, courts and regulatory authorities to carry out its investigation or enforcement duties.

Such co-operation might best be achieved through agreements with other competition authorities¹⁹⁷ and facilitated by regular communication amongst competition authorities (OECD, 2011). Such agreements typically set out the principles for mutual cooperation between the respective governments to facilitate competition authorities' execution of activities in each other's territories. In addition, OECD (2011) suggests potential 'work-sharing' agreements in relation to improving co-operation amongst competition authorities in enforcing merger remedies. While the CCS does not at present have any such agreements with other competition authorities in place, Singapore's free trade agreements with both the US and the EU contain competition chapters that provide an avenue for co-operation with authorities on competition matters in these jurisdictions. Nonetheless, such co-operation agreements may not be completely effective, particularly in cases where national interests may be at stake.

4.7 Advocacy

The role of the CCS is not only confined to enforcement of competition law, but also involves competition advocacy aimed at promoting a pro-competition culture. In this role, the CCS engages with government departments and policy makers to ensure that the competition impact of government policies is duly considered.

Given the potential for increasing e-commerce adoption to have pro-competitive effects through the streamlining of supply chains, reductions in search costs, expanding the geographic scope of the market and increasing product variety, there are good arguments for promoting the take-up of e-commerce amongst businesses and consumers. This may be done through policies that are aimed at removing the barriers to e-commerce take-up identified above.

¹⁹⁷ An example of such an agreement is the - *Agreement between the European Communities and the Government of the United States of America* regarding the application of their competition laws (95/145/EC, ECSC; see <http://ec.europa.eu/world/agreements/prepareCreateTreatiesWorkspace/treatiesGeneralData.do?step=0&redirect=true&treatyId=300>)

Whilst the preferences of consumers for shopping in stores may persist and change only slowly, policies that are aimed at overcoming trust issues and facilitating the development of complementary infrastructures would seem to be desirable overall (though their effectiveness may be limited as long as preferences for in-store shopping are strong). Similarly, raising awareness of the potential scope for misleading customers through non-transparent online pricing policies and price obfuscation, and putting in place measures that deal with these problems (e.g. through consumer protection legislation and appropriate enforcement) may be helpful in terms of promoting customer confidence.

Given that network effects, which are common in an e-commerce environment, can create strong first-mover advantages and raise competition concerns in the long run, it is important to ensure that such policies do not distort competition and market. In particular, any subsidies or grant schemes that might be put in place in order to facilitate the adoption of e-commerce activities should be designed in such a way that they do not favour specific undertakings or platforms. It might also be appropriate to attach obligations to such grants or subsidies that ensure that the scope for platform compatibility and customer switching is maximised (e.g. an obligation to allow customers to migrate their data from one platform to another). Where tax incentives are offered to firms to encourage them to set up shop in Singapore, the likely competitive impact ought to be considered, and potential competition benefits should be identified.

It is also important that such policies take into account the potential detrimental effects from e-commerce activities, such as those relating to the collection and use of consumer data, some of which may come under the purview of consumer and data protection laws.

Overall, the issues discussed above call for close co-operation between the relevant authorities and the CCS.

5 Conclusions

Although the development of e-commerce in Singapore is still in its early stages, doing business online is expected to play a much more prominent role going forward. Given the small and open nature of Singapore's economy, the benefits from a more widespread exploitation of e-commerce opportunities could create substantial benefits. While the apparent preference of Singaporeans for shopping in store may remain, the expected growth in smart device penetration and m-commerce alongside improvements in online offerings are expected to drive take up of shopping online. On the business side, initiatives by the government and industry bodies to help local businesses with establishing an e-commerce strategy together with the increasing number of e-commerce service providers entering the market should help businesses to move into the e-commerce world.

The broad conclusions of our study on the impact of e-commerce on competition policy and law in Singapore reflect, for the most part, a consensus across both the academic literature and the case practice of competition authorities:

- E-commerce adoption can produce, and has produced, economic benefits, yet there should not be a presumption of pro-competitive effects.
- The possible competition concerns associated with e-commerce are not substantively different to traditional sales channels. However, certain concerns (e.g. related to network effects) may be more prevalent in e-commerce settings.
- Potentially new issues arise in relation to the use of data analytics, both in relation to the erosion of privacy and with regard to tacit co-ordination amongst competitors through algorithmic pricing.
- E-commerce does not require fundamental changes to competition policy frameworks and approaches, but it is likely to affect the focus of investigations and present practical challenges in enforcing competition law.

We have found that e-commerce adoption can have profound positive effects for both consumers and firms. It can connect buyers and sellers over a wider geographic area, boost efficiency in the supply and distribution of products and services, empower buyers with easy access to information and prices, enable the emergence of innovative new business models, and broaden the range of products demanded and supplied.

Though there is evidence of such benefits in practice, positive effects should not be taken for granted. Depending on market

characteristics, the potential benefits may be limited, for example if certain information is not easily conveyed online, suppliers engage in price obfuscation strategies, or the focus of competition shifts to price at the expense of quality.

Competition authorities should consider incentives that firms may have to limit consumer benefits from e-commerce. Vertical agreements might be used to restrict online sales, thus inhibiting e-commerce adoption overall. Firms that do sell online might deliberately obfuscate information shown to buyers, creating search costs, or firms may respond to increased price transparency by sacrificing important aspects of product or service quality in order to be more price competitive.

Competition concerns may arise specifically in relation to online platforms, which have replaced traditional intermediaries in many sectors. Though such platforms may facilitate entry by smaller suppliers, they raise their own competition concerns. Network effects may be naturally conducive to higher concentration in markets, in which case, competition authorities should consider whether countervailing factors – heterogeneous consumer preferences, multi-homing, innovation and low switching costs between platforms – are sufficient to preserve effective competition. Where network effects are strong, firms may compete ‘for’ the market; then, there may be a thin line between fierce competition and predatory behaviour. Where a platform has become dominant, it may have incentives to leverage its market power into new markets, for example by bundling services. Informational advantages (e.g. as a result of having collected a rich dataset about user behaviour) might help in this.

Even where platforms are not dominant, they may be ‘competitive bottlenecks’, able to impose restraints such as MFN clauses on sellers. Such restraints can dampen competition by raising entry barriers for new platforms, while also dampening competition in markets.

Another area of significant interest relates to the collection and use of consumer data. Firms can often collect and process a broader range of data about customers when trading online, which may benefit consumers through personalised offerings, but may harm them if firms can appropriate a greater share of surplus through price discrimination. Competition concerns may arise if data held by incumbents creates entry barriers. If consumers are not fully aware of (and able to control) the amount of data being collected, firms can avoid competing on privacy as a non-price dimension, so the extent of data collection and use, may not reflect the cost of these activities to consumers (e.g. in terms of lost privacy).

The ability to gather and process a vast amount of information about prices and competitors’ offers when trading online in combination with a better understanding of consumer behaviour means that

businesses rely more and more on algorithms for decisions such as setting prices or marketing to particular segments. The use of such algorithms may increase the risk of tacitly collusive outcomes. Such detrimental effects of greater transparency may be difficult to detect, and existing competition policy frameworks may not be particularly well suited to deal effectively with such threats. This is a new area of concern, having received attention from competition authorities only recently. The extent to which these effects will be material is unclear at present.

The increasing importance of consumer data also suggests the need for a careful review of the effectiveness of current data protection policy and laws both from a competition as well as consumer protection perspective. This calls for close co-operation between the relevant authorities to look at data protection concerns. Similarly, competition authorities and consumer protection agencies may jointly tackle non-transparent online pricing policies that cause harm to consumers.

Given the scope for e-commerce to increase competitiveness and create welfare gains, there is a role for competition advocacy to promote policies that enable the adoption of e-commerce amongst consumers and businesses through increasing trust and confidence and overcoming the barriers to take-up identified above. However, it is also important that such policies do take account of the potential competition risks (in particular as a consequence of network effects) and address the potential detrimental effects to which consumers might be exposed in an e-commerce environment (in particular in relation to over-confidence in the accuracy and quality of information available online, and the risks associated with the potential misuse of consumer data gathered in the course of e-commerce activities).

In terms of enforcement, the most prominent competition concerns are related to types of conduct – such as vertical agreements, price obfuscation, abuse of dominance by platforms and the collection of consumer data – that are by no means unique to e-commerce. Therefore, established competition policy frameworks, including in Singapore, already deal with such types of behaviour. However, the concerns that we have identified present some specific challenges for the application of competition law in practice.

E-commerce adoption may affect market definition in a number of ways. Markets may become geographically wider where online channels compete with traditional offline channels, though limits to trading will remain relevant for many products. Increases in product variety may result in more market segmentation, and the greater scope for price discrimination will need to be considered when looking at competitive constraints.

In two-sided markets, market definition may be challenging. Where a quantitative approach is used, this should capture feedback effects

between the two sides; where a more qualitative approach is used, competition authorities should consider that focusing on one side only, risks neglecting any adverse impacts on users on the other side. In the presence of strong network effects, structural remedies may have little enduring impact; therefore, behavioural remedies may be a more effective choice.

Where platforms have become established, they may be able to suppress competition through the use of vertical agreements (such as MFN clauses), which have been opposed by competition authorities in many jurisdictions. In this respect, competition authorities should be aware that this conduct could have anti-competitive effects even when no single firm is dominant and when there is no co-ordination among firms that would clearly support a finding of collective dominance. The same applies to obfuscation strategies.

Certain technical aspects of firms' conduct online can also complicate matters for a competition authority. Where firms use complex and opaque mechanisms to produce rankings and prices, it may be challenging to identify any anti-competitive intent. This may apply to instances of price discrimination and potential abuse of dominance, but also to (tacitly) collusive behaviour – the use of algorithm-based pricing software, combined with high price transparency online, could in theory facilitate collusive outcomes, with uncertainty about the legal interpretation of an 'agreement' or 'concerted practice'.¹⁹⁸

The collection of consumer data may increasingly be relevant to competition assessments. Competition authorities may take into account any commercial advantage derived from the data held by companies, when assessing market power or the effects of a proposed merger. Competition authorities might also benefit from the large volumes of data being collected online when pursuing quantitative methods, though this is dependent on being able to obtain the relevant data from firms. Overall, the increasing role played by e-commerce does not necessarily call for a more or less interventionist approach by competition authorities:

- On the one hand, these markets are often characterised by network effects that tend to push towards more concentrated market structures and providing strong first-mover advantages. This would suggest placing greater emphasis on ensuring that competition between platforms can remain effective in such markets. This may require intervening early, before a market tips, or swiftly, preventing

¹⁹⁸ See Section 4.3 for a more in-depth discussion.

a firm from leveraging a dominant position in one market into another.

- On the other hand, in markets that are characterised by dynamism and innovation, market power might only be transient and intervention risks stifling innovation.

At the same time, investigations related to e-commerce can be relatively complex. Where e-commerce adoption has created fast-moving markets characterised by a high rate of innovation, a full investigation and any subsequent legal challenges might result in a long and drawn out process that is arguably undesirable. Given the characteristics of these markets, all parties involved may have somewhat stronger incentives to settle cases quickly – assuming that reasonable commitments can be accepted – when dealing with e-commerce.

Ultimately, whether and how to intervene – and how quickly – is a decision that needs to be made on a case-by-case basis, balancing potential competition concerns with efficiency benefits and the risk of creating market distortions through misguided intervention. As competition authorities across the world begin to tackle the issues that arise more prominently in e-commerce markets, and experience begins to build to help competition authorities to identify with greater accuracy what types of behaviour might require immediate attention, the task will become easier. In the meantime, competition authorities tread a fine line, as expressed in a speech by the Chief Executive of the UK CMA, Alex Chisholm, in 2014, noting that *"... it must be remembered that an economy in the throes of creative destruction needs to be kept on a knife-edge (a precarious place to be, especially during a gale). Markets need to contain enough promise of profit to spur innovation, while being competitive enough to keep strong incentives to continue to innovate and serve customers. This creates both an opportunity and a danger for competition regulators... That's why we need vigilant and agile competition authorities, that while careful not to intervene too soon, don't leave it too late either (our own knife-edge). And competition authorities with the ability to sort real market distress signals from all the noise of creative destruction; and to tell the sound of actual market failure, from the fury of the out-competed."*¹⁹⁹

¹⁹⁹ Alex Chisholm, Speech at CRA Competition Conference in Brussels, *Giants of digital: separating the signal from the noise and the sound from the fury*, 10th December 2014: <https://www.gov.uk/government/speeches/alex-chisholm-speaks-about-digital-technology>

Annex A Case studies

In this Annex, we present three case studies that illustrate the likely impact of e-commerce on competition in the supply of groceries, travel booking services, and B2C marketplace services.

These case studies are based on desk research and interviews with industry players.

A.1 Groceries

Market overview

The four largest supermarket chains in Singapore are NTUC FairPrice, Giant and Cold Storage (both owned by the Dairy Farm Group) and Sheng Siong. At present, each of the four supermarket chains has its own online store.

Several pure-play entrants have also entered the market in past years. Most notably, RedMart started its business with non-perishables in 2012 and added fresh produce to its range in 2014. Other online players tend to be focussed on niche market segments, for example Go Fresh (high-end fresh produce) and Green Circle (organic fruit and vegetables).

There is also a small and falling share of purchases being made at small convenience stores and wet markets; this share is expected to continue to decline over time.²⁰⁰

Online grocery shopping accounts for a very small proportion of total sales

The groceries market in Singapore is estimated to be worth US\$6 billion market with online sales representing roughly 1% of total sales in 2014. By comparison, online sales account for 10% to 15% of expenditure on groceries in the UK, a mature e-commerce market.²⁰¹ Nielsen (2014) confirms that groceries are not amongst the top products that local shoppers in Singapore would consider buying online, with just a quarter of respondents indicating that they were or would be likely to do so.

In the view of industry players expressed during our interviews, the rather limited take-up of online grocery shopping may be explained by consumers' strong preference for shopping in store. Being able to look at the physical product when shopping is perhaps even more important in the case of groceries where for fresh produce, looking at or touching the physical product is the main way of ascertaining its quality. Even in mature e-commerce markets such as France, the UK and Spain where consumers are used to shopping online, *"consumers who haven't yet tried grocery shopping online said their biggest concern is not being able to see or touch the actual products before buying. They want reassurance that their groceries will be fresh and high quality—no bruised fruit, no wilting lettuce"* (McKinsey, 2013)

²⁰⁰ KPMG (2006)

²⁰¹ The Straits Times, 20th July 2014, *Growing market for e-grocers in Singapore*: <http://www.straitstimes.com/news/singapore/more-singapore-stories/story/growing-market-e-grocers-singapore-20140720>

Next to physically inspecting goods, the retailer's reputation is an important source of information about quality. One of the click-and-mortar grocery retailers we interviewed said that in particular for fresh food, consumers typically prefer to purchase from a local, reputable retailer. RedMart noted that achieving consumer trust is key to persuading a segment of consumers to change their current habits and consider online shopping for fresh produce: "[T]he culture here is to go to wet markets for fresh food, but we want to get people to trust that we can also give them produce that is even better".²⁰²

In addition to preferring to buy fresh produce in store and/or from a reputable retailer, customers generally prefer to buy all their groceries in a single transaction, making a large range of products in stock another key factor of success. RedMart noted that "the biggest conversion rate improvement is adding more range, making it [RedMart] a one stop shop. That's why we go into fresh [food] and we will be adding so many more products. We will have a bigger selection than the grocery store".²⁰³ This view is also shared by the click-and-mortar retailer we interviewed, who considers that wholesalers and suppliers selling directly to consumers (such as in the case of Green Circle) are unlikely to displace the function of supermarkets as being a one-stop-shop, and that having to buy from multiple stores online could greatly reduce the convenience of shopping online.

Nevertheless, adoption appears to be increasing

The combination of a preference for one-stop-shopping and the preference for buying fresh produce in store rather than online makes the supply of groceries online a challenging business. Nevertheless, current trends are promising for more being spent online on groceries in the future. NTUC FairPrice has reported a 15% year-on-year growth in online sales in the first half of 2014, and RedMart reported a 20% increase in revenue each month in 2014.²⁰⁴ In our interviews, retailers expressed the view that take-up is likely to increase substantially over time.

Convenience is a strong driver of take-up

One of the biggest drivers for the take up of online grocery shopping is the convenience that it provides – customers can shop outside traditional opening hours, they can have groceries delivered to their

²⁰² Ibid.

²⁰³ TradeGecko, 20th May 2014, *Are e-Commerce businesses turning into logistics companies? - an interview with RedMart's CEO on the operations backend*: <http://www.tradagecko.com/blog/ecommerce-businesses-turning-logistics-companies-interview-redmarts-ceo-operations-backend>

²⁰⁴ As reported by 3rd September 2014, *Today, New online shopping service at NTUC FairPrice*: <http://www.todayonline.com/singapore/new-online-shopping-service-ntuc-fairprice>, and *The Straits Times*, 20th July 2014, *Growing market for e-grocers in Singapore*: <http://www.straitstimes.com/news/singapore/more-singapore-stories/story/growing-market-e-grocers-singapore-20140720>

home and they may benefit from time-saving features such as saved shopping lists. Home delivery may of course not be convenient for all customers, but would certainly seem to appeal to stay-at-home parents or those with large families.

Reflecting the relative advantages and disadvantage of online grocery shopping, the composition of online grocery orders differs from the baskets of goods typically bought in store. Bulky, heavy, non-perishable items are commonly bought online (e.g. Pozzi, 2007, and Andrews and Currim, 2004), where the convenience of home delivery is especially high. On the other hand, as industry players noted in our interviews, shopping for fresh produce online is less common. This suggests that, at least for a minority of consumers, the option of buying some goods online (e.g. large non-perishables) and some goods in store (e.g. fresh produce) is a reasonable alternative to one-stop shopping, where all types of goods are bought as part of a single transaction.

Business models and their challenges

Order fulfilment is key

A key determinant of success for online grocery retailers is order fulfilment. According to Scarber and Le Blanc (2011), order fulfilment can be *“the saving grace or Achilles heel for those attempting to thrive in online grocery”*. AT Kearney (2012) predicts *“smart delivery solutions are the tipping point for online grocery success”*.

There are two key aspects of order fulfilment in providing an online grocery service, namely the process of picking and packing products and ultimate delivery.

Picking and packing

Picking and packing may be done in store (for click-and-mortar grocers only) or at a warehouse. Typically, picking and packing is done by the retailer, though there are alternative online business models where third-party ‘personal shoppers’ pick the products from a store on the customer’s behalf (e.g. Instacart in the US).

Picking in store allows click-and-mortar firms to fulfil online demand without much additional investment in new capacity, systems or infrastructure. Relatively little time and investment is needed in order to cover this aspect of serving online demand.

By contrast, picking from a warehouse – the only option available for pure play grocers - involves higher set-up costs. However, picking from a warehouse allows for some automation and can deliver greater efficiency compared to in-store picking.

Traditional retailers including those in Singapore, typically launch their online service by fulfilling online orders by picking in store. For instance, RedMart notes that *"most online retailers in Singapore do not have dedicated fulfillment capacity for their online offering and usually just fulfill online orders through traditional retail stores."*²⁰⁵

The labour-intensity of this model and the constraints placed by in-store product availability limit the extent to which this model can scale up to meet greater demand online, and thus quite often, as online volumes grow, grocers will move their fulfilment operations to a warehouse. Warehouse picking and home delivery has become the leading business model in many countries. In the UK, the supermarket, Tesco has invested in warehouses to improve the efficiency of their order fulfilment system. From our interviews with industry players, we know that at least one supermarket chain in Singapore has moved some order-fulfilment operations from in store to its warehouses.

Warehouse fulfilment requires greater levels of investment, but it is the most viable long-term business model

When implemented successfully, fulfilling demand from warehouses can be three times more efficient than picking in store (AT Kearney, 2012).

Because of the large number of unique items that may be contained in a single order, the picking process is particularly crucial in this sector. With such strong emphasis on warehouse logistics and the associated technology, it should not be surprising that online grocery retailers see themselves *"internally as a technology company that does retail"*, as a representative of UK retailer Ocado has stated.²⁰⁶

RedMart has noted that *"because we are picking and packing so many different products for each order, warehouse optimization is much more important for us than for a normal ecommerce company"*.²⁰⁷ The firm has invested in a specialist supply chain solution that allowed it *"to streamline processes to accept incoming stocks, put them away to optimal locations in the warehouse, and pick and pack*

²⁰⁵ Retail in Asia, 14th Jan 2014, *CEO Talking Shop: Singapore's online grocer increases fulfillment capacity*:

<http://www.retailinasia.com/article/tech/technology/2014/01/ceo-talking-shop-singapores-online-grocer-increases-fulfillment-capacity>

²⁰⁶ Computer Weekly, 28th June 2013, *CIO interview: Paul Clarke, director of technology, Ocado*: <http://www.computerweekly.com/news/2240187092/Interview-Paul-Clarke-director-of-technology-Ocado>

²⁰⁷ TradeGecko, 20th May 2014, *Are e-Commerce businesses turning into logistics companies? - an interview with RedMart's CEO on the operations backend*: <http://www.tradegecko.com/blog/ecommerce-businesses-turning-logistics-companies-interview-redmarts-ceo-operations-backend>

orders in the fastest possible manner”, increasing efficiency by more than 50%.²⁰⁸

Delivery or pick-up

Once the ordered items are picked and packed, the next step is to get them to the customer. The retailer may allow the customer to pick up the order in store (for click-and-mortar grocers), from a warehouse (e.g. with a drive-through system) or from a convenient location, such as convenience stores often used by pure-play retailers to provide a click-and-collect service. In Singapore, many retailers offer their customers the option to ‘click-and-collect’. RedMart for instance, offers click-and-collect at various locations.²⁰⁹ NTUC FairPrice expanded its click-and collect service in Q3 of 2014, covering more outlets, and aiming to make this option even more widely available going forward.²¹⁰

However, a large part of the convenience benefits from online shopping may be linked to home delivery, and therefore a click-and-collect model, though less investment-intensive, may offer little incremental benefit over shopping in store. Therefore, the retailer will typically deliver the order to the customer’s home.

Offering adequate delivery services is also challenging

Providing home delivery is logistically demanding and requires significant investment, particularly if it includes delivery of fresh produce. Certain perishable goods, such as fruits and vegetables, may easily be damaged in transit, which could easily compromise the consumer trust that seems to be so crucial for adoption of online grocery shopping. Similarly fresh and frozen goods should be kept within a specified temperature range and require an unbroken cold chain in delivery in order for their quality to be maintained.

Moreover, in order to appeal to consumers, retailers may need to offer delivery windows that are relatively narrow and still reliably deliver the products within that window of time. One alternative delivery method is unattended delivery, where it is not necessary for the customer to be at home at the time of delivery. Obviously this requires that the products are stored safely and at the correct temperature. Some retailers, such as Amazon Fresh in the US, offer this option, leaving the items on customers’ doorsteps in temperature-controlled bags.²¹¹ The climate in Singapore might

²⁰⁸ Enterprise Innovation, 13th January 2013, *Singapore’s online grocer increases fulfillment capacity*: <http://enterpriseinnovation.net/article/online-retails-big-challenge-increasing-fulfillment-capacity-237859010>

²⁰⁹ See: <https://support.redmart.com/hc/en-us/sections/200719964-Click-Collect>

²¹⁰ The Straits Times, 3rd Sep 2014, *NTUC FairPrice launches new online shopping service*: <http://www.straitstimes.com/news/singapore/more-singapore-stories/story/ntuc-fairprice-launches-new-online-shopping-service-2014#sthash.ZXMBHToi.dpuf>

²¹¹ See <https://fresh.amazon.com/help>

limit the scope for such delivery options in particular for products that have to be refrigerated, though for other products, unattended delivery might be feasible. RedMart, for example, offers an unattended delivery option to its customers as long as they provide an “Authority to Leave” their shopping at their doorstep or with the security guard/concierge.²¹²

Hence, delivery is one of the most important elements to providing an online grocery service and ensuring a reliable, high quality delivery service is key to retaining customers and building reputation.

Retailers may opt for a third-party delivery provider initially, as this offers a low-cost and flexible way of covering this aspect of the fulfilment process. However, the grocer’s lack of control over the delivery process could be problematic. Furthermore, in Singapore, choice of logistics providers capable of providing an unbroken cold chain is limited – we have been told at the time of writing that only Ta-Q-Bin has the infrastructure to do so.

RedMart outsourced its delivery services at first, but soon decided to develop its own delivery fleet in order to be able to guarantee a higher level of quality, noting that “[w]e pay a lot of money to acquire a customer and if they have that bad experience on their first delivery they are not going to use us again and they are going to tell everyone how terrible we are. We couldn’t afford this to happen. [...] We learned that, especially with groceries, you need to control that last mile [...] Groceries is the only product category with sufficient volume and frequency of ordering to be worth having your own fleet”.²¹³

RedMart has also invested in the development of an in-house Uber style app that optimises delivery routes for its drivers and allows them to keep customers informed.

Overall, the high fixed and sunk costs associated with investments in warehouse logistics, the lack of third-party delivery services and the advantage from a proprietary delivery fleet pose significant barriers to entry for online grocery retailers as well as traditional supermarkets looking to offer an online shopping service.

²¹² See <https://support.redmart.com/hc/en-us/articles/200376854-What-if-I-want-to-give-an-ATL-Authority-To-Leave-my-delivery-at-my-doorstep-security-guard-concierge->

²¹³ TradeGecko, 20th May 2014, *Are e-Commerce businesses turning into logistics companies? - an interview with RedMart’s CEO on the operations backend*: <http://www.tradegecko.com/blog/ecommerce-businesses-turning-logistics-companies-interview-redmarts-ceo-operations-backend>

Potential effects of e-commerce on competition

Grocery supply is typically oligopolistic, and entry barriers remain significant with e-commerce

The supply of groceries is typically oligopolistic in nature, with a few supermarket chains accounting for the large majority of sales in many countries including Singapore. High levels of concentration within the industry can raise competition concerns in the case of mergers (for example the merger between Albertson/Safeway in the US in 2014)²¹⁴, in relation to anti-competitive agreements (for example, bundling of groceries and petrol by Coles/Shell and later Woolworths/Caltex in Australia in 2004, see Gans and King, 2004), or with regard to an abuse of dominance through predatory pricing (for example, by Walmart on 'corner products'²¹⁵ in the US and Germany in 2000²¹⁶). There are also often concerns over monopsony power exercised to the detriment of suppliers, as in the UK, where added concerns over incumbent's control of land (which frustrated entry in certain local markets) led to the revision of the Groceries Supply Code of Practice and the formation of a supermarkets regulator (Competition Commission, 2008).

To the extent that this market structure historically has been protected by entry barriers that were mainly related to the ability to acquire suitable sites for physical stores, one might expect that wider take-up of e-commerce could in principle support new entry and increase competition. This would be particularly relevant in Singapore where land is scarce and both prices and rentals of retail spaces have been increasing over the past few years.²¹⁷

Pure-play retailers are likely to face some entry barriers

However, as we have noted above, entry barriers remain significant even if new entrants can bypass the need for physical retail stores and rely on warehouse fulfilment.

Pure-play entrants will have to provide a wide range of products in order to compete with supermarkets as a one-stop-shop for consumers. In previous market investigations on groceries by

²¹⁴ FTC, 27th January 2015, *FTC Requires Albertsons and Safeway to Sell 168 Stores as a Condition of Merger*: <https://www.ftc.gov/news-events/press-releases/2015/01/ftc-requires-albertsons-safeway-sell-168-stores-condition-merger>

²¹⁵ Corner products are products for which consumers know the prices and can recognise a discount when they see one.

²¹⁶ Institute for Local Self-Reliance, 1st November 2000, *Wal-Mart charged with predatory pricing*: <http://ilsr.org/walmart-charged-predatory-pricing/>

²¹⁷ The Urban Redevelopment Authority of Singapore reports that the Property Price Index for retail spaces has been increasing since 2011, while the Rental Index of retail spaces in the central region of Singapore has seen more fluctuation, rents have been increasing since Q2 of 2013: <https://www.ura.gov.sg/uol/media-room/news/2015/jan/pr15-03.aspx>

competition authorities around the world, a distinction was often made between supermarkets that offered a wide range of products (e.g. in excess of 10,000) that act as a 'one-stop-shop' for consumers, and convenience stores that are typically considered as part of a separate market (Competition Commission, 2008).²¹⁸

Since costs related to warehouse logistics increase with the range of products offered, pure-play retailers may face challenges in expanding their product range sufficiently to compete with large supermarkets. In growing their range, pure-play retailers may face expansion barriers in the form of physical (fulfilment centre) and operational (delivery and warehouse management) constraints. RedMart for instance identified these two areas as likely barriers to expansion during its interview with DotEcon. However, both barriers to entry and to expansion may be reduced with technological improvements. RedMart noted that "*[t]echnology is becoming exponentially more powerful and cheaper. It is not going to be as capital intensive to optimize and scale as it used to be*".²¹⁹

The emergence of (affordable) third-party delivery solutions might also help, but other entry barriers also exist:

- Brick-and-mortar retailers have an advantage from long-standing relationships with suppliers. RedMart noted that "*[i]n the beginning suppliers don't know you, they don't want to give you inventory and take the risk. You need to build your reputation and build relationships.*"
- In our interviews, industry players also indicated that traditional supermarkets may benefit from holding vast volumes of detailed customer data that has been collected through loyalty card schemes. This may allow them to use targeted marketing and discounts, for example, to improve customer retention.

Given that new entry is unlikely to take place on a scale that changes market structure, this then raises the question whether reduced

²¹⁸ We note however in some cases, the relevant product market definition might be narrower, reflecting the type of products on offer. For instance, in assessing the acquisition of Wild Oaks Market by Whole Foods in the US, the Federal Trade Commission (FTC) defined the relevant product market to be "*premium, natural and organic supermarkets*". FTC, 6th March 2009, *FTC Consent Order Settles Charges that Whole Foods Acquisition of Rival Wild Oats was Anticompetitive*: <https://www.ftc.gov/news-events/press-releases/2009/03/ftc-consent-order-settles-charges-whole-foods-acquisition-rival>

²¹⁹ TradeGecko, 20th May 2014, *Are e-Commerce businesses turning into logistics companies? - an interview with RedMart's CEO on the operations backend*: <http://www.tradegecko.com/blog/ecommerce-businesses-turning-logistics-companies-interview-redmarts-ceo-operations-backend>

search costs may result in more intense competition within a market where concentration is likely to remain high.

The groceries sector is often associated with fierce price competition (AT Kearney, 2012) and supermarkets may sell certain products at low or negative margins, including 'loss-leading' promotions aimed at attracting customers, earning supra-competitive margins on other products.²²⁰ Some commentators have noted that supermarkets in Singapore also engage in similar pricing strategies in order to attract customers.²²¹ In principle, such strategies could be rendered unsustainable as e-commerce has the potential for lowering search costs.

Substantial search costs remain

Comparing prices of individual products online may be somewhat easier than in store, but some search costs remain. In particular where customers tend to buy certain baskets of goods, comparing prices of each item across different retailers' websites may be time-consuming. There is little evidence to suggest that customers are more likely to purchase from multiple retailers online, picking the cheapest supplier for individual products. The preference for one-stop-shopping, highlighted by industry players in our interviews, appears to be the limiting factor in this regard. RedMart also identified this as a key challenge in wooing customers, noting, "*[I]f you have a limited selection, they [customers] can't find a lot of their products so they have to go to the grocery store anyway, and if they have to go anyway they pick up some stuff that we sell. We think the biggest conversion rate improvement is adding more range, making it a one stop shop*".²²²

The convenience offered from saved shopping lists for repeat purchases may also limit switching between retailers based on the price of a basket of goods. Unless it is easy to use the same shopping list across different retailers' sites, costs involved in comparing prices

²²⁰ In addition, the UK Competition Commission found various other possible reasons for below-cost pricing: to maintain a differential against rivals' prices, to sell surplus stock (e.g. more seasonal fruits than needed to meet demand), to support new product launches and because of downstream price stickiness when upstream costs change (Competition Commission, 2008, §5.55). Some authorities may take the view that this pricing behaviour constitutes predation in particular cases (e.g. Institute for Local Self-Reliance, 1st November 2000, *Wal-Mart charged with predatory pricing*: <http://ilsr.org/walmart-charged-predatory-pricing/>).

²²¹ See for instance the speech by Minister Without Portfolio, Mr Lim Boon Heng at the first Co-operative Leaders' Conference in 1994: <http://www.nas.gov.sg/archivesonline/data/pdfdoc/lbh19940227s.pdf>

²²² TradeGecko, 20th May 2014, *Are e-Commerce businesses turning into logistics companies? - an interview with RedMart's CEO on the operations backend*: <http://www.tradegecko.com/blog/ecommerce-businesses-turning-logistics-companies-interview-redmarts-ceo-operations-backend>

online may remain material. Aggregator websites that facilitate such comparisons across retailers may emerge – such as Mysupermarket in the UK – but these may face limitations, for example where the range of products stocked by different retailers differs or where the (perceived) quality of different retailers' own-label brands differs. We note that such aggregator sites are not available in Singapore yet.

Nevertheless, some search cost reductions may be possible online, for example through customer reviews or website features that allow ranking of products in a certain category on the basis of a chosen characteristic. In some cases, the retailer may also offer a customised service or personalised recommendations that reduce search costs. RedMart for instance, would remind its customers to reorder a product before they run out of it.

In any case, the presumption that e-commerce reinforces price competition may not apply to the groceries sector where several empirical studies have found that, contrary to some other sectors, price elasticity of demand for groceries seems to be lower online than offline, that is, online shoppers are less price sensitive than those who shop offline (Chu and Cebollada, 2012; Pozzi, 2010; Andrews and Currim, 2004; Danaher et al, 2003; Degeratu et al, 2000). There may be various reasons for these findings, but in general they indicate that online grocery shopping appeals particularly to consumers with a relatively strong preference for non-price factors (such as convenience). Thus, it is possible that competition in the online channel will be less focused on price and more so on other aspects, such as product quality and convenience. In line with this, AT Kearney (2012) noted that “[i]n many ways, smart delivery solutions are the tipping point for online grocery success” and that some pure-play retailers “primarily sell small assortments of premium fresh products geared to less price-sensitive shoppers”.

RedMart has noted that its business strategy is in no way geared towards focusing on price but that at present it seeks to differentiate itself from traditional supermarkets by the convenience it offers. Going forward, it aims to offer a more comprehensive product range compared with traditional supermarkets.²²³

*Long-tail benefits
are perhaps limited*

Whether e-commerce might result in an increase in product variety with the resultant gains in consumer welfare is however questionable. Given that large supermarkets already offer a wide

²²³ TradeGecko, 20th May 2014, *Are e-Commerce businesses turning into logistics companies? - an interview with RedMart's CEO on the operations backend*: <http://www.tradegecko.com/blog/ecommerce-businesses-turning-logistics-companies-interview-redmarts-ceo-operations-backend>

product range that pure-play retailers may well struggle to match, there would seem to be limited scope for much greater variety online. In addition, there would seem to be a persistent advantage for physical stores in terms of supplying fresh produce in general, and a greater variety of fresh produce in particular. However, consumers who do not live in the vicinity of a supermarket may still benefit from greater variety than is offered by local convenience stores. Also, certain pure-play retailers may specialise in particular segments (e.g. wine) and may then offer great variety within that segment.

Geographical market boundaries may widen

However, with warehouse fulfilment and home delivery, grocery markets may become less local. The relevant geographic markets for groceries in previous market investigations by competition authorities were often deemed to be local – typically defined as drive times of five to fifteen minutes between stores. Home delivery of groceries bought online may widen the relevant geographic market as a wider pool of customers may be reached. Indeed, in the UK, the Competition Commission (CC)'s investigation of the groceries market in 2008 noted that a future expansion of online grocery retailing – which has since been observed to some degree – might alter the assessment of the relevant geographic market (Competition Commission UK, 2008).

The 'death of distance' might have market structure implications

At the same time, competition with convenience stores serving local areas (e.g. urban areas) that are not in close proximity to a supermarket could become more intense. Pozzi (2011) provided some empirical evidence supporting the existence of such an effect in the US. Pozzi noted that large supermarkets were usually located in suburban areas, which "*leaves smaller retailers a chance of shielding themselves from competition by locating more conveniently*". However, a strong take-up of online grocery shopping has the potential to erode geographic differentiation. The empirical results indicate that the introduction of online grocery availability in a particular area by large click-and-mortar chains is associated with a reduction in the number of small stores, leading to market consolidation.

Singapore's small geographic size and high density of shops means that this effect might be less pronounced, but market structure may nonetheless change.

A.2 Travel

Market overview

The travel sector was one of the first in Singapore to adopt e-commerce and accounts for the largest online retail segment (see Section 2.2.2). Nielsen (2014) found that travel services – air tickets, tours and hotel bookings – were the items most frequently bought online in Singapore. Interviews with industry players suggest that searching for flights and hotels online has become commonplace amongst travellers, in particular with the younger generation. In a survey by GfK of travellers in Singapore, 80% of respondents indicated that they gather travel information online.²²⁴ Keeping up with market and social trends, travel service providers are increasingly offering their services through multiple online channels differentiated by the devices used for access. Online travel agent (OTA) Expedia, for instance, launched its app for the Apple iWatch in late April 2015.²²⁵ Whilst some travellers in Singapore, especially older ones, might still prefer to use brick-and-mortar or click-and-mortar travel agents (TAs) for their travel booking needs, the general consensus is that the share of travellers who rely on online channels will continue to increase.²²⁶

As more consumers turn to the internet for their travel needs and make bookings themselves, the scope for TAs to add value shrinks.²²⁷ For online customers, price comparison websites and aggregators will become the most valuable tools. For instance, Wego noted that the *"meta search model has a lot more value to consumers in Asia Pacific than in the US or Europe due to the lack of price parity in the marketplace. In most of our markets, there are more suppliers, more independent hotels, vibrant low cost carriers and more comparison shopping is needed"*.²²⁸

²²⁴ GfK Singapore, April-May 2014, *Travel Bookings Survey*, see summary at: <https://www.gfk.com/sg/news-and-events/press-room/press-releases/Documents/SG%20Travel%20Infographic.pdf>

²²⁵ See: <https://www.apple.com/watch/app-store-apps/>

²²⁶ This view was presented by industry players interviewed by DotEcon.

²²⁷ This view was presented by industry players interviewed by DotEcon.

²²⁸ Web In Travel, 25th June 2013, *US\$17m richer, Wego aims to become top online travel brand*: <http://classic.webintravel.com/news/us17m-richer-wego-aims-to-become-top-online-travel-brand-3837>

The National Association of Travel Agents Singapore (NATAS) noted in 2014 that *"Singaporean travellers are indeed very experienced and do not require traditional assistance from travel agents as they did in the past - e.g. in booking air tickets, in booking hotels, or offering the lowest price. However, we feel that there is still a need for TAs, in that despite Singaporean travellers possessing a lot of knowledge on travel, they may not necessarily be able to put together a comprehensive travel plan, or have the time to do so"*.²²⁹ As such, there remain a segment of travellers in Singapore that still turn to traditional TAs for organised tour services. However, the market share taken by TAs in Singapore is likely to decline further going forward. Indeed, the continued survival of many brick-and-mortar travel agents in Singapore may be uncertain in the web age.²³⁰

Business models and their challenges

Consumers who shop for travel services online may book a flight or hotel directly via the website of the airline or hotel, book through an online travel agent (OTA) such as Expedia, or a click-and-mortar travel agent such as Chan Brothers. Both TAs and OTAs are regulated and require licences from the Singapore Tourism Board in order to operate.

Consumers may also use a meta-search engine such as Wego to compare booking options from hotel and airline websites and from TAs and OTAs. These meta-search engines do not sell travel services to the customer but merely provide a portal through which the customer can search and compare the available offers. Often, meta-search engines allow the consumer to complete the booking (with the OTA or airline and hotel) through their portal. Customers may access meta-search engines via web browsers on their desktop or via mobile apps.

Wego for instance noted that the customer conversion rate on its mobile app is as good as on its normal website. The lack of interoperability between the mobile apps of meta-search engines and travel service providers at present however means that meta-search engines are unable to allow a customer to complete the booking through their portal. More developments are required in

²²⁹ Towkay Zone, 6th February 2014, *OTAs or TAs? NATAS' Ms. Anita Tan Shares Insights on the Travel Landscape*: <http://www.towkayzone.com.sg/content/654-OTAs-or-TAs-NATAS-Ms-Anita-Tan-Shares-Insights-on-the-Travel-Landscape>

²³⁰ The Straits Times Communities, 24th October 2014, *Travel agents get creative in Web age as competition increases*: <http://www.stcommunities.sg/travel/south-east-asia/singapore/news/travel-agents-get-creative-web-age-competition-increases-o>

the industry to adopt common standards before mobile apps gain more popularity.²³¹

Meta-search engines earn revenues from charging suppliers (hotels, airlines or OTAs), typically per click or per customer acquisition. In some cases, meta-search engines also auction off placement positions of search results based on certain key word searches. Some meta-search engines such as Wego also earn advertising revenues from travel and non-travel related advertisers.²³²

OTAs on the other hand earn their revenues in a similar manner to TAs, by selling travel services to customers. OTAs may also earn wholesale revenues by offering their inventory for sale by other TAs. Expedia for instance has a B2B platform – Travel Agent Affiliate Programme (TAAP) – from which TAs in Singapore can source and sell Expedia inventory. As with meta-search engines, consumers may access OTAs' through a number of different online channels ranging from standard web browser to mobile apps, including applications developed for wearable devices such as the Apple iWatch.

Working as content aggregators, OTAs and meta-search engines often operate across many countries. One of the challenges faced by these players noted in one of our interviews with industry players is adapting to local market conditions, including the range of payment options that may be used in a local market. For instance, in the Philippines, one can pay by '7 Eleven' – the convenience store chain offers a payment option known as '7 Connect' where one can pay for online purchases in 7 Eleven stores. One would expect such barriers to entry associated with adapting to local market conditions to also affect other e-commerce players such as online marketplaces that operate in multiple-regions. In Singapore however, these concerns are likely to be less significant given that the country is one of the easiest places for doing business in the world.²³³

TAs have the advantage over their online counterparts of being able to engage with customers in store, potentially providing more advice and better recommendations based on this interaction. However,

²³¹ Web in Travel, 7th Oct 2014, *Standards for mobile app deeplinking would be game changer for meta, says Veitch*: <http://www.webintravel.com/standards-mobile-app-deeplinking-game-changer-meta-says-veitch/>

²³² See Tech In Asia, 10th September 2009, *Interview with Ross Veitch, co-founder of wego.com*: <https://www.techinasia.com/interview-with-ross-veitch-co-founder-of-wego-com/> and Web In Travel, 25th June 2013, *US\$17m richer, Wego aims to become top online travel brand*: <http://classic.webintravel.com/news/us17m-richer-wego-aims-to-become-top-online-travel-brand-3837>

²³³ The World Bank ranks Singapore top out of 189 countries in terms of the ease of doing business: <http://www.doingbusiness.org/data/exploreeconomies/singapore>

TAs have struggled to compete against both OTAs and airlines and hotels selling direct to customers who often offer lower prices.²³⁴ Specifically, Asia Travel, a local OTA notes, “many OTAs are managed from outside Singapore, allowing these portals to avoid local taxation and offer services at lower prices”. Local TAs find it hard to compete and to survive, and have to differentiate their services and develop a niche in order to provide greater added value to their customers.²³⁵ In addition, NATAS has been encouraging local TAs to adopt online channels by offering training and advice. NATAS also developed an online portal that its members can use for free to list their services online.²³⁶

Both meta-search engines and OTAs are multi-sided platforms and are subject to network effects, which can create barriers to entry. For instance, Wego noted that “[y]ou need content partnerships with all the big travel companies to offer users a compelling product but to get the travel companies interested you need a critical mass of users in markets that the travel companies want to reach. Our solution to this dilemma has been to partner with the large portals in order to bring the critical mass of traffic and to adopt a multi-market regional approach such that we can always offer a travel company an audience that is attractive to them”.²³⁷

OTAs and meta-search engines also need to invest heavily in marketing in order to draw traffic to their platform. Responding to social trends and other developments, these sites need to advertise on Facebook, pay Google for paid searches, and optimise their websites for Google searches. OTAs may also pay meta-search sites for traffic and participate in auctions these sites hold to improve placement and increase visibility of their listing. Industry players told us that the marketing expenditure required to draw sufficient amounts of traffic is a significant challenge for OTAs and meta-search engines alike.

The industry players we have interviewed also indicated that meta-search engines and OTAs face the expansion or entry of firms who hold strong positions in adjacent markets. For instance, the entry of TripAdvisor and the potential entry of Google into search and

²³⁴ Towkay Zone, 6th February 2014, *OTAs or TAs? NATAS' Ms. Anita Tan Shares Insights on the Travel Landscape*: <http://www.towkayzone.com.sg/content/654-OTAs-or-TAs-NATAS-Ms-Anita-Tan-Shares-Insights-on-the-Travel-Landscape>

²³⁵ *ibid*

²³⁶ *ibid*

²³⁷ See Tech In Asia, 10th September 2009, *Interview with Ross Veitch, co-founder of wego.com*: <https://www.techinasia.com/interview-with-ross-veitch-co-founder-of-wego-com/>

bookings of hotels and travel services²³⁸ respectively is likely to create substantial competitive pressure on OTAs and meta-search engines, potentially even forcing these players out of the market in the long run.

Although the internet has enabled providers of travel services – airlines and hotels – to sell directly to consumers, these firms typically rely on search engines and meta-search engines to drive traffic to their sites.

The ability of travel service providers (including those in Singapore) to compete directly on price and to play off different distribution channels is often restricted by price parity clauses/MFN clauses imposed by larger OTAs. Airlines are often subject to price parity clauses imposed by Global Distribution Systems that reduce the scope for price competition across sales channels.

MFN clauses imposed on hotels and airlines may ultimately also affect the businesses of meta-search engines (including those in Singapore) as greater price convergence enforced by such clauses reduces the scope for meta-searches to add value.²³⁹

Potential effects of e-commerce on competition

E-commerce may affect competition upstream (i.e. between airlines, or between hotels), as well as changing the role of intermediaries and the competitive pressures that affect them.

E-commerce seems to have strengthened price competition between airlines

A common view is that, in the travel sector, e-commerce has focused consumer attention on price by enhancing transparency and facilitating price comparisons. As a result, it may be that airlines and hotels compete more strongly on price and less on other dimensions, with the possibility of average prices and average product quality both falling.

This hypothesis has received significant attention in the literature in the context of airline bookings, where studies do suggest that price competition has been strengthened by e-commerce. Verlinda and Lane (2004) found that “*the market for air travel is becoming more price-competitive as the size of the Internet airline travel search population grows*”. Sengupta and Wiggins (2006) found that,

²³⁸ Tnooz, 10th June 2013, *Introducing the largest travel metasearch engine in the world: Google*: <http://www.tnooz.com/article/introducing-the-largest-travel-metasearch-engine-in-the-world-google/> and Geek Beat, 25th February 2015, *Google Enters Travel Business With Google Flights*: <http://geekbeat.tv/google-enters-travel-space-with-google-flights/>

²³⁹ This view was presented by industry players interviewed by DotEcon.

controlling for a range of characteristics, online tickets were 13% cheaper and there was lower price dispersion online. Similarly, Orlov (2011) found that increases in internet penetration reduce average prices. Granados et al (2012) estimated price elasticity for airline tickets offline and online and found greater price sensitivity in the online channel.

Lower prices may reflect efficiencies...

To some extent, lower prices may simply reflect efficiencies brought about by e-commerce. Aside from cost savings brought about by disintermediation and by other developments (e.g. online check-in, mobile boarding passes, etc.), a potentially important source of efficiency may be improved capacity utilisation. Dana and Orlov (2009) argued that online bookers facing lower search costs may be more likely to respond to inducements to make bookings on flights with excess capacity, helping airlines to optimise load factors. Consistent with this, they found that differences in internet penetration – over time and geographically – were correlated with differences in load factors.

...but there is also evidence of lower quality

At the same time, however, price reductions may also reflect lower quality as competition becomes increasingly focused on price. There is some evidence to support this view, though much of it is anecdotal. As Granados et al (2012) stated, “[c]ompared to decades ago, domestic airlines have stripped their onboard economy class service of quality differentiators such as premium meals and amenities—and most recently, even peanuts and crackers”. Alter and Orlov (2012) considered alternative measures of quality – flight time, and flight delay (i.e. the difference between scheduled and actual arrival times)²⁴⁰ - and found that flights serving geographic areas with high internet penetration are associated with longer delays. The explanation offered by the authors is that online booking is conducive to a consumer focus on price and airlines have responded by prioritising price over quality, whereas in the past consumers would have shopped more frequently through TAs. TAs may have induced customers to consider non-price factors, while they also tended to sort flights based on flight time and therefore created greater incentives for airlines to minimise this.

Overall, empirical studies provide some evidence that e-commerce has increased price sensitivity of consumers booking flights online as well as increasing price competition for flights, albeit potentially at the expense of quality. In the case of hotels however, industry players told us that quality and other service characteristics would

²⁴⁰ The authors take into account the fact that the difference between the scheduled departure and arrival times routinely overstates the actual flight duration, and that the scheduling used on different flights can involve different amounts of deliberate ‘overestimation’ of the flight time.

remain a focus for consumers even when booking online. In fact, travellers booking online may become more sensitive to non-price aspects as online bookings facilitate comparisons of service features that are important to them, such as the star rating of the hotel, availability of WiFi or other hotel facilities.

Airlines may be able to exploit online shopping behaviours

In the case of flights, if consumers increasingly make decisions based on price, for example choosing from amongst the lowest-priced results returned by an OTA or meta-search engine, airlines may have incentives to try to exploit such behaviour through strategies such as 'drip pricing' (see Section 3.3.1). To an extent, hotels might also avail themselves of similar tactics by charging separately for desirable add-ons, such as WiFi access.

E-commerce may detrimentally affect small TAs

The travel sector presents a clear example of disintermediation driven by e-commerce. Whilst the role of traditional TAs has certainly not been eliminated, it seems to be much diminished – in Singapore as much as in other countries. Goldmanis et al (2010) examined the impact of e-commerce on market structure in the US using data from 1994-2003,²⁴¹ noting that during that period, consumers increasingly shifted to buying airplane tickets online. Airlines reduced the commission rates paid to TAs or ceased paying commission altogether, and the number of TAs fell by 35% between 1997 and 2003.

Empirical evidence presented by Goldmanis et al (2010) shows that increases in online purchasing were associated with a particular reduction in the number of small TAs (as measured by the number of employees in each establishment). This suggests that e-commerce has driven consolidation in the brick-and-mortar segment of the market. The authors' interpretation is that smaller TAs were relatively inefficient (e.g. because they were unable to exploit economies of scale) and some were forced to exit the market due to online competition, whereas larger TAs were better able to survive, with some of them introducing online portals that contributed to the decline of their smaller competitors.

There is evidence that a similar trend may exist in Singapore. NATAS has stated that, although it works with hotels and airlines to try to secure special rates and commissions for TAs, "*typically commissions and special rates are only granted to large TAs as they are*

²⁴¹ Lieber and Syverson (2012) later extend the analysis to 2007, confirming the original study's findings.

able to bring in larger groups of customers, and smaller TAs are often left out of the picture".²⁴²

Use of MFN clauses by intermediaries may raise concerns

As the use of TAs declines with customers using OTAs and meta-search engines and booking directly with travel providers, a relevant question is whether new competition concerns arise with the rise in popularity of such search and booking mechanisms.

One key concern for the travel industry raised by the industry players we have interviewed (and one that is currently investigated by several competition authorities in a number of jurisdictions, including in Austria, France, Germany, Hungary, Italy, Switzerland and the UK) is the imposition of price parity/MFN clauses on hotels by OTAs. Whilst such clauses may not eliminate price competition (as, for example, resale price maintenance obligations would), they limit the scope for competition across different retail channels, including amongst different OTAs (typically referred to as 'wide MFNs') and between the OTA and the hotel's direct booking facility ('narrow MFNs'). Most investigations consider potential efficiency benefits associated with such clauses – such as preventing free-riding on the investments that a particular platform might make in providing customer service, and providing customers with the reassurance that they are enjoying the 'lowest price' when using a particularly platform, but tend to find against the use of such clauses.²⁴³

Another area of concern for the travel industry raised by industry players during our interviews is the potential impact of Google's entry into the market for online search and booking of travel services. Google's involvement in many online markets in connection with its strong position in the market for online search is the subject of a long-running investigation by the European Commission – which has sent Google a Statement of Objections in April 2015²⁴⁴ - as well as investigations in other jurisdictions. The concerns that have been raised with regard to comparison-shopping in the European Commission's Statement of Objections issued in

²⁴² Towkay Zone, 6th February 2014, *OTAs or TAs? NATAS' Ms. Anita Tan Shares Insights on the Travel Landscape*: <http://www.towkayzone.com.sg/content/654-OTAs-or-TAs-NATAS-Ms-Anita-Tan-Shares-Insights-on-the-Travel-Landscape>

²⁴³ EC, 15th December 2014, *Antitrust: Commission announces the launch of market tests in investigations in the online hotel booking sector by the French, Swedish and Italian competition authorities*: http://europa.eu/rapid/press-release_IP-14-2661_en.htm

²⁴⁴ EC, 15th April 2015, *Antitrust: Commission sends Statement of Objections to Google on comparison shopping service; opens separate formal investigation on Android*, Press release: http://europa.eu/rapid/press-release_IP-15-4780_en.htm

April 2015 could be extended to cover other search services²⁴⁵, not least because Google's involvement in travel services through Google Flight has been an issue earlier on in these proceedings.²⁴⁶

²⁴⁵ CNET, *Google faces European charge it abused search dominance*, 15 April 2015: <http://www.cnet.com/news/google-faces-european-charge-it-abused-search-dominance/>

²⁴⁶ ComputerWorld, *Expedia, Tripadvisor file antitrust complaints against Google in Europe*, 3rd April 2012: <http://www.computerworld.com/article/2502509/technology-law-regulation/expedia-tripadvisor-file-antitrust-complaints-against-google-in-europe.html>

A.3 B2C marketplaces

Market overview

B2C marketplaces are the online equivalent of shopping malls in the brick-and-mortar world. They are platforms that connect a potentially large number of buyers with a range of sellers in a single (virtual) location. Unrestricted by physical constraints, these B2C marketplaces can grow to a much larger size than would ever be possible for traditional malls, in terms of the number of sellers and buyers. SP eCommerce, who runs Omigo, a B2C marketplace, told us that the wider range of products available online, competitive prices (particularly if shipping is offered for free), the convenience offered to customers and a reliable delivery service are key factors that are likely to drive take-up of online shopping by consumers in Singapore. Globally, B2C marketplaces are among the most popular websites visited by internet users.²⁴⁷ In 2014, Amazon Marketplace recorded sales of two billion items worldwide.²⁴⁸

In Singapore, the most-used websites for online shopping include several B2C marketplaces such as Amazon, Qoo10 and eBay, which are currently the most popular and appear to have similar market shares on the basis of website visits (UBS, 2014). New marketplaces have entered the market in the past few years – Rakuten's Singaporean website opened in January 2014, Taobao launched its South East Asian site in September 2014 and Lazada launched its .sg site in May 2014. Rakuten, Qoo10 and Taobao all host a significant number of foreign sellers from Japan, South Korea and China respectively, who are seeking to supply consumers in Singapore as well as the rest of South East Asia (SEA). These platforms often see Singapore as a test bed location for expanding operations to the rest of SEA.

There are also a number of local marketplaces such as ShopAbout and Omigo, which are used mainly by local retailers. More specifically, ShopAbout works mainly with local brick-and-mortar retailers who wish to establish a presence online.

²⁴⁷ For instance, Amazon.com, eBay.com and Taobao.com are among the top 20 most-visited websites globally, according to Alexa rankings of March 2015. See <http://www.alexa.com/topsites>

²⁴⁸ The Wall Street Journal, 5th January 2015, *Amazon's Third-Party Merchants Are a Growing Piece of the Sales Pie*: <http://blogs.wsj.com/digits/2015/01/05/amazons-third-party-merchants-a-growing-piece-of-the-sales-pie/>

The foreign marketplaces offer a much wider range of products and lower prices compared to local marketplaces. This is likely to reflect the significantly larger number of sellers on these platforms, with sellers being 'higher up' the supply chain so that their prices include fewer mark-ups by distributors. In addition, many of the local click-and-mortar retailers may be concerned about undercutting the prices they charge in their brick-and-mortar business.²⁴⁹ Whilst local retailers trading on online marketplaces may not necessarily be as price-competitive as their foreign counterparts, they tend to offer better ancillary services, such as local warranties on consumer electronics, repair services or the option to pick up an order in store. Purchasing from local retailers also offers consumers greater certainty that the product will be suited for local use, for instance with regard to electrical appliances.

Despite the wide range and competitive prices that online marketplaces offer and the convenience that comes with shopping online, a CBRE survey in 2014 indicated that local shoppers still have an overwhelming preference for shopping at physical stores – a view that was also expressed by industry players in our interviews. 93% of respondents in the CBRE survey indicated that they shop at shopping centres for non-food items. Two-thirds of respondents also indicated that they would continue to shop in physical stores over the next two years.²⁵⁰ It was reported in March 2015 that many of the retailers, including the major department stores in Singapore such as Robinsons, Tangs and Isetan, were looking at launching their own e-commerce site or improving their existing e-commerce offering, which means that online sellers using B2C marketplaces may well face additional competition from direct online retail channels going forward.²⁵¹

Business models and challenges

Pricing models

Common to the B2C marketplace business models is that buyers are not typically charged directly for the use of the platform, but sellers are. The precise pricing models used for charging sellers however differ.

²⁴⁹ These views were informed by DotEcon's interviews with industry players.

²⁵⁰ The Straits Times, 12th March 2015, *More shoppers here buy in-store than online: Survey*: <http://www.straitstimes.com/news/singapore/more-singapore-stories/story/more-shoppers-here-buy-store-online-survey-20150312>

²⁵¹ Today, 21st March 2015, *Trouble ahead for stores as e-shopping bug bites*: <http://www.todayonline.com/singapore/trouble-ahead-stores-e-shopping-bug-bites>

Most platforms will receive commission on each sale as a percentage of the price paid by the customer. The rate of commission may vary according to product and seller characteristics.

For example, Qoo10 charges between 7% and 12%, depending on the item price and on the seller 'grade' (as determined by the seller's volume of transactions and customer ratings).

Amazon.com, Rakuten and Lazada charge different commission rates that depend on product category.²⁵² In the US, eBay charges a fixed commission rate of 10% to standard sellers, though paying subscribers benefit from lower rates of 6-9%, depending on product category.

Whilst some platforms will generate revenue from sellers solely through commission rates, others will also use additional revenue streams. For example, in some countries eBay may charge insertion fees that are payable regardless of whether the item sells and are unrelated to the price obtained (though sellers usually benefit from a set number of free listings per month), as well as various other fees for optional features that sellers can choose to help promote their listings. Amazon.com charges a fixed closing fee as well as the percentage-based commission rate. Rakuten charges its sellers an annual subscription fee in addition to the percentage-based commission rate.

*Other differences
in business models*

Aside from differences in pricing structures marketplaces also differ in various other aspects:

- Some marketplaces exclusively cater for B2C transactions – Lazada for instance, allows only registered business entities to sell on its site, whereas others (e.g. eBay and Taobao) are also widely used for C2C transactions.²⁵³
- Some 'pure' marketplaces act exclusively as intermediaries between third-party buyers and sellers, whereas others (e.g. Amazon) may also act as retailers in their own right, listing their products on the website alongside those offered by other sellers.
- Some marketplaces seek to offer a very wide and diverse range of products, whereas others are somewhat more focused on particular product categories; for example, etsy.com focuses on handmade and vintage items.

²⁵² Amazon.com's commission rates range from 6%-45%, Rakuten's commission rates range from 5%-8%.

²⁵³ eBay notes in its interview with DotEcon that the majority (80%) of the transactions on its platform are of brand new products rather than used goods which make up the remaining 20% of transactions.

Competition amongst B2C marketplaces appears strong

In Singapore, one of the challenges faced by online marketplaces is the amount of competition in the market. Several foreign marketplaces have set up local sites to serve Singaporean and South East Asian consumers in the past five years. This may make it difficult for individual platforms to attract sufficient traffic and sales on the buyer side as well as engage a large number of sellers in order to offer a wide range of products.

In our interview with industry players, we were informed that one of the biggest challenges faced by a B2C platform is the large marketing spend required to draw traffic to its platform and capture wallet share of buyers. This might be particularly challenging for marketplaces such as Omigo and ShopAbout since the prices offered by local retailers on these marketplaces might be higher than those of foreign retailers selling on other marketplaces.²⁵⁴

Multi-homing is common on both sides. Both eBay and SP eCommerce noted in our interviews that buyers in Singapore would typically shop on multiple sites, while sellers also multi-home across marketplaces and in some cases have set up their own online stores. This is likely to support competition between marketplaces. Fierce price competition may also result from some of the newer marketplaces engaging in penetration pricing strategies in order to establish a market position.²⁵⁵ Marketplaces that are unable to match the lower prices offered to sellers using these marketplaces, which may even be below costs, could be forced out of the market.

Demand from sellers for the services of B2C marketplaces will also be affected by local department stores entering the online retail area, not least because the omni-channel experience that these retailers can provide may give them an advantage over pure-play online sellers.

Therefore, online marketplaces in Singapore, particularly the new entrants, face a considerable amount of uncertainty over whether buyers will gravitate towards their platforms and over the wallet share that the platform will be able to capture from these buyers.

²⁵⁴ For instance, selecting a product at random that is available on the various marketplaces – 'Samsung Galaxy Note 3, 32GB smartphone' and conducting a basic search for a on the various marketplaces on the 14th April 2015 yielded that the phone was most expensive on Omigo (\$998, seller not indicated), followed by ShopAbout (\$829, local seller), Rakuten (\$813, seller in Hong Kong), Qoo10 (\$765, seller in South Korea) and Lazada (\$677-\$771, comprising a local seller and sellers in Hong Kong). Note that differences in product characteristics (some sellers provide local warranties while other do not for instance) and differences in delivery costs were not accounted for. The price of a single product is of course not representative, but provides some indication that prices are indeed higher on Omigo and ShopAbout compared to the other marketplaces.

²⁵⁵ This was the view expressed in our interviews with industry players.

Making significant investments on marketing and offering a wide range of products against the backdrop of such uncertainty could be difficult to justify.

Potential competition issues relating to B2C marketplaces

One of the issues in assessing competition of online B2C marketplaces is establishing the relevant product market. B2C marketplaces are clear instances of multi-sided transaction platforms where it would be appropriate to define a single market. Though in general terms, offline retail channels may effectively substitute for online channels, and demand for the services of platforms depends on the ability of sellers to self-provide the services that these platforms offer (which may apply to larger retailers, in particular established firms extending their offer to include online sales), the key issue in relation to B2C marketplaces appears to be that these platforms provide access to customers that retailers might otherwise not be able to reach. This means that, from the perspective of sellers, different platforms may be seen as complements unless almost all buyers multi-home or are prepared to switch between platforms (and, indeed, between online and offline channels) readily and easily. We note, for example, that click-and-mortar consumer electronic retailer Mega Discount Store, trades on Rakuten, Qoo10 and on its own website.

Another key consideration in competition assessments is that B2C marketplaces are subject to network effects, as discussed in Section 3.3.2. Where the user base on both sides grows to sufficient levels, the widespread use of B2C marketplaces has the potential to benefit both consumers and retailers.

B2C marketplaces provide efficiency benefits to consumers and facilitate entry of small retailers

From the consumer perspective, such platforms can provide a one-stop-shop for a wide range of purchases, reducing search costs compared with a counterfactual where all retailers individually list their products on separate websites, as eBay told us in our interview. When consumers use particular marketplaces repeatedly, platforms can store customer details, such as payment and address details, delivery preferences, product wish lists and so on, making the marketplace easier and more convenient to use. They can also use a customer's past web browsing and purchasing data to make personalised recommendations or offer discounts that are relevant to each individual. Buyers can also build up their 'reputation' (e.g. on eBay) through repeated use of a platform based on the platform's rating mechanism. These aspects can create substantial consumer benefits, but also result in switching costs for buyers.

From the seller perspective, marketplaces offer various advantages, many of which may be particularly relevant to small firms who would find it difficult, if not impossible, to establish their own independent web presence. Selling via a widely used marketplace allows sellers to

reach a wide potential customer base that would otherwise require significant marketing expenditure to acquire. eBay for instance has more than 150 million active buyers globally.²⁵⁶ Marketplaces may also allow sellers to make use of their payment, fraud protection and customer services. In some cases, marketplaces may also offer logistics services or connect sellers with third-party logistics providers. They may offer retailer ratings systems that allow sellers to build a positive reputation on the basis of reliability and customer satisfaction from previous transactions. Sellers can leverage on the marketplace's brand name to boost buyer confidence.²⁵⁷ By facilitating entry of small retailers and allowing them to compete for customers against larger retailers, marketplaces may have the effect of enhancing competition amongst sellers.

However, platforms may have incentives to act anti-competitively

While the potential benefits are clear, the existence of network effects could also be conducive to anti-competitive effects. With network effects, a small number of incumbent platforms (or a single platform) may attain a large market share, which makes it highly valuable to users on both sides and means that other platforms will find it difficult to challenge or displace the incumbents. The advantages enjoyed by larger incumbents could be reinforced if there are significant economies of scale, for instance from large fixed costs in IT infrastructure.

At present, in Singapore, the presence of multiple online marketplaces and volume of new entry suggest that concerns about market tipping could be premature. We have been told that multi-homing is common for both buyers and sellers, and competition is fierce.²⁵⁸

However, elsewhere there have been concerns about large, successful marketplaces raising commission rates charged to sellers. In 2013, Amazon increased commission rates by up to 70%, causing uproar amongst its sellers.²⁵⁹ Taobao in China proposed five to tenfold membership fee increases for its sellers in 2011, prompting action by the Ministry of Commerce to intervene and mediate.

²⁵⁶ Informed by eBay during its interview with DotEcon on the 8th April 2015.

²⁵⁷ Singapore Business Review, 8th July 2014, *How e-commerce could be a game-changer for retailers*: <http://sbr.com.sg/media-marketing/commentary/how-e-commerce-could-be-game-changer-retailers>

²⁵⁸ This was the view expressed by industry players in our interviews.

²⁵⁹ The Guardian, 28th March 2013, *Amazon's fees hike for third-party traders provokes fury*: <http://www.theguardian.com/technology/2013/mar/28/amazon-fees-hike-third-party>

Taobao then delayed the implementation of the new rates.²⁶⁰ The Chinese government has since been reported to be drafting legislation to govern online commerce that will be in place by the end of 2015²⁶¹ and the Chinese competition authority has been reported to be investigating the pricing tactics of e-commerce players in the Chinese market, in order “to ensure a fair market”.²⁶²

Excessive pricing as a means of abusing dominance is not explicitly prohibited under the Competition Act in Singapore, hence the CCS may not be able to step in as the Chinese government has done should similar issues arise in Singapore. This arguably places greater emphasis on ensuring that the market remains effectively competitive despite the fact that markets subject to network effects tend to be more concentrated. In this regard, any attempt to foreclose the market or reduce competitiveness through measures that limit multi-homing or make switching more difficult should be carefully assessed.

Marketplaces may engage in aggressive pricing to build market share – but this might be deemed predatory

The fierce competition that exists in Singapore at present may simply be the effect of players vying for market share. Given network effects, platforms may compete fiercely to acquire users through the use of penetration pricing strategies or offering inducements to sellers in order to attract traffic. When commission rates charged to sellers are below costs, other marketplaces that are no less efficient may be forced out of the market, to the detriment of competition in the longer term.

Lower commission rates may also allow sellers on this platform to lower prices, potentially undercutting brick-and-mortar retailers or retailers on other platforms. Allegations of predatory or exclusionary pricing on the part of B2C marketplaces have been made in India. In particular, Flipkart’s ‘Big Billion Day’ sale in October 2014 resulted in complaints from various parties.²⁶³

²⁶⁰ China Internet Information Center, 17th October 2011, *Ministry intervenes in Taobao controversy*: http://www.china.org.cn/business/2011-10/17/content_23641663.htm

²⁶¹ China Law Insight, 27th October 2011, *Tmall Incident – Another Chinese Internet Giant Accused of Abusing Dominance*: <http://www.chinalawinsight.com/2011/10/articles/corporate/antitrust-competition/tmall-incident-another-chinese-internet-giant-accused-of-abusing-dominance/>

²⁶² Reuters, 13th February 2015, *Alibaba’s Jack Ma seeks to reassure employees over U.S. lawsuits*: <http://www.reuters.com/article/2015/02/13/us-alibaba-group-lawsuit-idUSKBN0LH11F20150213>

²⁶³ India Times, 21st October 2014, *No probe into ‘big billion day’ sale by Flipkart: Nirmala Sitharaman*: http://articles.economictimes.indiatimes.com/2014-10-21/news/55279608_1_amazon-india-predatory-prices-day-sale

Marketplaces do not have direct control over final prices set by sellers, but they might still be able to exert a strong influence on prices by varying commission rates, pressuring sellers to lower prices and even paying reimbursements to sellers for doing so.²⁶⁴ If transparency over such practices is limited, allegations of predatory pricing by the platforms may be difficult to prove, in particular because sellers may, at least formally, retain autonomy in setting prices.

Authorities have opposed the use of MFNs, as well as other restrictions on sellers

Concerns about market tipping are likely to be particularly grave where platforms engage in behaviour that reduces the ability of their customers to multi-home or switch. For example, requiring sellers to use a particular platform exclusively, or sell a certain percentage of their total volume through a platform, may fall into this category. Similarly, not allowing users to take their seller rating (or their buyer rating) across to other platforms may increase switching costs.

In this regard, competition authorities have looked at the use of price parity or most favoured nation (MFN) clauses (discussed in Section 3.4.2). The use of MFN clauses is a way for the platform to exert some control over retail prices offered to consumers, since they prevent sellers on the marketplace from offering lower prices through alternative channels (e.g. on other marketplaces, or when selling direct to the consumer). The use of MFNs by an incumbent platform can raise entry barriers, since it effectively prevents any new entrant platform from undercutting the incumbent, regardless of how low the new entrant's commission rates and seller fees are. If the use of MFNs is widespread across several marketplaces, this could reinforce price stability in product markets and could weaken the incentive for a marketplace to reduce its commission rates unilaterally, facilitating tacit collusion on high commission rates.

Many competition authorities around the world have investigated the use of MFNs by online platforms, including by B2C marketplaces such as Amazon Marketplace, as well as other types of platforms (e.g. offering hotel booking, e-book publishing or price comparison services). Amazon announced that the Marketplace MFN would be abandoned across the EU in response to investigations by the UK OFT and Germany's Federal Cartel Office for example.²⁶⁵

²⁶⁴ India Times, 20th May 2014, *Amazon, Flipkart & Snapdeal adopting models to ensure discounted prices*: http://articles.economictimes.indiatimes.com/2014-05-20/news/49974402_1_snapdeal-largest-online-marketplaces-discounts and India Times, 21st October 2014, *Publishing houses join hands to stop predatory pricing by Flipkart and Amazon*: http://articles.economictimes.indiatimes.com/2014-10-21/news/55279751_1_flipkart-and-amazon-ws-retail-predatory-pricing

²⁶⁵ EC, May 2013, *Germany and United Kingdom: Antitrust Cases against Amazon formally closed*: http://ec.europa.eu/competition/ecn/brief/05_2013/amaz_deuk.pdf

We were told in our interviews with industry players that, at present, marketplaces in Singapore do not impose such MFN clauses. However, these clauses could potentially have an adverse effect on competition if they were to become a prominent feature of the industry.

*Restrictions
against selling on
other channels*

Aside from MFN clauses, other practices might have similar effects in terms of restricting competition. In South Korea, Gmarket, an online auction and shopping platform owned by eBay, was fined for abuse of dominance²⁶⁶ in relation to practices that aimed to discourage sellers from making transactions through a rival platform, 11st.²⁶⁷ Specifically, Gmarket had notified sellers that, if they traded on 11st, they would be excluded from a Gmarket promotional event.

In Europe, the European Commission launched an inquiry in April 2015 investigating the practices of internet companies blocking or restricting sales across Europe. Specifically, the Commission is concerned about the use of “geo-blocking” technologies by these companies. Although this inquiry is not specific to B2C marketplaces, it could nonetheless affect the likes of Amazon.

Similar concerns would be applicable in Singapore. For instance, if similar geo-blocking restraints were applied, this could potentially result in less competition, narrower choice for consumers and higher prices.

²⁶⁶ Gmarket had a 90% share of the “domestic online auction market” that was identified by the Fair Trade Commission as the relevant market.

²⁶⁷ Practical Law, 1st September 2010, KFTC decision on eBay Gmarket's abuse of market dominance: <http://uk.practicallaw.com/4-503-1301?q>

Annex B Literature review

This annex provides an overview of the academic literature and other studies that we have reviewed in the course of our work. To assist the reader, we have attempted to group the studies around certain topics.

B.1 Academic literature

General economics of e-commerce

Online versus Offline Competition (Lieber and Syverson, 2012)

The paper provides an overview of the state of e-commerce (looking at data from the US), describes the effects of e-commerce on market demand and supply characteristics, discusses how e-commerce might affect market outcomes; and draws out some implications of e-commerce for firm strategy.

Comparing online and offline channels, the authors discuss various effects from the adoption of e-commerce, including:

- *New informational asymmetries*, as buyers may have less information about the products available (for example because they cannot examine physical goods before purchase). This creates a typical 'lemons' problem.²⁶⁸ Consumers may also lack information about online sellers' trustworthiness and about the security of online transactions. Market responses aimed at mitigating these asymmetries include seller-rating mechanisms.
- *Reduced buyer search costs*, as comparing prices of different suppliers is generally easier and quicker in an e-commerce setting, often facilitated by price aggregation and comparison websites, product reviews and discussion

²⁶⁸ The 'lemons' problem arises in markets where buyers have little or no information about the quality of a product before making a purchase, such as the market for used cars. Even though buyers might be prepared to pay a premium for products with above average quality, the inability of sellers credibly to signal the quality of their products means that the market will in the extreme case be driven towards supplying low quality goods only (see Akerlof, 1970).

forums. Nevertheless, empirical evidence indicates that positive but modest search costs still exist online.

- *Lower distribution costs*, as e-commerce may diminish the importance of, or even remove links in the supply chain (for example in the travel sector, where the number of travel agency offices has fallen and online-only travel agents have emerged). E-commerce may also reduce the need for holding inventories, which not only reduces distribution costs but can also result in an increase in variety available to buyers.
- *Changes to the geography of markets*, as reduced search costs and lower distribution costs may cause geographic market boundaries to change. Empirical evidence provides some support for this notion of 'death of distance', but also suggests possible countervailing factors (e.g. cultural factors creating a preference for trading with nearby parties).
- *Greater delays between purchase and consumption*, as delivery lags for physical goods create waiting cost that may reduce the attractiveness of the e-commerce channel relative to the physical distribution channel.

The authors then trace the impact of these effects on market outcomes.

Reduced consumer search costs and distribution costs suggest a downward effect on prices. This aspect in particular has been studied intensively and a body of empirical evidence supports the hypothesis of falling prices.

At the same time, firms with cost disadvantages may have strong incentives to make price comparisons more difficult, e.g. through price obfuscation or bundling of ancillary services, and may try to reduce the impact of price differentials through enhancing brand and reputation. This may help explain why the empirical evidence indicates that substantial price dispersion still exists in many online markets.

If e-commerce increases the emphasis on price competition, the market share of low-cost firms can be expected to increase at the expense of high-cost firms. With economies of scale and scope, low cost firms tend to be larger, so that one would expect an increasing level of concentration as larger firms grow and smaller firms become less competitive (with some of them perhaps even leaving the market). Empirical evidence is limited, but there is some support for this hypothesis.

E-commerce may also affect the potential for collusive behaviour, since "*the very transparency that makes it easier for consumers to compare products can also make it easier for colluding firms to monitor each other's behaviour*".

The Economics of Internet Markets (Levin, 2011)

This study provides an overview of economic research investigating the emergence and growth of new online platforms, which have some distinctive features:

- scalability, i.e. they can expand rapidly at low cost;
- customisation through, for example, recommendations, search results and targeted advertising;
- potential for rapid innovation;
- scope for experimentation, e.g. through testing new algorithms.

Much research has examined the role of platforms as intermediaries bringing together buyers and sellers, or consumers and advertisers. The emphasis has been on the importance of network effects, since the value of a platform to a user will often depend on who else is using it.

Theoretical models suggest that platforms should be expected to charge a low price to those user groups that create value for other users, potentially resulting in cross-subsidies. For example, search engines may offer free services such as email in order to increase user numbers, which increases the value of the platform to advertisers. At the same time, there may be some tension between the objectives of increasing the user base through lowering prices and increasing quality, and extracting greater surplus from existing users through higher prices and lower quality (e.g. as a result of increased exposure to advertising).

Network effects may lead to markets 'tipping', with one (or very few platforms) eventually surviving at the expense of smaller ones. This has been observed in practice in relation to consumer auctions and internet search. Such outcomes raise competition concerns if new entrants are unable to gain market share, even when they have cost or technology advantages over the incumbent.

Various factors matter when looking at the competition impact, including:

- the extent to which users are locked in because of network effects – for instance, the value of a social network to a user clearly depends on its market share, but the same does not necessarily apply of a search engine;
- the extent to which network effects are accompanied by scale economies, e.g. larger search engines may benefit from a superior ability to improve algorithms;
- whether low switching costs, low entry costs and the possibility of users using multiple platforms may mitigate competition concerns.

Levin notes that there is little empirical evidence relating to platform competition. One study looked at auctions on two competing

consumer auction websites and found higher prices on the larger site, which is consistent with the idea of tipping.

Facilitated by technological developments, online platforms have introduced new ways of matching users and providers of a vast range of new 'offerings' – whether these are products, advertisements, jobs or potential dating partners. Two specific mechanisms that have attracted significant attention are auctions for 'sponsored search' advertising placement and reputation systems in e-marketplaces.

Sponsored search advertising auctions support novel market design features such as:

- pricing on a per-click basis;
- the use of a second-price format (where the price paid by one bidder reflects the demand expressed by other bidders and the economic concept of opportunity cost); and
- a weighting system based on an estimated 'quality' of the ad (where bidders with ads that are particularly 'relevant' to the individual may be able to pay relatively low prices, since such ads are more favourable to a positive user experience on the search engine).

Technology may allow advertisers to place finely targeted advertising messages that are only displayed to specific types of users, at specific times and/or under specific circumstances.

Enhanced targeting might improve matching and increase the social value of advertisements, but it might also tend to increase the concentration of advertising firms. The added complexity may increase transaction costs for advertisers and may disproportionately favour informed advertisers who are able to 'cherry-pick'; it may thus create thin markets for specific user types.

Reputation systems are important because they potentially reduce the informational asymmetries caused by e-commerce, in relation to the quality of products and trustworthiness of sellers. eBay's feedback-based reputation system has been studied extensively and many studies have argued that it has been crucial to the platform's success. Some evidence indicates that sellers with higher scores benefit from higher prices and sales rates. However, other studies point to the system's limitations in reducing informational asymmetries. The system might suffer from 'grade inflation', since close to 100% of feedback is positive and therefore is arguably not very informative. This might be due to fear of retaliation, which could be addressed by alternative (e.g. non-sequential) feedback mechanisms.

Similarly, the design of recommendation systems²⁶⁹ used by the likes of Netflix and Amazon and consumer review websites and the incentives and impact of such systems have received considerable attention in computer science and marketing (though perhaps less in economics). The ranking mechanisms used by search engines to display results create a complex set of incentives. Platforms may have incentives to maximise traffic, which may induce consumers to search more than they would ideally like. A related issue is whether ranking mechanisms should be transparent – often they are not, but this may be justified to prevent manipulation of the rankings.

A prominent hypothesis from the early days of e-commerce was that reduced search costs would boost competition and reduce price dispersion. A number of studies show that online competition has lowered prices but that price dispersion remains. This may be because even though search costs have been reduced they are still non-negligible. Related to this, online sellers may use obfuscation strategies and consumers may lack sophistication or attention. For example, there is some evidence of consumer auction prices rising above posted prices in some cases, and several studies show auction prices not fully adjusting to reflect differences or changes in shipping costs.

Another prominent hypothesis was that low search and distribution costs would cause demand to shift towards niche products – the so-called 'long tail' hypothesis. There is empirical evidence in support of the hypothesis, e.g. using data on books offered by Amazon. In other contexts, the long-tail hypothesis may be less compelling as e-commerce might channel demand towards the most popular products, e.g. on the basis of online reviews. There is evidence of this from the online video rentals market.

A third hypothesis was that online markets would increasingly employ more flexible and dynamic sales mechanisms. For example, auctions can be used more widely to facilitate price discovery, in particular where one-off sellers are offering unique products. However, the paper notes that listings on eBay have increasingly made use of the 'buy it now' price format (posted prices)²⁷⁰, which is now by far the most commonly used pricing policy.

²⁶⁹ These systems are used to create suggestions of other products or services in which a user might be interested based on what other customers who have made similar purchases have bought.

²⁷⁰ These offers indicated that eBay may be providing a virtual storefront for many small businesses who save on the cost of establishing their own systems for trading online.

Competition Policy Implications of Electronic Business-to-Business Marketplaces: Issues for Marketers (Pressey and Ashton, 2007)

This paper provides an overview of B2B e-marketplaces, analyses the antitrust issues that may arise in the course of online B2B interactions and offers guidance to firms using e-marketplaces (drawing on analysis and guidance provided by the US FTC).

B2B online marketplaces have the potential to generate significant efficiencies, for example through joint purchasing, lower search costs, a credible 'middleman' and reduced administrative costs. However, B2B e-marketplaces also give rise to a variety of antitrust issues including information sharing, monopsony power and exclusionary practices. Though not fundamentally new, these issues may require particular attention in a B2B environment.

B2B e-marketplaces use real-time customer data to increase efficiencies in the supply chain. This data could also facilitate price coordination or other forms of anticompetitive coordination. In order to assess whether such co-ordination takes place, competition authorities would tend to look at the structure of the market and whether the information was shared amongst competitors; the type of information that is being shared (e.g. about past or future transactions; whether the information is commercially sensitive etc.) and the reason for sharing; and how prone the market is to collusion in general.

The authors note that, although the FTC guidelines require 'safeguards' in order to limit some parties' access to sensitive information, they do not specify what exactly this means for industrial marketers. They find that a majority of e-marketplace sites emphasise information security protocols to protect sales data. A good guideline for participating firms might be to join a marketplace that is not owned by either the buyer or seller site as this might minimise information security concerns.

Another aspect of information sharing is the use of aggregated data. The FTC's antitrust principles on how to manage competitor data (though not specifically relating to B2B data) state that the data aggregation (e.g. a survey) must be managed by a third party, the information collected must be more than three months old, and information must have been reported anonymously by at least five firms (neither accounting for more than 25% of the data individually).

E-marketplaces could allow the exercise of monopsony power through joint purchasing where a group of buyers collude to affect input prices. Antitrust analysis would need to evaluate whether the buyer group is sufficiently large to allow manipulation of input prices through withholding demand, in order to distinguish lower prices due to monopsony power from lower prices because of increased efficiency. Existing FTC guidelines limit joint purchasing by competitors to up to 35% of the total sales in a market and collective

purchases must make up no more than 20% of the buyers' total revenues. The authors also mention that if e-marketplaces use reverse auctions they should include controls to limit false bidding and ensure that bids are binding in order to avoid buyers 'testing the market'.

Concerns about exclusionary practices may arise when operating rules allow for discrimination against, or exclusion of certain businesses. This can also include exclusive dealing agreements that force firms to conduct all (or a certain percentage) of their business through a specific platform. In relation to the exclusion of a particular firm the FTC would evaluate:

- the extent of the competitor's disadvantage if access were limited, evaluating potential substitutes such as offline markets;
- the effect on competition of excluding this firm (e.g. an examination of whether there is still effective downstream competition in the market etc.) taking into account market concentration, theories of unilateral and coordinated anticompetitive effects and downstream entry; and
- whether excluding this firm brings any competitive benefits that would offset the anticompetitive harm.

Pressey and Ashton analysed a sample of B2B e-marketplaces with respect to membership criteria and exclusionary practices finding that:

- firms would only be excluded for a poor credit history or if they did not meet other qualification criteria;
- no exclusivity or volume agreements could be identified; and
- switching costs were very low.

In summary, the authors believe that since no B2B e-marketplace had gained significant market power and most operate within specialised industries, a long-term benefit from excluding any buyers or sellers seems unlikely.

There Goes Gravity : How eBay Reduces Trade Costs (Lendle et al, 2012)

Using a dataset of cross-border transactions between 62 countries (which account for of 92% of total world trade) conducted over eBay and comparable offline channels, this study shows that the effect of distance on international online trade is substantially lower than in the offline world. The authors identify a reduction of information and trust frictions as the source of this effect.

The dataset covers all eBay B2C transactions for a chosen basket of consumer goods with a fixed price, disaggregated into 40 product categories, over the period 2004-2007. Using a framework where geographical distance is the sole proxy of trade cost, the study finds that 'elasticity of distance' (measuring the impact of distance on trade volumes) is 61% smaller online. When controlling for other

factors such as a common language, common legal system, a border, colonial history or a free-trade agreement, the coefficient for distance decreases both for online and offline markets, but the elasticity of distance is still 65% smaller online. This holds for all categories of goods.

However, distance still matters significantly for trade, and this is attributed to shipping costs, trust frictions or information frictions. The paper finds that the impact of distance depends on reputation. When distinguishing between 'powersellers' and non-'powersellers' – based on the eBay rating system that indicates a reputable seller with consistently high reviews and a large quantity of sales – the impact of distance is substantially greater for non-'powersellers'.

To investigate the importance of search costs associated with product information, the paper uses estimates of the elasticity of substitution (as substitution decreases when there is a stronger need for product information), trademark intensity (using data from the WIPO Global Brand Database) and the number of complaints by trademark owners to eBay about potentially illegal transactions. For categories with low trademark intensity and higher costs of searching for known products, the difference in the impact of distance is greater. The paper also finds that with higher levels of corruption or less information about a particular country, the difference in the impact of distance between online and offline markets is greater. This suggests that concerns about information and trust may be more limiting for offline cross-border trades.

In order to control for buyer differences, the analysis also covers the impact of social equality and internet penetration. The underlying assumption is that in societies with very unequal income distribution and low internet penetration, the customers who are able to use eBay have quite distinctive characteristics. Indeed, the difference in impact of distance between offline and online markets is greater in countries with an unequal income distribution and in countries with low internet penetration. However, the authors argue that in exporting countries "*as international as Hong Kong*" and importing countries "*as equal as Sweden*", distance would still matter less online.

Lastly, the study estimates the increase in consumer welfare resulting from geographically wider online markets, finding that on average the equivalent increase in real income would be 29% (ranging from 80% in Brazil to -0.9% in Belgium).

What does Economic Research tell us about Cross-border e-Commerce in the EU Digital Single Market? A Summary of Recent Research (Martens, 2013)

The paper is aimed at providing a non-technical summary of the latest economic research studies on cross-border e-commerce in the EU and elsewhere. The author points out that much of the literature comparing online and offline cross-border trade has focused on B2C transactions, which ignores that offline trade is more likely to involve

B2B companies and wholesalers who distribute the goods in domestic markets. He also highlights that cross-border trade is not an end in itself, but that the ultimate objective is to increase consumer welfare through the removal of trade barriers.

The literature reaches similar conclusions on the reduction of trade costs in online markets, largely due to lower information costs, but there is still a 'home bias' reflecting preferences for domestic products or language effects. There are classes of goods that are strongly culture-dependent for which distance has a particularly large impact on trade.

In summary, the study highlights that despite the reduction in information and search costs brought about by e-commerce, *"there is no evidence yet that suggests that consumer preference for domestic over foreign purchases is lower online than offline. The promise of the "death of (geographical) distance" may to some extent be replaced by a strengthening of cultural and linguistic distance. Online infrastructure components such as an efficient parcel delivery system and interconnected electronic payments systems may somewhat reduce trade costs and facilitate cross-border e-commerce but they are unlikely to fundamentally change the observed behavioural patterns."*

Policy measures should not only focus on increasing the volume of trades on online markets (as points in the EU Digital Agenda stipulate) but on increasing consumer welfare. Stronger price competition and a greater variety of supply and consumer choice available through online suppliers, and reductions in consumer transaction costs (time gains, transport costs) might substantially improve consumer welfare regardless of the volume of online cross-border trades.

Google, Facebook, Amazon, eBay: Is the Internet Driving Competition or Market Monopolization? (Haucap and Heimeshoff, 2013)

This paper looks at the characteristics of online markets such as search engines, online auction platforms and social networks, and assesses their implications for competition policy. Specifically, it notes that several internet markets, often fuelled by network effects, are characterised by highly concentrated market structures. Google, YouTube, Facebook and Skype are identified as dominating their respective relevant markets, arguably leaving room for only a small competitive fringe.

In some cases there are strong incumbency advantages that go beyond network effects. For example Google benefits from being an established market player with access to historical search data (in addition to a large active user base) as it can use this data to refine its algorithm and improve the search services it provides. This affords the firm a significant advantage over any potential new entrants.

The possibility for users to multi-home could lower market

concentration and reduce market power held by the dominant incumbent. The authors note for instance that it is easier for users to multi-home in the case of online travel agencies such as Expedia, and social media platforms such as Facebook, providing greater scope for competition in these markets. However, in the case of online trading platforms such as eBay, it is more difficult for users to multi-home as switching costs are more significant.

Competition, Efficiency and Market Structure in Online Digital Markets. An Overview and Policy Implications (Cambini et al, 2011)

This paper reviews the burgeoning literature on e-commerce and its impact on market structure and competition. In particular, the paper examines five main topics:

- In relation to the efficiency of electronic markets (e-markets) relative to traditional markets in relation to price levels, price elasticity and menu costs, the paper notes that earlier studies in the late nineties on the impact of e-commerce on price levels often found higher prices online than offline, specifically in the markets for second-hand cars, CDs, books and software whilst later studies found evidence of lower prices online compared to offline for CDs and books, life insurance and new automobiles. This may be due to e-markets not having been fully developed at the time of the earlier studies, and that effective competition took some time to develop. The effect of e-commerce on price elasticity is mixed. Some studies found that internet search transformed demand to be extremely elastic in particular for online books, whilst others found that consumers who bought groceries online were less sensitive to price compared to offline as they were less keen to switch from a web interface they were comfortable with as well as less willing to test the services of a new retailer. Prices are being updated more frequently online, and price adjustments are smaller, which suggests lower menu costs. This should avoid concerns about price stickiness.
- In relation to the level of price dispersion and competition in e-markets, the literature shows that price dispersion persists in e-markets. This may be because of product heterogeneity including in relation to delivery times offered and shipping costs; brand trust and awareness which is more important in e-markets because of spatial and temporal separation between buyers and sellers; lock-in or switching costs faced by consumers; price discrimination and market segmentation; and imperfect information and consumers' limited rationality
- The use of 'shop bots' (or 'gatekeepers') that perform comparisons on price and product information online can affect competition. The existing literature mostly focuses on the structure of such fees charged by information

intermediaries for their services, in particular, in relation to indirect network effects given the two-sided nature of such price comparison platforms.

- Regarding online privacy and use of data collected online, the paper summarises how firms collect and use data, including to price discriminate, perform targeted advertising and price steer. The net benefit of such data use is often ambiguous. Some studies have found that schemes that offer consumers higher levels of digital privacy may not necessarily result in greater benefit for consumers.
- Regarding price dynamics and collusion in online digital markets, a number of studies provide some empirical evidence that suggests the largest retailers in the US online book market do not set price competitively, noting that similar collusive behaviour may also be found in other developing online markets.

Overall, the finding is that existing competition law frameworks are generally capable of dealing with competition issues that arise from e-commerce.

E-commerce and the Market Structure of Retail Industries (Goldmanis et al, 2010)

The authors examine three industries in which e-commerce is perceived to have had a substantial impact, namely: travel agencies, bookstores and new car dealers. The study finds that growth in internet purchasing is associated with changes in market structure; in all three industries. The number of small brick-and-mortar establishments falls, whilst there is no significant impact on the number of larger firms.

The authors propose a theoretical model of general equilibrium based on the assumption that online shopping reduces search costs. According to the model, take-up of online shopping will lead to relatively inefficient firms losing market share or sometimes exiting the market.

The theoretical prediction is tested empirically using US data from 1994-2003. For 345 distinct geographic areas, the dataset captures the number of brick-and-mortar establishments in each industry²⁷¹ and the percentage of consumers who shop online (in general). Employment data is used to classify each establishment according to size, on the basis of the number of employees. Across all three industries, increased take-up of online shopping is linked to a reduction in the number of smaller establishments, with no significant impact on larger establishments. If smaller

²⁷¹ A firm might own multiple establishments and these would be represented individually in the dataset.

establishments are indeed relatively less efficient (e.g. because of economies of scale), this confirms the theoretical predictions.

While the general pattern is common across the industries, the study notes differences in the mechanism of change. The number of travel agency establishments fell by 35% between 1997 and 2003, predominantly because of a fall in the number of small establishments. The analysis links this to the increasing penetration of online purchasing. A 15% increase in the fraction of consumers making purchases online (equal to one standard deviation) corresponds to a 13% (21%) drop in establishments with 1-4 employees (5-9 employees). The trend is common across geographic areas and seems largely caused by airlines' nationwide cuts in agent commissions in response to consumers' increasing purchasing of tickets online, direct from the airline.²⁷² The authors also speculate that the larger establishments are more likely to have made the transition to click-and-mortar business models; they "*may host the very portals that led to the decline of their smaller competitors*".

On the other hand, the market structure changes in the case of bookstores seem more linked to local market effects. The exit of small establishments was more pronounced in geographic areas where e-commerce penetration increased relatively rapidly. This suggests that the effect is predominantly related to reduced search costs among particular geographic groups of consumers, rather than aggregate-level changes (such as the nationwide commission cuts in the travel industry), of which there is no evidence.

Finally, the new car industry differed from the other two industries in that internet-only sales channels were very difficult to set up under the relevant law. Therefore, e-commerce in this industry was perceived "*purely a demand-side device that lowers consumers' costs of gathering product information*", through comparison and referral services to brick-and-mortar dealers. Whereas in the other two industries the dataset did not capture the market structure of the online-only segment of the market (e.g. sales of books via Amazon), in the new car industry there were virtually no online-only sales, so the full market structure effect of search cost reductions could be captured. In this industry, the total number of establishments did not decline, but rather increased. In areas with particularly rapid take-up of online shopping, the industry saw greater expansion,

²⁷² The first, relatively modest cut is reported to have occurred in 1995, but it was followed by a series of further cuts and by 2002, major carriers had ceased paying commissions altogether. Airline tickets accounted for around 58% of agencies' revenues in 1996; therefore the cuts had the potential to dramatically affect agency revenues.

which may be a consequence of reduced search costs. However, the same general pattern of consolidation was observed again as in the other industries.

Platforms and two-sided markets

Market Power in Online Search and Social-Networking: A Matter of Two-Sided Markets (Thépot, 2012)

This paper reviews the economic theory of two-sided markets, looks at the market for search and social networking websites (focusing on Google and Facebook) and provides a framework for assessing market power in these markets.

Google and Facebook are prime examples of platforms, bringing together users and advertisers. Both are market leaders, accounting for about 85% and 65% of online search and social-networking traffic in 2011 and 2012 respectively:

- Google provides search tools to users and sells customised advertising space to businesses.
- Facebook provides a platform for users to create content and communicate with each other but also enables businesses to create pages and display adverts or 'sponsored stories' based on known user data.

Users and advertisers in both cases are connected via network (or feedback) effects. For example, advertisers' demand increases with the size of Facebook's user base and the number of Google users. Users may be driven away by too much advertising, but benefit from the improvements in search technology and the greater range of social networking tools that the platform may be able to offer from attracting more advertisers.

In general terms, pricing decisions of two-sided platforms take account of network effects: demand on one side depends not only on prices on that side but also on demand on the other side, so adopting a dual pricing strategy that induces participation of both types of users is necessary for an efficient outcome. Competition authorities need to take into account that in such two-sided markets, the price structure might not reflect the relative marginal costs of serving each customer group, but this need not indicate that the market is not competitive. In particular, high margins on one side do not necessarily indicate market power and prices below cost on the other side are not necessarily predatory (one may offset the other). More competition between platforms might affect price levels but not necessarily the structure of prices.

In the context of market definition, this means that the SSNIP test, often used to establish market boundaries, needs to be applied carefully as it is susceptible to feedback effects between both sides of the platform. In order to determine the relevant market for the

platform as a whole, both sides of the platform and the network effects linking them need to be taken into account. Some authors have developed SSNIP tests that can be applied to two-sided markets but they require detailed information about feedback-effects.

An alternative way of defining the relevant market would be to look at how Google and Facebook monetise their platforms, with Google making profits from users' search queries and Facebook monetising their users' profiles, and both collecting and pooling user information to offer finely targeted advertising products. However, Thépot notes that competition authorities are unlikely to define markets as wide as "*monetisation of users' information to advertisers*".

Competition authorities tend to favour narrower market definitions. For example, in all its decisions, the European Commission has found a separate market for online advertising distinct from offline advertising. With online advertising, one may further distinguish between search-based and non-search based advertising. Google offers the former when ads only appear after the user has typed in a certain query, meaning that the advert is likely to be relevant to the user's current needs, which may justify looking at the different forms of advertising as separate services. On the other hand, non-search-based advertising can also be tailored to a particular audience, using for example Facebook's user data. The European Commission, in the Google/DoubleClick case, noted that the two types of online advertising might be considered substitutes "*as differences of technicalities and aims (brand awareness can be created by both types) between both tend to diminish*", whilst the FTC decided in the same case that search-based advertising and non-search based advertising could not be in the relevant market.

According to the study, the current trend seems to be for advertisers to use both forms interchangeably, which could potentially put Google and Facebook in the same market for online advertising. This would have a significant effect on their respective market shares.

The feedback effects that are characteristic for platforms are also relevant in relation to establishing market power, as they can give rise to substantial entry barriers. For example, in order to enter the market for search advertising, a potential new competitor would have to gain enough users first in order to make their platform attractive for advertisers, which might be an insurmountable barrier (even in the case where the new entrant had a more efficient search algorithm, for example). Similarly, whilst setting up a social networking platform is not particularly costly, there are only incentives for users to switch to the new platform if enough other users do so. These strong network effects mean that the market always tends towards few large platforms (or perhaps just one platform), with competition occurring for the market rather than in the market.

Defining Markets That Involve Multi-Sided Platform Businesses: An Empirical Framework With an Application to Google's Purchase of DoubleClick (Noel and Evans, 2007)

Noel and Evans show that applying standard tests used to define markets, such as the traditional (one-sided) SSNIP test, yield biased results in a two-sided environment. In particular, using a standard SSNIP test to evaluate the relevant market for assessing competition between symmetric²⁷³ platforms with positive network effects will result in a market definition that is too narrow, because the link between the two sides further reduces the profitability of a price increase on one side by reducing participation on the other side.

The authors show that formulae for Critical Loss Analysis need to be adjusted in the two-sided market case. Critical Loss Analysis is an implementation of the SSNIP test that compares Critical Loss (CL) and Actual Loss (AL). CL is the percentage loss in quantity that would be exactly enough to make an X% price increase for the hypothetical monopolist's products unprofitable. AL is the estimated percentage loss in quantity that the monopolist would suffer if it increased prices by X%. The relevant market is defined as the set of product for which CL=AL for a hypothetical monopolist.

Two biases arise when the standard formulae for CL Analysis are extended to platforms.

First, because the one-sided estimate does not account for feedback effects, an estimation bias arises. An unbiased estimate of the short-run own-price elasticity of demand (where short-run means that feedback effects have not commenced) underestimates the full effect of a price increase because it does not take into account the negative effect on the other side for the platform, and the interaction between the two sides which implies a multiplier effect of this bias over time.²⁷⁴ Evans and Noel's generalised AL formula takes this bias into account.

The second bias, called the Lerner bias goes in the opposite direction: if the single-sided price-cost mark-up is used to estimate the short-run elasticity of demand, this estimate overstates the long-run price elasticity that would apply over a sufficiently long time period to allow all feedback effects to have worked through the platform. As a result, markets may be defined too broadly.

²⁷³ Symmetric platforms are those that serve coincident sides. Asymmetric platforms have only one side in common.

²⁷⁴ A price increase on one side of the platform reduces participation on that side and over time, it also affects participation on the other side negatively. But when this happens, the platform is less valuable to the customers on the first side so demand here contracts further, which again affects the other side and so on.

The net impact of these biases is unclear for symmetric platforms, and matters are even more complicated with asymmetric platforms. Overall, market definition exercises that are overly formalistic should be avoided for multi-sided platforms.

The Antitrust Analysis of Multi-Sided Platform Businesses (Evans and Schmalensee, 2012)

This paper summarises the economic theory on two-sided markets, considers antitrust issues in relation to multi-sided platforms and demonstrates that many antitrust tools used for single-sided firms cannot directly be applied to multi-sided platforms. It specifically considers mergers, exclusive dealing and predatory pricing, highlighting the issues that arise in multi-sided platforms and summarising the existing literature.

When defining the relevant market and assessing market power, competition authorities need to consider feedback effects and the welfare impact of alleged anti-competitive behaviour.

In a merger case, competition authorities should investigate whether social welfare would decrease or increase after the proposed merger, considering unilateral and coordinated effects and efficiency. Evaluating these effects is more complicated for multi-sided platforms and standard formulae used to assess unilateral effect may be too simplistic. Additionally, as mergers of multi-sided platforms increase the size of all customer groups, there is increased scope for benefiting from network effects – an efficiency gain that might offset anti-competitive effects.

In relation to assessing exclusionary behaviour, the need for a critical mass of users is important. Achieving critical mass on all sides might be challenging for a new entrant and the firm might build up its customer base sequentially (e.g. only approach advertisers once there are enough users). It is sufficient to limit access to one side of the platform (e.g. through exclusive dealing) to block new entry. At the same time, exclusionary tactics could under certain assumptions increase welfare because both sides of the platform benefit from more users on one side through feedback effects (as long as price increases do not offset this benefit). Exclusive arrangements may also be desirable because they could allow new entrants to differentiate themselves from incumbents.

Below-cost charges are not necessarily an indication of predatory behaviour. Platforms may charge prices below marginal cost to some sides for good efficiency reasons and recover their total costs overall. It is therefore more difficult to establish whether a firm is engaging in predatory pricing practices. An indication of predatory pricing could be a change in pricing policy or lowering overall prices for no apparent reason. However, competition authorities need to consider whether there has been a change in demand on either side of the platform, as this would justify a change in relative prices.

Market Definition in Two-Sided Markets: Theory and Practice (Filistrucchi et al, 2013)

This paper discusses the appropriate approach to defining relevant antitrust markets in the case of two-sided platforms. The authors set out principles that should help competition authorities to identify under what conditions it is appropriate to define to separate (but interdependent) markets covering each side of the platform and where a single market including both sides needs to be defined. They also identify the exceptional conditions under which a one-sided approach would be harmless.

Analysing findings from a number of competition cases considered by authorities in Europe and the US, the authors find a general consensus that the two-sidedness matters, but current practices do not generally reflect the consensus. This may result in wrong findings and may indicate a failure fully to incorporate lessons from the economic theory of two-sided markets into the application of competition law principles. It may also stem from the desire to be consistent with previous practice, or be the result of higher data requirements and the higher complexity of empirical analysis in cases involving two-sided platforms.

Starting from the recognition that indirect network effects are the defining characteristic of a two-sided market, where the structure of prices charged to the two customer groups matters, the paper distinguishes transaction and non-transaction markets. In the former, customers on the two sides of the market interact directly with each other (e.g. in the case of an e-marketplace there is direct interaction between buyers and sellers with money and goods being exchanged). In the latter, no direct interaction takes place (e.g. there is no direct interaction between the advertisers on a media platform and the platform's other users).

In the case of a two-sided transaction market, the platforms that are considered to be substitutable by one customer group by definition must be substitutable from the perspective of the other; it is therefore appropriate to identify a single market comprising both sides. By contrast, in the case of non-transaction markets, customers on either side may consider different platforms as substitutes, so it would be appropriate to identify two separate, but inter-related markets. Even in this case, both sides need to be considered (e.g. in terms of feedback effects), unless the indirect network externalities are working in only one direction. In the latter case, it is only necessary to consider the side(s) that do(es) not generate externalities and the typical one-sided approach can be applied without problems. An example would be newspaper advertising, where the greater circulation of a newspaper makes it more attractive for advertisers, and thus an increase in readership

generates a positive externality. If advertisers do not create externalities for readers, then looking at the advertising side only and ignoring the reader side would be reasonable.²⁷⁵

In relation to the SSNIP test, the authors argue that in two-sided transaction markets the relevant price is the sum of charges to both customer groups. When looking at two-sided non-transaction markets, it would be appropriate to consider the impact of hypothetical price increases separately for both sides. In both cases the analysis should be undertaken under the assumption that the hypothetical monopolist would optimally adjust the balance of prices, and it should consider feedback effects.

By implication, if a single-sided SSNIP test is undertaken in relation to one side of a two-sided non-transaction market, then the resulting market is likely to narrow; the result may still be used to provide a lower bound on the scope of the relevant market.

If a two-sided SSNIP test is used without including the optimal adjustment of the price structure by the hypothetical monopolist (as would be the case under the approach proposed by Noel and Evans – see above), then the resultant market is likely to be too wide. Such a test can then provide an upper bound on the scope of relevant market.

Price Coherence and Excessive Intermediation (Edelman and Wright, 2015)

The paper looks at the use of intermediaries by buyers (for instance, payment systems such as Visa or online trading platforms such as Amazon) and models the effects that arise when these intermediaries impose price parity (or MFN) clauses on sellers.

Intermediaries often offer buyers who use their services benefits such as cash rebates in the case of credit cards or payment protection services in the case of Amazon. Investments in these benefits are recouped from fees charged to sellers. Sellers in turn pass this cost on to buyers who purchase via the intermediary in the form of higher retail prices. Without price parity clauses, buyers who purchase directly from sellers may pay a lower retail price in exchange for not enjoying these benefits. Only buyers who value the benefits offered by the intermediary more than the difference in retail prices will use the intermediary.

When price parity clauses are imposed, the differential between the seller's retail price and that charged by the intermediary is eliminated, such that prices across different channels are coherent.

²⁷⁵ We note, however, that it is unclear that this assumption is justified where there are feedback effects through prices, e.g. where changing advertising rates also has an impact on the cover price of a newspaper and thus affects readership.

Price coherence softens competition as neither the seller nor a potential new entrant or existing rival intermediary, who may be more efficient, can compete on price. As buying directly from sellers is no longer cheaper, more buyers use the intermediary (to enjoy the benefits offered), further strengthening the intermediary's bargaining position with sellers. Price coherence therefore allows an intermediary to increase its fees to sellers without losing buyers to the direct sales channel. This means that it can increase its investment in buyer benefits and pass the costs on to sellers without concern about any loss in usage of its platforms (as long as sellers do not refuse to deal through the platform). With higher buyer benefits, even more buyers, again, will join the platform. As a result, intermediaries will over-invest in buyer benefits to draw buyers, and buyers will over consume intermediation. Ultimately, such over investment and over consumption will lead to inflated retail prices and lower consumer surplus.

These inefficiencies are not specific to a monopolistic market structure. In the case of multiple competing intermediaries and without customer multi-homing (a key assumption), price coherence prevents price competition and instead steers intermediaries to compete on buyer benefits, potentially exacerbating these inefficiencies. The paper provides some practical examples of rising retail price levels over time in the case of credit card payments and travel booking networks.

In the case of travel booking networks, travel agents (TAs) tend to buy air tickets from Global Distribution Systems (GDSs), and thus airlines sell to TAs via GDSs. Different GDSs are not interoperable and using multiple GDSs would require "*systems that are not widely available to combine their results*". Hence multi-homing costs are high and TAs tend to use a single GDS, choosing according to the incentive payments offered. Both the fees charged by GDSs to airlines and incentive payments made by GDSs to TA have increased over time.

Informational issues

Reviews, Reputation and Revenue: The case of Yelp.com (Luca, 2011)

This empirical study examines the impact of the review website Yelp on the restaurant sector in the Washington state. Yelp had become the dominant source of restaurant reviews for the area, and according to the study the internet appears to improve the availability of information about experience goods.

The dataset used matches restaurant reviews from Yelp with restaurant revenues obtained from the State department. The dataset covers more than 1500 restaurants on a quarterly basis over several years. Yelp prominently displays average ratings for individual restaurants, rounded to the nearest half-star (users may

choose to browse additional details, such as the exact average rating and the text of individual reviews), and the rounding thresholds can be exploited using a regression discontinuity design: when a restaurant goes from being marginally rounded down (e.g. average rating 3.24, three stars) to marginally rounded up (3.26, three and a half stars), the change in its rounded rating is mostly exogenous.

The key findings are that a one-star increase in the rounded average rating is associated with a 5-9% increase in revenue. This effect is entirely driven by independent restaurants. There is no observed effect for chain restaurants, which supports the theory that consumers already have substantial information about the quality of chain restaurants and that Yelp is predominantly providing consumers with information about the quality of independent restaurants. The revenue of chains overall has decreased over time while consumer usage of Yelp has increased.

Opinion Spam and Analysis (Jindal and Liu, 2008)

The study looks at how 'review spam' posted by consumers and firms may dilute the benefits of e-commerce associated with improved access to (authentic) information for buyers.

Three possible types of review spam are identified, namely

- untruthful opinions (or 'fake reviews'), which include 'hyper spam' (undeserving positive reviews) and 'defaming spam' (unjust negative reviews);
- reviews that only comment on the brand, rather than the specific product;
- non-reviews (e.g. advertisements).

The authors analyse 5.8 million reviews by 2.14 million reviewers on Amazon.com.²⁷⁶

The authors find that opinion spam on Amazon.com reviews is widespread, though it is still likely to account for a small minority of total user activity. Many spam reviews are likely to have been written by the same group of users.

However, the authors emphasise that this only an initial investigation and further work should be carried out.

²⁷⁶ In order to automate the analysis of reviews, the authors rely on supervised learning with manually labelled training examples. Whilst this is effective in identifying the second and third type of review spam, it is less effective for the first type given that fake reviews may be deliberately crafted to appear authentic. The authors therefore assume that duplicate or near-duplicate reviews that are not identified as the second or third type of review spam are likely to be untruthful opinions. The most common type of duplicates found were reviews of different products from the same user that are duplicates (often exact duplicates), posted on the same day. Such reviews can then be used as training examples.

Promotional Reviews: An Empirical Investigation of Online Review Manipulation (Mayzlin, Dover and Chevalier, 2014)

The paper looks to provide empirical evidence of the extent to which firms manufacture 'promotional reviews' (positive reviews for their own, and negative reviews for rivals' products). The authors compare hotel reviews on TripAdvisor, where anyone is able to post a review, to reviews on Expedia, where only users who have booked at the hotel through the website may do so. The methodology does not require promotional reviews to be detected (which is difficult as such reviews aim to mimic unbiased reviews) but rather exploits the different business models of the two websites.

The authors use theoretical models that link the incentive to write promotional reviews ('manipulation') to the cost of doing so. Not only do the costs of manipulation affect the amount of manipulation in equilibrium, but heterogeneity in such costs across websites may result in differences in behaviour.²⁷⁷

On a website such as TripAdvisor, the cost of manipulation reflects the possibility of being exposed, which could lead to fines, lawsuits or other costs in terms of the effect on consumer opinion. The study's key assumptions are that the benefit accrues only to one hotel²⁷⁸ and that the cost increases with the number of hotels owned or managed by a firm. This is because any resulting action after manipulation is discovered is likely to implicate the entire organisation that is responsible.²⁷⁹ Therefore, the net benefit from trying to manipulate reviews should be greater for small firms that own only one (or few) hotels.

By contrast, the overall cost of manipulation is increased significantly if the website (such as Expedia) requires users to incur a cost (e.g. make a purchase) before being able to write a review.

²⁷⁷ The authors note that in the case where costs are heterogeneous, high-cost firms may be disadvantaged. This is because even though consumers may be aware that manipulation takes place, without being able to observe cost differences they will underestimate the extent of manipulation from low-cost firms and overestimate the extent of manipulation from high-cost firms.

²⁷⁸ The authors acknowledge a possible counterargument based on positive reputational spillover effects, but they argue that such spillovers are unlikely since the websites are set up for reviews of individual hotels. Moreover, spillover effects could only apply to positive promotional reviews – fake negative reviews of rival neighbouring hotels could only benefit one hotel rather than the brand as a whole. Finally, the analysis allows the authors to look specifically at hotels owned by multi-unit owners, but not affiliated to a brand or chain. In this case, spillover effects are implausible.

²⁷⁹ The authors cite an example where the actions taken by TripAdvisor and the media coverage seem to support the assumption.

Thus, the overall amount of manipulation should be lower, and differences between large and small firms should be reduced.

Based on the above, the authors seek to test the following claims:

- small firms write more promotional reviews (both positive and negative).
- firms near to many competitors (especially small competitors) will have more fake negative reviews.

They use data on around 3000 hotels from 50 US cities that have reviews on both websites. The review data was matched with third-party data on hotel ownership (e.g. independent or branded, single or multi-unit ownership, or operated by a multi-unit management company). Data on location and other characteristics was used to create as control variables.

For each hotel and each website, the authors calculate the percentage of reviews that have a very high score and a very low score, and then compare these percentages across the two websites for the same hotels. These ratios are then used to test the claims, e.g. by testing whether independent hotels have a higher TripAdvisor/Expedia ratio of high scores, which would support the claim that small firms write more (positive) promotional reviews. Empirical support is found for both claims, and the conclusions are robust to using an alternative dataset from another website similar to Expedia.

Overall, the study indicates that manipulation of reviews exists, but that it is not widespread, perhaps because of the fear of substantial reputational risks.

Search costs and price competition

Information, Search and Price Dispersion (Baye, Morgan and Scholten, 2006)

The paper provides a comprehensive overview and analysis of the theoretical literature that seeks to explain price dispersion in markets for homogeneous goods, including online and offline markets. It also provides an overview of the relevant empirical literature, which shows that price dispersion is fairly common even in online markets.

The authors review a number of search-theoretic models (which consider various search processes that consumers might follow, such as making an upfront decision to obtain a fixed number of quotes, or search sequentially and stop according to some rule), models that involve third parties acting as an 'information clearinghouse' (e.g. price comparison websites) and models that involve bounded rationality of consumers and firms. Different models may be appropriate for looking at different market environments, and in general terms the predictions of the impact of search costs on price

dispersion depend strongly on the model specifics. Lowering search costs can either increase or decrease the variance of prices in equilibrium. Similarly, heightened competition can increase or decrease price dispersion, and – as the authors state – “*a little bounded rationality goes a long way in explaining price dispersion.*”

The empirical literature is concerned with testing various hypotheses about the impact of search costs on price dispersion. A common issue across all these studies is how price dispersion should appropriately be measured.²⁸⁰ The further challenge that has to be addressed in any empirical analysis is to pick the model that is most appropriate and to control for exogenous factors, as well as the fact that firms’ attempt to optimise their pricing in light of consumer search behaviour affects the data, but is not necessarily captured in all models.

The literature broadly confirms the hypotheses that consumers will search more when purchasing expensive items (i.e. items that account for a large proportion of the buyer’s expenditure) and for items that are purchased frequently.

Of particular relevance to e-commerce is the relationship between price dispersion and search costs, which strongly depends on the assumptions made about the underlying search process (i.e. the model) and may be difficult to measure because search costs are unobservable. A study of the market for life insurance over the period 1992-97 found a close match with the predictions of one of the clearinghouse models, where price dispersion initially increases with the proportion of shoppers who have low search costs, but then decreases after a critical threshold has been crossed. Using internet penetration as a proxy for the proportion of shoppers with low search costs, the study finds that price dispersion initially increases, but then starts to decline as more than about 5% of customers use the internet to compare terms and prices.

More broadly, the literature comparing price dispersion in online and offline markets has produced mixed results. This should not be surprising given that there are sound theoretical reasons why lower search costs lead to either higher or lower price dispersion. Indeed, in some cases, dispersion is greater online than offline, even after accounting for shipping costs. Looking at the price difference between online and offline purchases, results are similarly mixed. Online prices for automobiles tend to be lower than offline prices,

²⁸⁰ The paper discusses the relative merits of a number of commonly used measures such as the variance in prices (which may be standardised as a coefficient of variation), the price range (highest price minus lowest price), the ‘gap’ between the lowest and second-lowest prices, or the difference between average observed price and lowest observed price.

and this is not explained by the fact that online buyers are more adept at negotiating discounts. On the other hand, studies of prices for travel services, books, CDs, software and vitamins found that online prices are the same or higher. We note that some subsequent studies challenged the latter findings.

There is broad support for the hypothesis that the number of sellers matters for price dispersion, with findings of lower prices and lower price dispersion as the number of competitors increases.

Finally, some studies look at the extent of so-called temporal price dispersion, where firms change prices over time so that their relative position in the distribution of prices changes. Such price dispersion occurs persistently and will not be reduced over time to reflect differences in firm costs. While heterogeneity of firms is often found to be a major source of price differences, even after controlling for these differences economically significant levels of price dispersion are found. There is evidence of such persistent price dispersion online, for example in relation to consumer electronics, CDs, movie videos and books.

In conclusion, the empirical literature shows that price dispersion is ubiquitous and persistent, regardless of product, sales channel or time period. Despite innovations that have reduced search costs (including the internet) "*[r]eductions in information costs over the past century have neither reduced nor eliminated the levels of price dispersion observed in homogeneous product markets*".

A Nearly Perfect Market? Differentiation vs. Price in Consumer Choice (Brynjolfsson et al, 2010)

This study looks at search costs, product differentiation and heterogeneous consumer preferences expressed through click-through rates on books listed on a 'shop bot' (an automated comparison site showing price, shipping costs, retailer etc.). It finds that consumers face non-trivial search costs in online markets (consistent with other studies) and that consumers who searched more intensively placed greater importance on non-price factors, such as brand and delivery times.

The study relies on a sample of 12 months of search data from DealTime.com of the top 100 bestselling books, with information on click-throughs, price, delivery time, reputation and the screen on which the offer is displayed. Each screen lists ten offers, and by default, offers are listed by price (though this can be changed).

Half of the customers were found not to click on the offer with the lowest price. Therefore, although goods were homogeneous, the consumers viewed the 'bundled good' (the book and the retailer's brand / services) as differentiated.

Consumers show different behaviours. Most consumers only click on the first screen (91%) and others click on offers beyond the default

screen (9%); almost none rank products by an attribute other than price (less than 1%); a few click on multiple offers (16%).

Consumers who only clicked on the first screen were the most sensitive to price. Those who clicked through to later screens were the least sensitive to price and exhibited strong brand preferences. Consumers also valued shorter delivery times. Consumers who clicked on more than one offer had a low responsiveness to delivery times but had a preference for brands.

In summary, the study provides empirical evidence of consumer sensitivity to non-price factors used by retailers to differentiate their offerings and of non-trivial search costs.

Search, Obfuscation and Price Elasticities on the Internet (Ellison and Ellison, 2009)

This paper uses data from a price comparison website (Pricewatch²⁸¹) and firm-level data in order to measure the effect of e-commerce on the tendency for consumers to compare prices online, testing the early predictions that the internet will bring about 'frictionless commerce'. In particular, it considers whether the evidence supports the hypothesis that e-commerce enhances consumer search and boosts price competition, but also whether retailers might respond by adopting obfuscation strategies in the online environment.

In general terms, obfuscation may be any behaviour by firms that raises consumers' search costs or increases the proportion of consumers that have to incur search costs. A specific – and more tractable – form of obfuscation is the use of add-on pricing schemes, where firms post prices for low-quality products on a price comparison website but do not make the price of higher-quality upgrades easily observable. Customers learn about these add-on prices only on the retailer's web site, and incur a cost in comparing prices charged by competing retailers for high-quality versions. Retailers can exploit this by marking up high-quality versions. The margin earned on high-quality versions theoretically might be competed away by lowering the price of the low-quality product to attract consumers, but if such price competition then attracts predominantly consumers who are unlikely to upgrade (an adverse selection problem), this effect may be muted. Retailers instead have an incentive to maximise the proportion of customers who choose to upgrade, e.g. by taking a low-cost, high-value feature out of the low quality version and make it available in the high quality version.

The study covered the supply of memory modules, served by a large number of small firms selling memory upgrades and other computer

²⁸¹ A price search engine popular with customers looking for computer parts.

parts mainly through Pricewatch. Pricewatch lists suppliers of a particular part by price (with twelve entries per page), and there is substantial re-shuffling in the sorted lists as retailers change their prices fairly frequently. The study used priced data, collected hourly, over a one-year period for the twelve or 24 lowest priced products in four predefined categories, and prices and quantities sold from an internet retailer operating two websites. Data provided also included wholesale costs. The supplier offers three quality levels, differentiated by the quality of the physical product and contract terms (e.g. life time warranty vs. limited warranty, re-stocking fees, return shipping paid etc.).²⁸²

Estimation of elasticities showed that demand for the low-quality products whose prices are listed on Pricewatch is extremely price sensitive, reflecting the importance of the Pricewatch ranking in driving sales. Low-quality goods are an effective 'loss-leader', meaning that this rank effect extended to driving sales of medium and high-quality goods as well. Further analysis confirmed that purchasers of medium and high-quality goods were influenced not only by the price of those goods themselves – as would presumably be the case if consumers were perfectly informed – but also by the retailers' Pricewatch ranking, which was based on low-quality goods. The fact that this second factor was a significant determinant of purchasing decisions supports the theory that consumer learning about prices online is still incomplete.

The data also supports the existence of the adverse selection effect. For example, when a retailer is ranked first on Pricewatch, its sales mix tends to include a disproportionately high share of low-quality products, meaning that the low price attracts a larger proportion of customers who are not prepared to upgrade. The analysis of mark-ups shows substantially higher mark-ups on medium and high-quality products, with average mark-ups being significantly above the level that the authors estimate would be sustainable without obfuscation strategies.

Thus, whilst the internet clearly facilitates consumer search, as demonstrated by the very high price elasticity of demand for low-quality goods, firms may be able to adopt particular obfuscation strategies that maintain some search costs and support mark-ups.

²⁸² Pricewatch itself is trying to reduce obfuscation (e.g. by requiring the disclosure of shipping charges and including them in the price ordering).

Long tail and competition

From Niches to Riches: The Anatomy of the Long Tail (Brynjolfsson et al, 2006)

The article examines the 'long tail' phenomenon, which links e-commerce to an increase in the range of products bought by consumers, from both the demand side and the supply side.

The phenomenon is apparent in the market for books, where analysis shows that 30-40% of Amazon's book sales are for titles that would not normally be found in a brick-and-mortar store. Consumer surplus is vastly increased as a result of these additional titles being available. Similarly, much greater variety is observed online for other products (CDs, DVDs and consumer electronics).

On the supply-side, the long-tail trend is driven by the fact that:

- the cost of stocking an additional product is generally much lower for an online retailer. In some cases, e.g. where goods can be stored and delivered electronically, the cost may be negligible;
- online markets are geographically wider and allow large retailers to aggregate consumer demand over a large scale and cater for 'rare' tastes as well as mainstream ones;
- changes in the supply chain can reduce costs of producing niche products – e.g. goods manufactured on-demand; and that
- disintermediation can facilitate the supply of niche products, e.g. where artists can promote and sell their music to consumers directly or via an online platform rather than requiring a contract with a major record label.

On the demand side, the long tail is supported by:

- search tools and sampling tools (e.g. book or song previews) that allow consumers to quickly find and 'test' niche products in which they might be interested; and
- recommendation systems that use consumer behaviour and revealed preferences to suggest new products, catering for niche preferences where a consumer is known to have these. Such systems help to expose consumers to niche products that they would be unlikely to encounter otherwise.

While research often focuses on consumer benefits from lower prices online, the authors estimate that consumer surplus gains from increased variety are much greater.

Goodbye Pareto Principle, Hello Long Tail: The Effect of Search Costs on the Concentration of Product Sales (Brynjolfsson et al, 2011).

The paper examines the relationship between search costs and the concentration of product sales, thus providing a demand-side explanation for the 'long tail' phenomenon in e-commerce (as

opposed to the supply-side explanation that links the greater variety of products on offer to lower distribution costs).

The analysis is based on data from a retailer selling through both a catalogue-based mail/telephone order channel and an internet channel (which accounts for roughly 60% of sales).²⁸³ The range of products, prices and information provided (description, photos) are identical in the two channels, as are order fulfilment methods and facilities. Thus, the main difference is that search costs may be lower in the internet channel, as customers have more options for searching and benefit from recommendations.

As the number of products is the same in both channels, a comparison of concentration measures provides a first indication of whether the distribution of online sales is relatively even and less concentrated on a few lead products. The Gini-coefficient is found to be lower for the internet channel (0.49) than the catalogue channel (0.53). Based on estimates of the parameters of a log-linear relationship between sales rank and sales volume, the authors conclude that the difference is statistically significant. The difference is not driven by different customer characteristics – even though there are systematic differences between customers using the catalogue and the internet channels, the difference in sales patterns persists even once customer selection effects are taken into account. An econometric analysis of the unit sales of the bottom 50% of products on a number of variables, including usage of the online search tools and recommendation system, indicates that recommendations and direct searches (where the customer directly searches for the product name or the product code) drive the sale of niche products.

Battle of the Retail Channels: How Product Selection and Geography Drive Cross-channel Competition (Brynjolfsson et al, 2009)

This paper examines the extent to which online retailers compete with traditional brick-and-mortar retailers, differentiating between popular and niche products. Using a dataset that covers the number of 'brick-and-mortar' stores in a local market and consumer purchase data for a large online retailer of women's clothing (selling through both a catalogue (mail/telephone order) and internet channel), the authors show that online retailers face significant competition from traditional channels for popular, mainstream products, but face little competition when selling niche products. Moreover, competition between the online channel and local stores is less intense than between the catalogue channel and traditional retailers, because the online channel sells a greater proportion of niche products.

²⁸³ The retailer also sells through a physical store, but sales through this channel are negligible.

The authors use data on around seven million purchases made over a three-year period (May 2003 to June 2006). The dataset includes the customers' home zip codes and can thus be combined with information about local market structures (the number of brick-and-mortar women's clothing stores in the customer's zip code).

Products are classified as 'popular' and 'niche' products, where popular products are defined as the top products that together generate 80% of sales. Popular products are more heavily stocked in stores than niche products. Estimating the impact of a number of variables on demand, the authors find that the number of local women's clothing stores has a negative and significant impact on demand for popular products, but not for niche products.

Overall, the results indicate the importance of product selection and search costs in shaping competition between online and traditional retailers. Online retailers may be able to offer a greater range of niche products, for which they face less competition from brick-and-mortar stores.

The authors note that their analysis should be applicable to other categories of products, and suggest that the effects identified may be even stronger for products such as books, music and DVDs where a unique identifier facilitates the identification of identical products online and offline, which should further strengthen competition between online and offline channels for popular products stocked by both, but not for niche products that are unavailable in many brick-and-mortar stores.

Price discrimination, personalisation and data collection

Privacy, Economics and Price Discrimination on the Internet (Odlyzko, 2003)

The paper argues that e-commerce strengthens firms' incentives and improves their abilities to price discriminate, driving an erosion of privacy. While price discrimination is usually economically desirable, it can arouse strong opposition from the public. Therefore, firms are likely to use techniques such as bundling that help to conceal the extent of price discrimination.

The author observes that although technologies exist to protect privacy on the internet, technologies that reduce individual privacy tend to have been taken up more widely. The public shows concern about privacy, in some contexts, but generally does little to protect it – e.g. only small benefits are needed to convince many consumers to sign up to store loyalty cards.

The standard explanation for widespread, and sometime intrusive, data collection by firms is that the data gathered enables targeted advertising. However, in the author's view this explanation is not sufficient, rather, a key driver is the incentive to price discriminate, which might offer a much higher payoff to firms than the ability to

target advertisements. The incentive may be particularly strong in online markets where fixed costs are high, relative to marginal costs.

From an economic perspective, price discrimination is often welfare-improving, but public opinion varies dramatically depending on context. Price discrimination is accepted or tolerated in many contexts (such as student and senior discounts, price matching or periodic sales favouring well-informed buyers, or yield pricing by airlines). However, public opposition is strong in others – for example, 19th Century railroad pricing (where the conditions of third-class carriages were made sufficiently bad to ensure that any passenger with sufficient willingness to pay would choose to travel in second-class), attempts to use variable pricing by Coca Cola (which experimented with vending machines that varied price depending on temperature²⁸⁴) or attempts by Amazon to price discriminate, reported in 2000.

To avoid such negative reactions, online firms are likely to use tactics that conceal the extent of price discrimination. Such tactics require a move away from simple cash pricing, e.g. by bundling, incorporating loyalty points in pricing and/or using individualised offers. The author predicts that bundling in particular will be the preferred avenue for price discrimination. Privacy will continue to erode and a firm's knowledge of consumer preferences will constitute an important competitive advantage.

Detecting Price and Search Discrimination on the Internet (Mikians et al, 2012)

Starting from the observation that firms may use consumer data to target advertising and/or to price discriminate, the paper attempts to identify instances of price discrimination on the internet.

The authors visit various online vendors and test whether the prices shown to different users might be affected by technology, geography or personal information. In order to test for an impact of technology, the authors use different browsers or operating systems. To test for geography, the authors access vendor sites through proxy servers in different countries. The impact of personal information is tested by creating user profiles with web browsing histories that conform to two different customer segments – 'affluent' and 'budget-conscious' – and by varying the originating URL (e.g. simulating direct website visits, referrals from search engines or through aggregator websites).

The findings can be summarised as follows:

²⁸⁴ The author suggests that framing played a role in this case, and that opposition might have been driven by the media's depiction of prices being raised in warm weather, whereas an account of prices being discounted in cold weather might have been more acceptable.

- No evidence is found of price discrimination on the basis of technological differences.
- For three websites (selling e-books, downloadable videogames and office products), prices depend strongly on the user's country. For a website selling office products the user's location within the US and within a state also significantly affected some prices. However, these findings do not necessarily indicate price discrimination; price differences may be explained by logistical reasons or varying degrees of (local) competition.
- The different 'personas' did not produce evidence of price discrimination, though differences in search results could be observed: searches on Google and on a hotel booking website returned results with a higher mean price for the affluent customer.
- Varying the URL of origin did affect prices in some cases. Two sellers of office equipment offered lower prices to users that were redirected from an aggregator website, as opposed to accessing the retailer's website directly.

Crowd-Assisted Search for Price Discrimination in E-commerce: First Results (Mikians et al, 2013)

This study follows up on previous work (Mikians et al, 2012), using a crowd-sourcing approach to identify retailers whose prices show substantive variation for further investigation.

Using a browser plugin, the authors gathered price data from 340 test users over a three-month period. Substantive price variation (15% – 40%) was found across a diverse range of retailers, including amongst others bookstores, clothing retailers, office supplies, electronics, car dealers, department stores and travel agencies, with some few cases where prices varied by a factor of two.

A systematic measurement study was then carried out on a specific set of 21 online retailers where widespread price variation had been observed. The size of price variations is typically 10-30% and the cheapest products often see the greatest variation. Prices vary across countries and in some cases within country (US). The authors were unable to attribute the observed price gaps to currency, shipping, or taxation differences.

The authors also note that third-party cookies (which allow tracking a customer's browsing history) are typically present on many websites. They find that almost all (95%) of online retailers present Google Analytics cookies and almost two thirds (65%) include Google's DoubleClick domain. Third party cookies from social networks are also prevalent, with Facebook being in the leading position (80%), followed by Pinterest and Twitter (45% and 40% respectively). Although there is no evidence that an affluent or budget-conscious browsing history affects prices, it would be relatively easy to discriminate according to the user's profile.

Measuring Price Discrimination and Steering on E-commerce Web Sites (Hannak et al, 2014)

The authors observe that personalisation of services is widespread in e-commerce. Online firms may use search and purchase histories to identify products that a user may be interested in, though in some cases they attempt to obfuscate the fact that recommendations are personalised, as users can find this objectionable.

While personalisation may benefit users in some instances, it may be used to a user's disadvantage by customising the products shown ('price steering', e.g. manipulating the selection of search results and their order, which may be masked by ambiguous ranking criteria such as 'relevance') or customising the prices of products ('price discrimination').²⁸⁵ In the author's view, the tools to detect such behaviour are currently not available and the paper makes some contributions to help address this.

Accounts and cookies from over 300 real-world internet users are used to examine 16 e-commerce sites, covering general retail, hotel booking and car booking. Control user accounts are used to differentiate between inherent 'noise' and personalisation based on user characteristics. Further controlled experiments (using fake accounts to simulate different user features including web browser/OS choice, being an account holder, and history of purchased or viewed products) are conducted to examine the impact of specific user characteristics on personalisation.

The study identifies various instances of personalisation:

- Cheaptickets and Orbitz implement price discrimination by offering reduced prices on hotels to members.
- Expedia and Hotels.com engage in 'A/B testing' that steers a subset of users towards more expensive hotels.
- Home Depot and Travelocity personalise search results for users on mobile devices.
- Priceline personalises search results based on a user's history of clicks and purchases.

²⁸⁵ The authors argue that online firms have an incentive to use tactics to induce consumers to spend more money, though they do not present an argument for why price steering and price discrimination should be harmful to consumers overall.

The Economics Value of Online Customer Data (Tucker, 2010)

The author emphasises that the practice of collecting consumer data is not new, but that online data collection²⁸⁶ creates an unprecedented amount of data that can be associated with individual consumers much more precisely. Compared with brick-and-mortar sellers, online sellers can collect various types of information from the moment a user accesses the website, often including the previous website that directed the user to the firm's website, any search terms that were used on the originating website, and any decisions made on the firm's website (not only purchasing decisions, but decisions not to purchase, after having viewed an item). If firms have agreements to share clickstreams with other websites, or agreements with social networking websites, the scope of individual user information that is available may widen substantially.

Online advertising is a prime example of how firms can use the data collected to display different advertisements to different consumers (covering display advertising such as banner ads, search advertising and social media advertising). Targeting makes advertising more effective, and the effectiveness of specific campaigns can be more easily measured than for other media.

At the same time, customers might be expected to benefit from tailored advertising as they receive more useful information. Also, evidence suggests that targeted ads are less obtrusive than non-targeted ads, and the potentially greater effectiveness and profitability of targeted advertising mean that it has greater potential to fund free online content and services.

However, considerable customer resistance to targeted advertising, which reflects privacy concerns, is a major problem for advertisers.²⁸⁷ In addition to privacy concerns, there may be costs to consumers through behavioural price discrimination – e.g. ads with discount coupons targeted at marginal consumers who have shown an interest in a product without making a purchase. When consumers are aware of such practices, they may distort decisions

²⁸⁶ Online data collection techniques include the use of IP addresses which may allow tracking of individual users, (third party) cookies that allow firms to track user activity across browsing sessions, web bugs that allow remote tracking with greater precision than cookies (and are more difficult to avoid) and click-stream data linking individual page requests. Deep packet inspection, which can be carried out by ISPs and is a more comprehensive way of collecting data, by inspecting the contents of data packets.

²⁸⁷ Turow et al (2009) finds that 66% of Americans do not want marketers to tailor advertisements to their interests.

and thus be harmful.²⁸⁸ Other forms of advertising, e.g. social media campaigns designed to generate positive word of mouth, may mislead consumers if they are not recognised as ads.

Apart from targeting advertising, data collected by firms can be used to personalise and improve the services and content offered to consumers. For example, the wealth of data collected by Google can help it to improve its search algorithms. Data about individual users can be used to provide content that is most relevant for the customer (e.g. tailored to the customer's location or personal interests inferred from browsing history). Consumer data can also improve the quality of recommendation systems and it might improve other aspects of a firm's operational efficiency, e.g. by providing real-time data that helps to forecast future demand.²⁸⁹

In conclusion, the collection and use of consumer data has been particularly transformative for the online advertising sector and the online services sector, which has pioneered the use of such data to improve user experience. Concerns arise because some consumers may not be well informed about the data that is being collected and may lack mechanisms through which to control data collection. Another concern arises where firms hold personally identifiable information that might be shared or breached.

Antitrust and the Robo-Seller: Competition in the Time of Algorithms (Mehra, 2015)

The paper discusses the increasing reliance on algorithms for pricing decisions and examines the implications for the application of antitrust law.

It provides a brief overview of the use of algorithms in everyday life and the changes this has brought about in the behaviour of sellers and the expectations of buyers. Of particular note is that algorithms are increasingly entrusted with making autonomous decisions (e.g. in the case of algorithmic trading in the finance sector and are able to make a large number of detailed adjustments on the basis of an ever-increasing amount of data. A striking example is the difference

²⁸⁸ The author suggests that consumers may strategically waste time by trying to behave in a way that is conducive to receiving discounts. However, a consumer would presumably only engage in such behavior if it were net beneficial, so it is not clear why this aspect of price discrimination should result in any harm, compared to an alternative scenario where there is no targeting and price discrimination. Moreover, if such distortions of consumer behavior became commonplace (which seems unlikely), the effectiveness of the advertising strategy would be compromised, such that firms should be expected to adjust their behavior.

²⁸⁹ Data collected for purposes such as product personalisation is closely tied to specific individuals, and usually stored for a longer period of time than data collected for advertising purposes. Therefore, data collected by firms for personalisation purposes presents greater privacy concerns, e.g. in the event of a data breach or in relation to data being shared with third parties.

between the 2.5 million price changes per day made by Amazon in November 2012, compared with about 50,000 price changes made by Walmart over that entire month; even after accounting for the fact that Amazon carries a substantially greater range of products than Walmart, the difference is vast.

With pricing decisions increasingly delegated to software systems that are capable of maximising sales on the basis of a much greater range of information and data, potentially collected in real time, there is a greater risk of tacitly collusive outcomes. Being able to process more data more quickly, robo-sellers can identify deviations from a collusive outcome much better than their human counterparts. They can respond much more swiftly, which in turn makes such collusive outcomes more sustainable. The US Sherman Act may not cover such independent price co-ordination as it does not involve any communication or facilitating practices.

Similarly, the established application of antitrust law to explicit co-ordination or cartel behaviour may not easily apply to co-ordinated behaviour of robo-sellers as it may be difficult to prove intent or the presence of an agreement.

Overall, the paper argues that antitrust law and the established way of its application may not be particularly well suited to deal with potentially anti-competitive effects arising from the use of robo-sellers. Agency law, which might be used to establish responsibility by the users of such systems for the outcomes may be limited in scope, and alternative solutions might therefore be required. Given the efficiency benefits that flow from the use of algorithmic pricing, an outright ban would be entirely inappropriate, and perhaps the best way forward is some form of regulatory oversight similar to the controls that are in place to protect privacy.

Privacy and Competitiveness in the Age of Big Data: The Interplay Between Data Protection, Competition Law and Consumer Protection in the Digital Economy (European Data Protection Supervisor, 2014)

The paper discusses EU approaches to data protection, competition and consumer protection. Many of the issues lie outside the scope of examining the competition policy implications of e-commerce; nevertheless, some pertinent points are raised about online business models, the role of consumer data in online markets and the competition policy implications of these developments.

The paper endorses the view that personal information can constitute an important intangible asset for many companies that operate online. This is a view that has been expressed by the

European Commission.²⁹⁰ In particular, the paper focuses on two-sided online business models that offer free services to users on one side – typically consumers – but collect information about those consumers (e.g. online search providers). The study argues that personal information can be seen as a form of currency that consumers use – willingly or not – in order to obtain ‘free’ services. The personal information then generates revenue for the platform on the other side of the market, e.g. by enabling targeted behavioural advertising.

When online business models are characterised in this way, there are potential implications for competition policy.

Defining the relevant market:

- Markets such as online search, email services and file-sharing have no geographic borders.
- Technological change and business model evolution can blur the borders between product markets, e.g. as online firms broaden their range of services and expand into new areas.
- In the European Commission’s investigation of Google/DoubleClick, the search side of the market was effectively disregarded and the Commission focused on the other side (provision of online advertising space). As such, any effects on consumer welfare – including in relation to the merged entity’s ability to collect and use consumer data – were not considered.

Market power:

- Where services are offered for free, traditional approaches to estimating market power (e.g. from share of sales/volume) are not adequate.
- Market power may depend in part on a firm’s ability to collect and retain personal information; firms may have incentives to deny rivals access to information, e.g. on (alleged) data protection grounds.
- Market power might also be sustained by denying users the possibility of transferring data to another platform and expanding into new markets by bundling or introducing new services (e.g. an email service provider launches a new photo-sharing platform and nudges existing users to take up

²⁹⁰ “Today, personal data are a type of asset for companies” (speech by Vice-President Almunia, ‘Competition and personal data protection’, 26 November 2012); “...big data is not just a new sector, but a new asset class. One that sits as a pillar of our economy, like human resources or financial capital” (speech by Vice-President Kroes, Big Data for Europe, 7 November 2013).

the new service. The more users use the photo-sharing platform, the more they become 'locked-in', as it would require increasing effort to recreate the data on an alternative platform. This may raise entry barriers). In the Microsoft/Yahoo investigation, the European Commission considered the possibility that the merger could increase Microsoft's ability to leverage market power into new areas, but found that this was not a concern in that particular case.

Remedies:

- Specific types of remedies might be considered that are related to data, such as forcing firms to provide options for consumers to control the amount of personal information that they surrender as 'currency'. For example, firms may provide a paid alternative to the free service, where minimal data is collected about individuals. There is some evidence that consumers may be willing to pay a premium in order to protect their privacy.
- Other remedies might include implementing data portability between platforms and imposing strict controls on the purposes for which data can be processed and used.

The Role of 'Big Data' in Online Platform Competition (Lerner, 2014)

This paper argues against claims that consumer data collected by online platforms is conducive to the creation of entry barriers and sustained market power.

In summary, the paper makes the following points:

- The collection of consumer data is widespread, not only among online firms but also by brick-and-mortar businesses.
- There are important pro-competitive rationales for data collection – for instance, to improve quality of services and to monetise user-ship in such a way that allows certain services to be offered to consumers for free.
- Any alleged link between data and barriers to entry is tenuous. The view of data as an 'essential input' is misguided – no one firm holds a substantial share of all consumer data and other inputs and characteristics generally drive competitive success. For example, in its investigation of the Google/DoubleClick merger, the FTC found that the data available to Google did not constitute an essential input to creating online advertising products – its competitors also owned proprietary data that was valuable and that Google couldn't access. Moreover, data is generally non-rivalrous (the same information about an individual can be collected multiple times by different parties) and third-party data brokers can help make data available to any party to whom it is valuable.

- Diminishing returns from consumer data may mean that competitive advantages from proprietary data are exhausted at a relatively small scale.
- Predictions of online platform markets tipping, including because of data-related advantages, are not supported by real-world evidence. Various firms have entered, grown and largely displaced incumbents in the markets for social networks (e.g. Friendster, MySpace, Facebook), web design or blogging (e.g. GeoCities, Blogger, Wordpress), online search (e.g. Lycos, Yahoo, AltaVista, Google). In practice, platforms are differentiated, which helps prevent tipping.
- Network effects may be limited in particular contexts. For example, in online advertising, firms normally pay on a cost-per-click basis and there is no obvious reason why a firm would prefer to advertise on a platform with 100 million users rather than one with ten million users. Moreover, larger platforms may be more susceptible to 'congestion' (e.g. several other similar firms also advertising on the same platform). Similarly, the benefits to users from a large number of advertisers may be minimal, if ads are generally not valued.

B.2 Other publications

Vertical Restraints for On-Line Sales (OECD Policy Roundtable, 2013)

The paper contains the proceedings of a roundtable on the implications of e-commerce for competition. It includes contributions from various OECD delegations with a particular focus on vertical restraints (though some broader implications of e-commerce were also discussed).

Four key areas addressed in the literature are identified:

- search costs, which have been lowered (though not eliminated) through the advent of the internet, and which are affected by the behaviour of firms seeking to make comparisons more difficult;
- the geographic scope of trades, which has been expanded as a result of reduced search costs and streamlined supply chains, but where preferences for shopping domestically (and perhaps locally) remain;
- the impact on distribution cost and product variety; and
- information asymmetries, which may have increased as a result of replacement of physical interaction by online trading, potentially making it harder for sellers to build their reputation.

Overall, e-commerce is seen to be making price competition more intense and geographic markets wider. This should improve consumer welfare, though the emphasis on price competition might mean that some welfare-improving investment is foregone. Moreover, network externalities may create entry barriers, making e-markets more concentrated.

Most authorities agreed that e-commerce does not require a new economic and regulatory framework. The present framework is still valid and can be adapted, though the emphasis on specific issues may change.

In relation to vertical restraints, concerns that they might facilitate collusion and soften competition apply equally to an e-commerce context, but classic arguments about RPM as a collusive mechanism are weaker, since price transparency is already high online. At the same time, some pro-competitive motivations for vertical restraints may be particularly relevant to e-commerce, e.g. where online competition in the absence of any vertical restraints might force offline retailers out of business to the detriment of customers (because the ancillary services offered by offline retailers would be lost). In this regard, RPM might have particular potential efficiencies because it could ensure that retailers earn a sufficient margin on its products to have incentives to promote a manufacturer's products (e.g. through a favourable ranking in search results).

Restraints such as retail MFN clauses (e.g. requirements by a platform that participating sellers do not charge lower prices on any other platforms) raise similar concerns to best-price guarantees, in terms of softening competition. MFNs might be dealt with in same way as RPM, but there may be an additional element of harm where an online retailer or platform can control the minimum market price and manipulate that price, e.g. by increasing its commission rates.

The contributions from national competition authorities, summarised below, provide some indication of the impact of e-commerce on the national economy, the approaches taken to e-commerce by the authorities and the relevant cases that have been encountered. (N.B. the contributions varied in depth and breadth).

Australia

Australia has seen substantial growth of online sales. In retail, this is changing distribution and supply chains and increasing exposure to import competition (though prices remain higher in Australia). Overall, there has been a positive overall effect of e-commerce on prices and competition.

The Australian Competition and Consumer Commission (ACCC) views its competition law and frameworks as applying equally to online and offline business models, though it has identified the online economy as a key priority, because potential benefits could be undermined by anti-competitive arrangements. The ACCC considers that the online environment presents specific risks linked to:

- network externalities in two-sided markets, which can be conducive to high concentration or tipping by increasing barriers to entry and expansion;²⁹¹
- the Interplay between horizontal and vertical components, in particular the extent to which vertical agreements such as MFNs can have an effect of horizontal price fixing;²⁹²
- false, misleading or deceptive conduct, in particular where suppliers exploit behavioural biases, e.g. drip-pricing which the ACCC has acted to address in the airline market; and
- the effectiveness of warranties and refunds where e-commerce firms are based overseas and there is little prospect of Australian consumers receiving redress in case of problems.

Regarding vertical restraints, the ACCC is of the view that RPM could be pro-competitive by addressing free riding, but that it may unduly restrict competition by shielding brick-and-mortar sellers from online price competition. Eternal Beauty Products Pty Ltd has faced a penalty for such conduct. Price parity agreements across platforms, which are prevalent in relation to online travel agencies, are a potential area of concern and in relation to electrical goods, the ACCC has opposed proposed arrangements for Narta (a buying group) to set minimum advertised prices. Exclusive dealing arrangements may restrict competition upstream or downstream. If e-commerce allows manufacturers to sell products directly it may be difficult to restrict competition upstream, and this had been a concern in a number of ACCC investigations. The ACCC also notes that international price discrimination is possible for content delivered digitally, e.g. on platforms such as Amazon and Netflix, which is a cause of frustration for Australian consumers.

Austria

The Austrian Federal Competition Authority had investigated a number of allegations in relation to of online sellers being pressured by producers, in particular on pricing. For example, there had been concerns about cases where selective distribution rights were granted for specific geographic areas and some producers only permitted sales on a website that had the same domain name as the

²⁹¹ In this context the ACCC opposed a merger between Carsales.com and Trading Post, seen as likely to substantially lessen competition. It also opposed an agreement that required eBay users to make transactions through PayPal, which could have removed competition for transaction services supplied to eBay users.

²⁹² In another case, travel agency Flight Centre allegedly sought agreements with airlines to guarantee that their prices offered directly to consumers would not undercut its own prices. The ACCC argued that this constituted horizontal price fixing. An area of interest in this dispute was Flight Centre's 'agent' role and whether the agency arrangement, of a vertical nature, precluded it from being a competitor of the airlines, was argued.

locally known, authorised brick-and-mortar shop. In the view of the Austrian competition authority, free-riding arguments do not apply to hybrid retailers and a separation of online and offline authorisation for hybrid retailers is a questionable practice.

In other cases, online retailers known to undercut the market price level were less likely to receive authorisation or were allegedly discriminated against in other ways by producers.

Canada

E-commerce has contributed to lower prices, greater choice and innovation, but also has introduced new challenges for the Competition Bureau. There has been widespread consolidation in both offline and online retail markets because of scale and scope economies.

The use of vertical restraints is prevalent. Price maintenance has been the most common restraint brought to the Bureau's attention and has been the subject of investigation, but exclusionary conduct has also been an issue.²⁹³ Restraints on online sales operate in the same way as 'traditional' restraints and are therefore covered by existing law and enforcement tools.

With regard to market definition, whether online and offline channels are in separate markets or compete within the same product market needs to be decided on a case-by-case basis. Where the market includes the online channel, its geographic scope may be wider as a result.

Czech Republic

Most of the Czech Competition Authority's casework in relation to e-commerce has been related to RPM clauses. Assessments have been made in the same way as in purely offline markets; it has not been necessary to formulate specific rules related to e-commerce.

European Commission

Article 101 may be applied to vertical agreements, though a Block Exemption Regulation (BER) adopted in 2010 (and the accompanying Guidelines on Vertical Restraints) provide a safe harbour for most vertical agreements where market share is less than 30%

Certain practices – in particular, restrictions on a seller's ability to sell online – are hardcore restrictions – they are deemed likely to severely restrict competition and therefore are not covered by the BER.

²⁹³ For example, the Bureau has challenged the behaviour of TREB, a real estate board that controls access to a database of property listings that estate agents rely upon. TREB rules prohibit agents from providing the information in innovative ways online, precluding the development of online business models.

In relation to free-riding arguments, the EC notes that online search prior to an offline purchase is roughly as prevalent as offline search prior to an online purchase – i.e. free riding works in both directions.

France

The French authority's contribution largely reflects its opinion on e-commerce (12-A-20, summarised below).

Germany

In the view of the German competition authority, e-commerce has great welfare-enhancing potential, and existing competition law provisions are sufficiently flexible to deal with competition issues arising online. However, the challenge is in applying them to new contexts.

Selective distribution agreements may be favoured by producers wishing to protect product characteristics such as brand value or safeguard quality of services, including pre-sale, which could be compromised if free-riding, low-cost online retailers were able to compete. However, free riding can also work in the opposite direction, and research in Germany suggests that consumers informing themselves online and then buying offline is more prevalent than the opposite effect. When looking at cases, the focus should be on keeping markets open to efficient online competitors.

In some two-sided online markets, rapid entry and shifts in market shares are possible. When this is the case, market shares may be of limited significance as an indicator of market power. In any case, where there are network effects, the two sides are interconnected and should not be looked at in isolation.

The most frequent cases of vertical restraints in the context of e-commerce involved bans on online sales per se, bans of sales through certain platforms, and RPM. While authorities should exercise caution, in some cases vertical restraints have the clear aim

of inhibiting changes to the supply chain brought about by e-commerce, leaving many of the potential benefits unrealised.²⁹⁴

Japan

B2C e-commerce transactions in Japan are concentrated on three platforms. Small retailers may depend on these platforms and may face switching costs, meaning that platforms can have dominant bargaining positions. There is evidence of vertical restrictions in the form of RPM, platforms preventing retailers from using customer data, and suppliers prohibiting online sales or setting prohibitively high wholesale prices for online retailers.

Korea

In the view of the Korean competition authority, e-commerce can benefit consumers by lowering prices, but network effects (tipping and lock-in) may have negative consequences by allowing monopolies to be created and maintained. Particularly frequent unfair practices in e-commerce include bundling²⁹⁵, RPM²⁹⁶ and exclusive dealing.²⁹⁷ The KFTC has assessed these under the same principles as those traditionally used for offline markets and considers that it is up to a competition authority to decide whether an online market should be treated separately when it comes to market definition.

²⁹⁴ Examples of relevant cases include hearing aids, contact lenses and GPS devices. In the case of hearing aids, one retailer published prices online, which included some prices for particular products that were undercutting the market. Other retailers complained to the manufacturer, who stopped supplying the price-cutting retailer in response. This eliminated the only source of price competition with the aim to maintain price stability, and the Federal Cartel Office decided to fine the manufacturer. In the case of contact lenses, the market leader was found to have restricted online sales, e.g. by preventing sales of certain products on eBay. Claimed efficiencies related to health and safety and protection from free riding on investments were not considered to be convincing as contact lenses were already prescription-free and widely available and the products in question did not require any particular new investments, e.g. for pre-sales services. The producer was also found to employ 'price management' strategies, monitoring online prices and inducing price-cutting retailers to raise their prices, and was fined in 2009. Garmin – a leading producer of GPS devices – voluntarily reported an RPM programme where online retailers were rewarded for selling at the retail price and penalised through higher wholesale rates for low pricing. Garmin was fined in 2010.

²⁹⁵ The KFTC fined Microsoft in 2006 for bundling Windows Media Player with its operating system. It judged that the products were separable and any efficiency enhancements were low relative to the anti-competitive impact of creating tipping effects and entry barriers. A similar decision was reached with respect to other instances of bundling (e.g. the bundling of Microsoft Messenger and the operating system).

²⁹⁶ The KFTC fined LG for engaging in RPM across its agencies, which sell laptops both offline and online.

²⁹⁷ Goldwin Korea was punished for contract clauses that included bans on online sales. Philips was fined for engaging in RPM and requiring certain major products to be sold offline only.

Norway

Web portals/platforms have emerged in a wide range of sectors in Norway. They may or may not be vertically integrated. Two-sided network externalities are prevalent and, when network effects are strong and there is little differentiation between platforms, entry barriers and concentration tend to be high. Tipping towards monopoly is a possibility. The NCA has, for example, warned of potentially anti-competitive effects in the e-books market due to the position of the large traditional publishers in Norway, which control distribution through vertical restraints (e.g. some vertical integration and a fixed-price policy that is exempt from competition law). This might prevent the development of new e-book platforms and lower-priced e-books. Similarly, hotel booking platforms such as Hotels.com have been a concern for the NCA, as hotels were required to pay seemingly high commission rates to these intermediaries and faced a price parity clause to ensure that consumers would receive the same price regardless of how the booking was made.²⁹⁸

Taiwan

In Taiwan, most online businesses use B2C or C2C platforms and few trade through their own websites. In response to the emergence of platforms, the FTC issued a statement on e-marketplaces in 2003 to provide guidelines for market participants in relation to the relevant legislation, focusing not only on product markets affected by e-commerce but also the market for e-marketplace services.

In defining relevant markets, e-commerce may require extra factors to be considered, such as network bandwidth, types of network transmission and features of products.

The FTC investigated a case in which Merida, a bicycle manufacturer, ceased to supply retailer Wei-Fong Co. and prevented it from offering product warranties on its existing stock, after the retailer had been found to have sold Merida bicycles on an online auction site. The investigation revealed that other retailers had also been warned against selling online and threatened with retaliation. Merida was fined as a result.

Turkey

Common problems affecting e-commerce in Turkey are fraudulent practices and poor service, e.g. long waiting times for the delivery of goods purchased online. The TCA's limited case history related to online vertical restraints indicates that the pro and anti-competitive

²⁹⁸ The NCA also investigated online portals that allowed real estate agents – exclusively – to advertise property. Real estate agents tended to bundle various services (valuation, photography etc.) together with advertising. The portals' refusal to supply other parties reduced competition and limited innovation and choice for end customers (individual property sellers). The NCA proposed regulation to require the portals to provide general access on non-discriminatory conditions, which was implemented in 2010. Since then, innovative services have been introduced by non-estate agents.

effects of such restraints are assessed on a case-by-case basis and that conclusions may vary. For example, in its Antis decision, the TCA accepted the argument that suitable pre-sales services for certain cosmetic products could not feasibly be provided online.

The TCA had not yet dealt with cases of RPM in an online context, but considers that RPM would be unlikely to be acceptable. RPM removes the main strength of online sellers – to reflect cost advantages through lower prices – while efficiency claims based on free-rider arguments are weakened by the fact that online sellers are now able to offer a wide variety of pre-sale services.

UK

Vertical restraints in the context of e-commerce are prevalent, perhaps because they can be easy to monitor in an online environment. The OFT focused on retail-price MFNs, where an online 'retailer' (or intermediary/platform) requires that its 'suppliers' (or affiliated firms) do not offer lower prices on any competing retailers' websites. Such clauses may result in a form of RPM, e.g. when a manufacturer uses RPM to ensure that its retailers do not breach any retail-price MFNs. Irrespective of this, the retail-price MFNs may themselves have anti-competitive effects because they reduce incentives for retailers to reduce commission rates; raise barriers to entry and expansion; leave little option for a supplier but to accept the MFN, if a distribution channel is established as a 'must-have'; and soften price competition, reducing the benefits that might otherwise arise from e-commerce, e.g. though price comparison sites.

US

In the US, vertical restraints are dealt with using a rule-of-reason approach and e-commerce has not been seen to require any changes to this approach.

Vertical restraints can address inefficiencies resulting from double marginalisation, under-provision of effort and free riding. On the other hand, anti-competitive effects might occur through collusion, softening of competition and entry deterrence.

Online sales have ambiguous implications for the effect of vertical restraints. E-commerce with network effects may be associated with greater market power, but market power could increase both the anti-competitive potential of the restraints and the possible efficiency benefits. Similarly, greater transparency may facilitate the monitoring of firms' behaviour and compliance with restraints, but transparency can equally have positive effects by boosting competition and reducing search costs.

E-commerce and Its Implications for Competition Policy (OFT Discussion Paper prepared by Frontier Economics, 2000)

This discussion paper looks at the impact of emerging online markets on commercial transactions from the view of buyers, sellers and intermediaries and discusses how the rise of e-commerce affects market definition, the assessment of market power, and the analysis of firms' conduct and agreements.

The study finds that the emergence of e-commerce increases competition in general but might also facilitate some forms of anti-competitive behaviour. E-commerce will not give rise to entirely new forms of anti-competitive behaviour and the existing competition framework should be sufficient to address competition cases in online markets.

The SSNIP test remains an effective tool for market definition, although in the short term lack of data might complicate its application. The key issues when characterising e-commerce markets are:

- whether e-commerce counts as a separate market from traditional outlets or whether it is just a different sales channel within the same market;
- how product markets change through changes in search and switching costs and through increased scope for price discrimination; and
- whether geographical markets widen in the case of e-commerce.

With respect to the geographic market, the study finds that this is especially important for B2C trade, as B2B markets will often already have been relatively wide because of better-informed buyers. How the geographical market changes also depends on the type of good and delivery costs. To the extent that geographic markets become wider, this may increase the need for cooperation between competition authorities.

However, changing cost structures for sellers might affect market definition. E-commerce businesses often have large fixed and low variable costs. This could facilitate entry into new (adjacent) market segments and increase the degree of supply-side substitutability, widening the market definition. Low marginal costs also mean that when applying the hypothetical monopolist test, for any given elasticity of demand a price increase is less likely to be profitable, in which case the relevant market should be widened.

Due to increased scope for price discrimination in e-commerce markets, the market might narrow in some cases if products are seen as sufficiently different.

In order to assess *market power*, competition authorities need to evaluate barriers to entry. These are lower for both B2C and B2B e-commerce because of lower search costs for buyers and the reduced need for a physical outlet for sellers. However, there are particular barriers that are more prevalent in online markets including:

- sunk costs from establishing customer loyalty;
- intellectual property rights;
- network effects that may give incumbents who have established a large base of users an advantage, in particular

where switching costs and lock-in effects make it even more difficult for a new entrant to win customers; and

- higher buyer power.

The discussion paper identifies excessive pricing, collusion, price discrimination, predation, vertical restraints and exclusive supply arrangements as potential *anti-competitive behaviour* in online markets.

Greater availability of information in the e-commerce space may facilitate collusion as online market data can be shared and accessed more easily and is updated more frequently. More guidance may be needed for businesses about which types of data can be shared and which are meant to remain as private information. Similarly, more guidance is needed with respect to horizontal agreements, making clear what types of agreements are generally permitted.

Online markets make it possible for firms to use price discrimination techniques more easily, using customer data to customise offers or prices. In addition, though this is not purely an e-commerce issue, firms are increasingly using 'versioning', for example when a product is offered as a basic or a premium version. The versions are priced differently and aimed at different customer target groups. The existing competition framework is sufficient to deal with price discrimination in e-commerce cases but provisions that ensure data protection and transparency about what customer data firms are collecting may be beneficial.

As in traditional antitrust cases, it is often difficult to distinguish between predatory pricing and fierce competition. Online firms frequently incur losses in the short term that might be necessary in order to establish a customer or user base for a network. A predation test should therefore be applied with caution.

Vertical agreements, especially selective distribution systems, were the most common competition complaints at the time of the study. Concerns were also raised in relation to arrangements that would result in denying access to essential facilities such as portals or software design.

The report notes that, because of network effects and the potential for tipping, short-term anti-competitive behaviour can have long-term consequences. This suggests that competition authorities should intervene as early as possible. On the other hand, premature intervention might well harm innovation in these new markets, and in some cases tipping toward a few players may be inevitable. Competition authorities therefore face the challenges of balancing these effects when deciding where and how to intervene.

Innovation and Competition Policy: Challenges for the New Millennium (Charles River Associates, 2002)

The report focuses on what is considered to be the 'new economy', a term used for the IT industry that includes computer software and hardware development and associated technologies but also general internet-based businesses. These online markets are very dynamic and competition is often driven by innovation rather than price, which affects the way competition policy should be applied.

Four characteristics of online markets are most relevant for competition policy:

- R&D and intellectual property are particularly important competition cases in innovative technology industries and patents become increasingly critical.
- Network effects on the demand-side often cause markets to tip towards a particular technology/seller. Since there is a big first-mover advantage in these markets, firms may compete aggressively in early stages and it becomes difficult for a competition authority to evaluate what constitutes as predatory behaviour.
- A cost structure with high fixed and low marginal costs that leads to concentrated markets with price discrimination and high margins might make it difficult for competition authorities to distinguish anti-competitive behaviour from natural consequences of the market structure.
- Technical complexity and compatibility requirements often mean that firms have to work together to develop complementary products, which might lead to a competition authority being concerned with cooperative behaviour.

These issues are then considered in the context of three different types of anti-competitive behaviour: unilateral conduct by a dominant firm, collective behaviour and mergers.

Predatory behaviour may be much more varied in the online technology sector than in traditional markets. In particular, competition authorities cannot just focus on predatory pricing but instead should look into all behaviour that a firm might not undertake but for the expected restrictive impact on competition.

Tying and bundling practices should not automatically be judged as anti-competitive behaviour. There might be a legitimate cost saving reason for bundling, or technology might imply that certain products should be bundled together. Firms engaging in these practices often have high fixed costs which they need to recover for example through higher sales volumes generated from tying products together (which can effectively work as a form of price discrimination).

Licences and patents play an important role in the technology industry. When evaluating whether particular licensing

arrangements harm competition, competition authorities need to evaluate the counterfactual, which might be that the firm would not licence the technology at all.

In relation to cooperative behaviour, cooperative standard-setting might be necessary in order to launch a product in the first place and ensure interoperability. Preventing such agreements could mean that certain products might not exist at all, and competition authorities need to be alert to this potential counterfactual. Similarly, cross-licensing arrangements and patent pools are ways of avoiding the problems that might otherwise arise from 'blocking patents'. These practices are often necessary for complementary products, but potentially less so for substitutes where they may indicate anti-competitive behaviour. They can also create entry barriers.

Platform joint ventures raise competition concerns because of potential collusion of competitors through the platform and exclusion of players from the platform. Cooperative R&D may reduce innovative competition between the firms involved but again a careful consideration of the most appropriate counterfactual is required in order to establish whether particular practices constitute anti-competitive behaviour or are necessary for the development of particular products in the first instance.

In the context of merger, competition authorities need to appreciate the competition could be for the market rather than in the market (e.g. because of network effects). If that is the case, the market would be prone to tipping and competition authorities should perhaps not be overly concerned with market concentration. At the same time, vertical mergers may be a concern if they result in the exclusion of a rival on a vertical level, for example if there is only one supplier for a product, and the concept of a substantial lessening of competition would be more useful than the concept of dominance because online markets will often have a dominant player.

Overall, the study finds that a more flexible application of competition law is needed in the case of online markets because they are highly dynamic and competition is often driven by innovation rather than price. Therefore, the traditional structure of analysis – starting with a market definition, then determination of market power and only then dealing with the anti-competitive behaviour and its consequences – is likely to produce errors. Instead, CRA calls for a 'first principles' approach to competition policy focussing directly on the anti-competitive behaviour. Additionally, in this 'first principles' approach, the notion of market power not only covers pricing power, but more generally the power to exclude, as this is often more relevant in the context of innovation-driven e-commerce businesses.

*Opinion on Competition of Electronic Commerce - Avis n 12-A-20 du 18 Septembre 2012
(Autorité de la concurrence, 2012)*

In 2012, the French Competition Authority (ADC) published a paper laying out its opinion on e-commerce. The discussion focused on three specific sectors (domestic appliances, cosmetic and personal care products and luxury and beauty products). It assessed the intensity of competitive pressure e-commerce has on traditional sales and identified the factors likely to hinder competition.

Comparing online and offline offers, the ADC noticed lower prices and a greater variety of products online. For electrical goods, price differences can be 10% or more, for cosmetics 8% to 10%, and for perfumes and beauty products prices were found to be similar online and offline. If delivery costs were taken into account (which may not be appropriate), the online price advantage is smaller but still significant.

According to the report, lower online prices were the result of price comparison websites, online marketplaces (eBay, Amazon, etc) increasing competition and choice, and pure-play retailers who have lower costs and thus are able to offer lower prices.

The ADC notes that online and offline channels are not perfect substitutes and considers that online shops mainly compete in a separate market. This may change as more and more consumers use both sales channels, for example in the electrical goods sector where the share of online sales has increased from 7% in 2006 to 15% in 2011. However, whether online and traditional sales channels are viewed as substitutes depends on the type of goods, as customers are more reluctant to buy certain things online (e.g. expensive electronic goods that are complicated to use). According to sellers, consumers buying in shops are primarily looking for service and advice, and value being able to take the purchases home straight away. The main motives for purchasing online are saving time (74%), price (66%), availability 24/7 (45%), the possibility to compare prices (44%) and a wider range of products (32%).

The ADC finds that restrictive distribution arrangements are potentially harming the development of e-commerce. In particular, some manufacturers use a selective distribution network that may slow down the entry of new players. Manufacturers are free to choose their business partners (online, offline, click-and-mortar) and set prices and conditions for different distributors within the limits of the competition law. The freedom to negotiate prices and trading conditions is generally considered to be pro-competitive and could generate efficiency gains for consumers.

In terms of price differentiation, the ADC notes that manufacturers might be allowed to apply lower prices to traditional retailers than to online ones. However, when supplying click-and-mortar retailers, manufacturers are not allowed to charge different prices depending on whether products will be sold on or offline. This is covered under

the competition law prohibiting all forms of dual pricing (though it does not apply if costs across platforms are significantly different).

The ADC also reviewed the conditions that distributors may have to meet in order to enter into online distribution channels (e.g. requirement to have a physical retail outlet, not offering the product anywhere else online). Some of these conditions might hinder competition from pure online players if the parties imposing the conditions have significant market power. In general, conditions for a selective distribution system must be necessary given the type of product, based on objective quality criteria and not stricter than necessary.

The ADC finds that requiring distributors of a selective distribution network to own a traditional retail store acts as a barrier to entry for pure online retailers. If enough physical outlets already exist, then sellers and distributors could agree on a fixed price to subsidise the brand's offline sales, rather than requiring every distributor to invest in a physical store.

Online Targeting of Advertising and Prices: A Market Study (OFT, 2010)

The OFT report looks at the use of behavioural advertising and customised pricing. The study evaluates the benefits and potential harm for consumers, identifies consumer concerns and examines technological developments. It covers existing consumer protection regulation and sets out recommendations for regulation and self-regulation of online advertising.

Behavioural advertising uses cookies to track consumers' browsing behaviour. Advertising can be placed on a firm's site based on the consumer's activity on that website or across a number of websites (where information is collected by third parties such as ad networks).²⁹⁹ In 2008, online behavioural advertising accounted for a small proportion of total advertising spend (between £64 and £95 million out of a total £3.35 billion) but with expectations of continued growth.

Concerns about behavioural advertising revolve around privacy issues, potential misuse of browser data, the potential for inappropriate or embarrassing advertising and the level of information provided to consumers. However, the study noted that web browsers are enabling greater control over cookies, and companies are making moves towards greater transparency and consumer control.

²⁹⁹ Deep packet inspection, where the internet service provider monitors all traffic from a user's computer, would enable additional types of behavioural advertising, but does not currently take place in the UK.

With regard to price targeting, theoretically this may be in the form of different prices, discounts, or product range restrictions for a particular user. The OFT found that online price targeting based on past online behaviour, including purchases and browsing, appeared to be more of a theoretical possibility than the reality in the UK at that time, though 'largely innocuous' targeted discounts were common and firms may also use postcode targeting.³⁰⁰ Technology capabilities may evolve to increasingly allow targeting prices on the basis of third-party information (e.g. using information from ad networks about a consumer's behaviour elsewhere online).

The research finds that consumers object to the use of data on online behaviour for targeting prices and that consumers' opposition to targeted prices may be the main deterrent to firms engaging in such practices. Consumers may remove cookies and use private browsing in order to limit the extent to which data about their behaviour can be collected, but consumer awareness of these options and how to use them appears limited. Price comparison sites may limit the scope for price targeting, and competition should prevent price rises, although this may not inhibit targeting of consumers who do not compare prices.

The OFT makes a number of recommendations for improving (self-) regulation of behavioural advertising and targeted prices, such as improving transparency, consumer understanding and opt-out controls.

The Economics of Online Personalised Pricing (OFT, 2013)

This study examines under what conditions online personalised pricing is likely to cause economic harm to consumers. It finds that the impact of personalised pricing on consumer welfare can be positive or negative and therefore a case-by-case analysis is necessary.

Price discrimination can have a positive impact on consumer surplus by expanding output (reaching customers that would not have been served under a uniform price), intensifying competition (by allowing firms to target competitors' customers through lower price offers), and preventing firms from committing not to reduce prices in the future. On the other hand, it brings prices closer to each consumer's maximum willingness to pay, reducing consumer surplus (the appropriation effect).

³⁰⁰ This general finding was confirmed by a further report published in 2013, following a call for input. OFT, May 2013, *Personalised Pricing – Increasing Transparency to Improve Trust*: http://webarchive.nationalarchives.gov.uk/20140402142426/http://www.of.gov.uk/shared_of/markets-work/personalised-pricing/oft1489.pdf

The net impact depends on the level of competition in the market, whether the interaction between firms and consumers is dynamic, and the level of sophistication of consumers.

The study considers monopoly and oligopoly markets separately, examining the different effects price discrimination can have on consumer surplus depending on the structure of the market and the mode of discrimination. In a monopoly, the impact on consumer surplus of price discrimination depends on the balance of the appropriation effect and the output expansion effect. The literature suggests that if there is a sophisticated system of discrimination then the appropriation effect is likely to dominate other effects and thus consumer surplus will be reduced. However, with several firms, the intensified competition effect exists. Where a firm is able to recognise the brand preference of its consumers, for example, it may offer lower prices to consumer with a relatively high preference for a competitor, which can have a positive impact on their consumer welfare.

With many firms, price discrimination may still be harmful, particularly in the presence of certain market characteristics: lack of transparency with regard to price discrimination practices, lack of consumer sophistication (e.g. not considering how their behaviour today might affect their purchasing options in the future), significant costs involved for firms to price discriminate, or a loss of consumer trust in online markets in general as a result of price discrimination concerns (whether or not price discrimination is harmful to them in practice).

The study notes that these features are more likely to exist in online markets than in offline retail markets. Notably, due to technical capabilities in online markets, firms are able to assess consumer heterogeneity more effectively and create more sophisticated price discrimination systems, whereas it might be more difficult for a consumer to observe prices quoted to other online shoppers. This suggests that online markets may be more vulnerable to consumer detriment from personalised pricing than offline markets.

Annex C The Singapore government's e-commerce initiatives

C.1 Policies and regulation

The Singapore government has put significant efforts into advocating the adoption of e-commerce

The Singapore government has always been pro-innovation and pro-enterprise and has designed policies and schemes to encourage business to adopt, and consumers to use e-commerce services.

The government e-commerce initiatives kicked off in the mid-nineties with the 1996 'e-commerce Hotbed Programme' (EHP). As Chan and Al-Hawamdeh (2002) state, this programme was aimed at:

- showcasing e-commerce applications;
- addressing policy concerns relating to legal, regulatory, trade, financial and economic issues that would arise from e-commerce, setting up a policy committee to ensure that appropriate laws and regulations were in place to address these issues and promote e-commerce take-up;
- resolving technical uncertainties associated with e-commerce adoption by creating a technical framework to conduct pilots for emerging solutions and services as well as establish the National Information Infrastructure Standards Program that established technical standards in e-commerce;
- bringing directory, identification, security and payment services infrastructures up to speed to support adoption of e-commerce;
- educating and training the workforce on e-commerce, including high-level envisioning and strategic planning for top management and technical sessions for IT teams as well as general awareness programmes for the public;
- incentivising the use of innovative e-commerce solutions with schemes to share risks and costs of e-commerce investments with industry; and
- creating alliances with international counterparts and positioning Singapore as an e-commerce hub.

The EHP policy committee recommended passing an Electronic Transactions Act (ETA) to provide a favourable legal environment for safe and secure e-transactions. The ETA was subsequently enacted in July 1998, providing the legal foundation for the recognition of electronic contracts and digital signatures. This gave predictability and certainty to parties contracting electronically. It also set out a

framework for a Public Key Infrastructure and created a Controller to license certificate authorities.³⁰¹

A series of consultations was held in 2004 and 2005 on updating the ETA to align with the United Nations Convention on the Use of Electronic Communications in International Contracts (which was adopted by the UN in late 2005). In 2010, the Electronic Transactions Act (2010 ETA) was re-enacted, replacing the 1998 ETA. The 2010 ETA retained the legal scheme for dealing with electronic contracts of the 1998 ETA but provided greater flexibility for dealing with technology changes.

In September 1998 the government also launched the E-commerce Master Plan (ECMP). The ECMP was aimed at increasing the use of e-commerce by businesses and consumers and developing Singapore into an e-commerce hub by attracting international e-commerce activities to Singapore. The goal was to have half of businesses using e-commerce and achieve e-commerce transactions worth S\$4bn within a period of five years. The ECMP included initiatives to:

- build out financial and logistics infrastructure including to provide secure electronic transaction processing services to web merchants and digital content publishers;
- jump start Singapore as an e-commerce hub, in particular with a focus on attracting B2B services to base their operations in Singapore through incentive schemes and other support programmes (discussed further below);
- encourage businesses to use e-commerce to improve productivity and competitiveness by providing simple trading platforms that they could use and holding promotion drives to increase awareness;
- promote the use of e-commerce by businesses and citizens by educating the public (with e-commerce being taught in professional courses in universities and polytechnics) and taking the lead through delivering key public services online; and
- harmonise cross-border e-commerce laws and policies with Singapore's top trading partners including Canada, Australia and Germany.

³⁰¹ Singapore was one of the first few countries in the world to implement the UNCITRAL Model Law on Electronic Commerce. IDA, *Differences Between Electronic Transactions Act 1998 and Electronic Transactions Act 2010*: <http://www.ida.gov.sg/Policies-and-Regulations/Regulations/Store/Differences-Between-Electronic-Transactions-Act-1998-and-Electronic-Transactions-Act-2010>

In the late nineties, the government led by example by making citizen services such as completing income tax returns, Central Provident Fund transactions, Urban Redevelopment Authority form applications, etc. available through electronic means.

Between 2000 and 2003 the e-Government Action Plan 1 was rolled out.³⁰² The aim was to provide as many public services (for businesses and citizens) online as possible. The ITU (2001) noted that by June 2000, 450 public services were available online. In 2000, GeBiz, a procurement portal for the government's G2B dealings was launched.

Part 2 of the e-Government Action Plan came into force between 2003 and 2005. This was aimed at delivering accessible, integrated and value-adding public services to citizens. Overall, 1,600 e-services were deployed between 2000-2005. This included paying government bills and fines, applying for business licences, applying for season parking at government buildings or getting information on government policies.

Between 2006-2010, the Integrated Government Master Plan (iGov2010) focused on integrating back end operations and harmonising the infocomm work environment across different government agencies, increasing reach (mobile services were rolled out) and improving the quality of e-services.

The current eGov2015 Masterplan (2011-2015) looks to interact with citizens and businesses to co-create new e-services³⁰³ with the government.³⁰⁴

In 2014, the Infocomm Development Authority of Singapore (IDA) launched the eCommerce & Operations Management Call for Collaboration (eCOM CFC) with industry with the objective of building suitable technology platforms in order to enhance the online presence of local retailers. This was in recognition that end-to-end e-commerce providers were missing from Singapore. Therefore, integration between retailers and e-commerce service providers, and in turn between e-commerce service providers and

³⁰² eGov, *eGovernment Action Plan (2000-2003)*: <http://www.egov.gov.sg/egov-masterplans/egap-i/vision-strategic-plan.jsessionid=3702C367D68977F58AA2C2A98F37862F>

³⁰³ New e-services include "personalised e-services offered at the whole-of-government level. To this end, the Government will be deploying a one-stop trusted platform called OneInbox for the delivery of government electronic correspondences to individuals and subsequently, to businesses". eGov, *eGovernment Action Plan (2011-2015)*: <http://www.egov.gov.sg/egov-masterplans/egov-2015/vision-strategic-thrusts.jsessionid=3702C367D68977F58AA2C2A98F37862F>

³⁰⁴ eGov, *eGov Masterplans Introduction*: <http://www.egov.gov.sg/egov-masterplans-introduction>

fulfilment providers was seen to provide scope for efficiency improvements across the value chain. The CFC's goal was to develop a Retail Service Framework, bringing together players from different levels in the value chain to develop integrated solutions.

The Retail Service Framework should help local retailers, who tend to be more focused on their brick-and-mortar operations, build up their e-commerce presence in order to compete with foreign e-commerce firms. By developing multiple one-stop e-commerce service providers who can offer an integrated service to retailers, barriers to adoption of e-commerce services should be lowered, and e-commerce providers and logistics service providers should be able to enjoy economies of scale. As of 15th of January 2015, the IDA was in the process of evaluating proposals received under the CFC.³⁰⁵

C.2 Trust schemes and payment protocols

The Singapore government has been pro-active in developing trust schemes and appease industry and consumer concerns associated with e-commerce

Between 1996 and 1998, the government developed the infrastructure to support e-commerce, including online banking, online payment and trust systems. Netrust was formed to issue and manage digital keys and certificates. The Secure Electronic Transaction protocol (SET) was implemented for online credit card payments. Cashcard for Open Network E-commerce (C-ONE) was set up, allowing consumers to make small denomination payments online (up to \$500) with a stored value card; and NET Financial Electronic Data Exchange was introduced to allow online payments via bank debit.

In 2000, IDA held a consultation on building trust and confidence in e-commerce. The consultation responses indicated that trust marks were required to instil greater confidence and trust in e-commerce transactions. The National Trust Council (NTC) was formed in 2001 with an aim of building public confidence in e-transactions.

The NTC launched the first national trust mark programme – TrustSG. The TrustSG accreditation is awarded to online merchants who adhere to good e-business practices. According to the Consumer Association of Singapore (CASE) – a TrustSG Authorised Code Owner who can issue the seal³⁰⁶ – TrustSG approved merchants should:

³⁰⁵ Towkay Zone, 15th January 2014, *E-commerce gets boost from IDA*: <http://www.towkayzone.com.sg/content/546-E-Commerce-Gets-Boost-from-IDA>

³⁰⁶ CASE accredits only B2C businesses while Commercenet Singapore is an Authorised Code Owner who can issue the TrustSG seal to both B2B and B2C e-businesses.

- "Ensure sufficient information about goods and services is available to inform the buying decision;
- Ensure that personal data will be secured and protected;
- Ensure that payment will be handled in a secured manner;
- Ensure that purchases will be delivered in a safe and punctual manner;
- Cancellation and refund policies are clearly stated; and
- Promptly address complaints (if made)"³⁰⁷

A Trust Mark Certification Fund was launched at the same time, providing subsidies of up to half the cost of the accreditation.

CASE's accreditation arm CaseTrust awards a more general CaseTrust seal to businesses with a good level of business and consumer practice. The TrustSG accreditation is awarded specifically under the 'Webfront' scheme of the CaseTrust accreditation. In other words, in terms of accredited e-commerce practices, the CaseTrust Webfront accreditation is equivalent to TrustSG.³⁰⁸

C.3 Funds and subsidies

Several government schemes offered to subsidise the cost of businesses taking up e-commerce or ICT systems

Following the enactment of the ETA, in November 1998, the then National Computer Board (now the IDA) launched the Local Enterprise Electronic Commerce Programme (LEECP), a S\$9 million fund set up by the government to subsidise half of local enterprises' e-commerce business integration costs.³⁰⁹ In addition, the Local Enterprise Technical Assistance Scheme (LETAS) offered by the Standards, Productivity and Innovation Board of Singapore (SPRING) that was in place since 1986 offered grants of up to 50% of the costs of hiring external experts to implement IT systems including upgrades of computer systems to implement e-commerce.³¹⁰

³⁰⁷ CaseFront, *Webfront (e-commerce)*: <https://www.casetrust.org.sg/accreditation-detail.aspx?id=9>

³⁰⁸ Note that there is a higher level of the CaseTrust accreditation, CaseTrust Gold. Similar to the basic CaseTrust accreditation, there is a differentiation between CaseTrust Gold for 'Webfront' and 'Storefront' indicating whether the business' e-commerce practices have been accredited or not.

³⁰⁹ Subject to a cap of S\$20,000 per enterprise.

³¹⁰ The LETAS was withdrawn in 2010, superseded by the infocomm@SME programme, run by the IDA, comprising a wider suite of funding and schemes such as iSPRINT and enhanced iSPRINT.

In 1999, the Approved Cyber Trader Scheme (ACTS) was introduced in order to attract B2B companies to base their offshore e-commerce trading activities in Singapore. Concessionary tax incentives on offshore income derived from transactions over the internet were offered to businesses under the ACTS.³¹¹

In 2000, the IDA and SPRING launched the e-Business Industry Development Scheme (eBIDS), a S\$30 million incentive scheme building on the developments of the LEECP and aimed at encouraging wider take up of e-commerce amongst businesses and helping businesses to increase revenues from their e-commerce activities. The eBIDS subsidised half of qualified e-commerce related consultancy costs as well as one year's worth of software and hardware purchases made by an enterprise.³¹² This funding could apply to multiple e-commerce related projects as long as these projects developed a different e-commerce capability for the enterprise. The eBIDS also provided a performance based incentive programme providing funding in proportion to the actual transaction value brought about by the particular e-commerce project.³¹³

While the exact impact of these schemes on take up of e-commerce has not been publicly reported, a survey conducted jointly by IDA and Singstat found that the proportion of top companies³¹⁴ in Singapore engaging in e-commerce activities increased from 4% in 1999 to 10% in 2000. Almost half (43)% of companies with e-commerce capabilities started their e-commerce activities in 1999.³¹⁵

Education and training to increase e-savviness

In the new millennium, the government turned its focus to educating and training the work force to be e-commerce competent. The E-Business Savviness Programme was set up to subsidise the cost of training employees on e-Business skills and knowledge.³¹⁶ The programme aimed to develop e-commerce champions within the

³¹¹ The ACTS ended in 2013. IRAS, *Annual Report 2012/2013*: <https://www.iras.gov.sg/IRASHome/uploadedfiles/IRASHOME/Publications/About%20Us2012.pdf>

³¹² Subject to a cap of S\$20,000.

³¹³ A maximum funding of S\$500,000 per company was awarded.

³¹⁴ Top 1000 companies by revenue and top 1,000 IT companies.

³¹⁵ IDA and Singstat, 2000, *Survey on E-Commerce 2000*. The survey covered 9000 companies stratified by industry sector (excludes government related bodies, businesses offering domestic work activities and mining and quarrying) and had a response rate of over 90%.

³¹⁶ This programme provided a subsidy up to 50% of the fees per trainee for approved courses with a maximum of S\$2,000 per trainee.

private sector who would advocate using e-commerce to transform businesses.³¹⁷

The Productivity and Innovation Credit (PIC) scheme was introduced in 2010 to help businesses innovate and improve productivity. The scheme offers 400% tax deductions or 60% cash pay-out on spending on research and development; acquiring intellectual property rights; and spending on IT and automation equipment and training. The PIC scheme is not specifically targeted at e-commerce, but the effective subsidy provided by the PIC scheme on IT equipment expenditure (which includes software for customer relationship management for instance), could encourage the roll out or enhancement of e-commerce services by businesses. In 2014, the PIC+ scheme was launched, extending the qualifying activities to include website development costs, which should have a more direct impact on e-commerce adoption by businesses.

Also in 2010, as LETAS was phased out, the Increased SME Productivity with Infocomm Adoption and Transformation (iSPRINT) scheme was launched. The iSPRINT scheme is intended to help SMEs deploy IT solutions by subsidising consultancy, software and training costs. The iSPRINT scheme is only available for a pre-approved list of software solutions and consultancy services. In addition, the scheme does not cover system upgrades or enhancements but only the initial computerisation. Customer relationship management and supply chain management solutions are included in the list of pre-qualified infocomm packages supported under iSPRINT, though these solutions are only relevant for e-commerce if these business functions are conducted online.

Helping SMEs to get superfast broadband

In 2014, the iSPRINT scheme was extended to cover SMEs' subscriptions to superfast broadband (meaning connection speeds of at least 100 Megabits per second) and the equipment cost associated with the take up of a commercial Wi-Fi service. This Enhanced iSPRINT scheme subsidises half the monthly cost of a SMEs' fibre subscription up to a period of two years³¹⁸ as well as half the equipment cost required to implement a commercial Wireless@SG Wi-Fi network in the firms' public-facing business premise. High quality internet access is a key input required for an e-commerce

³¹⁷ Chua (2012) noted that the IDA also has a variety of other initiatives in place to increase infocomm literacy of workers and the general public. These include the National IT Literacy Programme, Infocomm Competency Programme, Strategic Manpower Conversion Programme, Critical IT Resource Programme and Infocomm Training and Attachment Programme. Increasing the level of infocomm competency across the work force may also have an indirect effect on increasing e-commerce adoption in Singapore by raising the infocomm competency of the work force at large.

³¹⁸ Subject to a cap of \$120/month.

business and the enhancement of the iSPRINT scheme should have a positive impact on e-commerce adoption.

In 2014, the government has introduced several new online services. For instance, Land Transport Authority developed a mobile app allowing users to locate a taxi nearby to facilitate users hailing of a taxi. The Workforce Development Agency introduced a portal – JobsBank to match job openings offered by local companies to suitable local candidates registered on the portal. The Monetary Authority of Singapore (MAS) introduced new regulations that allow consumers to buy basic life insurance products directly from insurance companies, by passing insurance agents that typically sell these products on behalf for insurance companies. MAS launched an online portal on 7 April 2015 that allow consumers to compare life insurance products from different companies. In 2015, SPRING along with other government bodies will develop an e-commerce platform for SMEs to carry out warehousing, managing inventories and order fulfilment online. In addition, the government will also develop a separate platform that allows SMEs to source human resource systems and services online.³¹⁹

³¹⁹ The Straits Times, 9th March 2015, *Singapore Budget 2015: Shared e-commerce and HR platforms for SME to pool resources*:

<http://www.straitstimes.com/news/singapore/more-singapore-stories/story/singapore-budget-2015-shared-e-commerce-and-hr-platforms>

Annex D Bibliography

Akerlof G (1970), *The market for "lemons": Quality uncertainty and the market mechanism*, The Quarterly Journal of Economics, Vol. 84, No 3, (Aug1970), pp 488-500.

Andrews R and Currim I (2004), *Behavioural differences between consumers attracted to shopping online versus traditional supermarkets: implications for enterprise design and marketing strategy*, International Journal of Internet Marketing and Advertising 1.1, pp 38-61.

Ater I and Orlov W (2012), *The Effect of the Internet on Performance and Quality: Evidence from the Airline Industry*, Review of Economics and Statistics.

AT Kearney (2012), *A fresh look at online grocery*:
<http://www.atkearney.com/documents/10192/582867/A+Fresh+Look+at+Online+Grocery.pdf>

Autorité de la concurrence (2012), *Avis n 12-A-20 du 18 septembre 2012 relatif au fonctionnement concurrentiel du commerce électronique* (Opinion on competition of electronic commerce).

Bailey J P (1998), *Electronic Commerce: Prices and Consumer Issues for Three Products: Books, Compact Discs, and Software*, Organisation for Economic Co-Operation and Development, OECD/GD(98), n. 4.

Baye M R, Morgan J and Scholten P (2006), *Information, search, and price dispersion*, Handbook on economics and information systems 1.

Blum B and Goldfarb A (2006), *Does the internet defy the law of gravity?*, Journal of International Economics, Elsevier, vol. 70(2), pp 384-40.

Brynjolfsson E and Smith M (2000), *Frictionless Commerce? A Comparison of Internet and Conventional Retailers*, Management Science, vol. XLVI, n. 4, pp 563-585.

Brynjolfsson E, Dick A and Smith M (2010a), *A nearly perfect market? Differentiation vs. Price in consumer choice*, Quantitative Marketing and Economics, Vol. 8, 2010, pp. 1-33.

Brynjolfsson E, Hu Y and Rahman M (2009), *Battle of the retail channels: How product selection and geography drive cross-channel competition*, Management Science, 55.11 pp. 1755-1765.

Brynjolfsson E, Hu Y and Simester D (2011), *Goodbye pareto principle, hello long tail: The effect of search costs on the concentration of product sales*, Management Science, 57.8, pp1373-1386.

Brynjolfsson E, Hu Y and Smith M (2010b), *Research commentary-long tails vs. superstars: The effect of information technology on*

- product variety and sales concentration patterns*, Information Systems Research 21.4, pp 736-747.
- Brynjolfsson E, Hu Y and Smith M (2010c), *The longer tail: The changing shape of Amazon's sales distribution curve*, SSRN 1679991.
- Brynjolfsson, E, Hu Y, and Rahman M (2013), *Competing in the age of omnichannel retailing*, MIT Sloan Management Review 54.4, pp. 23-29.
- Brynjolfsson, E, Hu, Y and Smith, M (2003), *Consumer Surplus in the Digital Economy: Estimating the Value of Increased Product Variety at Online Booksellers*, Management Science Vol. 49, No. 11.
- Brynjolfsson, E, Hu, Y and Smith, M (2006), *From niches to riches: Anatomy of the long tail*, Sloan Management Review 47.4, pp. 67-71.
- Cambini C, Meccheri N and Silvestri V (2011), *Competition, efficiency and market structure in online digital markets. An overview and policy implications*, European Review of Industrial Economics and Policy, Number 2: <http://revel.unice.fr/eriep/index.html?id=3212>
- CCS (2007a), *Guidelines on Market Definition*:
<https://www.ccs.gov.sg/legislation/~media/custom/ccs/files/legislation/ccs%20guidelines/mktdefinitionjulo7final.ashx>
- CCS (2007b), *Guidelines on the Section 47 Prohibition*:
<https://www.ccs.gov.sg/legislation/~media/custom/ccs/files/legislation/ccs%20guidelines/s47julo7final.ashx>
- CCS (2007c), *Guidelines on the Section 34 Prohibition*:
<https://www.ccs.gov.sg/legislation/~media/custom/ccs/files/legislation/ccs%20guidelines/s34julo7final.ashx>
- CCS (2007d), *Guidelines on the substantive assessment of mergers*:
<https://www.ccs.gov.sg/legislation/~media/custom/ccs/files/legislation/ccs%20guidelines/substantiveassessmergerjulo7final.ashx>
- CCS (2007e), *Guidelines on the treatment of Intellectual Property Rights*:
<https://www.ccs.gov.sg/legislation/~media/custom/ccs/files/legislation/ccs%20guidelines/iprjulo7final.ashx>
- CCS (2010), *Notice of Infringement Decision Issued by the Competition Commission of Singapore, Abuse of Dominant Position by SISTIC.com Pte Ltd*:
<https://www.ccs.gov.sg/~media/custom/ccs/files/public%2oregister%2oand%2oconsultation/public%2oconsultation%2oitems/abuse%2oof%2odominant%2oposition%2oby%2osisticcom%2opte%2oldt/sistic2oinfringement2odecision2ononconfidential2oversion.ashx>
- CCS (2014a), *Grounds of Decision in Relation to the Notification for Decision of the proposed acquisition by Seek Asia Investment Pte Ltd of the JobStreet Business in Singapore*:
<https://www.ccs.gov.sg/~media/custom/ccs/files/public%2oregister%2oand%2oconsultation/public%2oconsultation%2oitems/propose>

[d%2oacquisition%2oby%2oseek%2oasia%2oinvestments%2opte/se
ekgdpublic.ashx](https://www.ccs.gov.sg/~media/custom/ccs/files/public%2oregister%2oand%2oconsultation/public%2oconsultation%2oitems/ccs%2oimposes%2openalties%2oon%2oball%2obearings%2omanufacture/all%2obearings%2oidpublic%2oversion%2720may2014.ashx)

CCS (2014b), *Notice of Infringement Decision Issued by the Competition Commission of Singapore, Infringement of the section 34 prohibition in relation to the supply of ball and roller bearings*, Case number: CCS 700/002/11:

<https://www.ccs.gov.sg/~media/custom/ccs/files/public%2oregister%2oand%2oconsultation/public%2oconsultation%2oitems/ccs%2oimposes%2openalties%2oon%2oball%2obearings%2omanufacture/all%2obearings%2oidpublic%2oversion%2720may2014.ashx>

CCS (2014c), *Notice of Infringement Decision Issued by the Competition Commission of Singapore, Infringement of the section 34 prohibition in relation to the provision of air freight forwarding services for shipments from Japan to Singapore*, Case number: CCS 700/003/11:

<https://www.ccs.gov.sg/~media/custom/ccs/files/public%2oregister%2oand%2oconsultation/public%2oconsultation%2oitems/ccs%2ofines%2o10%2ofreight%2ofowarders/air%2ofreight%2oforwarding%2o%2oinfringement%2odecision%2ononconfidentialpublic%2oregister.ashx>

Chan B and Al-Hawamdeh S (2002), *The development of E-commerce in Singapore, The Impact of government initiatives*, Business Process Management Journal, Vol. 8 No. 3 2002, pp. 278-288.

Charles River Associates (2002), *Innovation and competition policy: Challenges for the new millennium*, commissioned by the UK Office of Fair Trading.

Chu J and Cebollada J (2012), *A study of category pricing at an online grocery store*:

<http://research.nus.biz/Documents/Research%2oPaper%2oSeries/2012-008.pdf>

Chua J (2012), *The e-transformation journey of Singapore*, in Hanna N K and Knight, P T (eds), *National Strategies to Harness Information Technology, Seeking Transformation in Singapore, Finland, the Philippines, and South Africa*, Springer New York.

Competition and Markets Authority (CMA) (2014), *Private motor insurance market investigation final report*:

https://assets.digital.cabinet-office.gov.uk/media/5421c2ade5274a1314000001/Final_report.pdf

Competition and Markets Authority (CMA) (2015a), *The commercial use of consumer data*:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/435817/The_commercial_use_of_consumer_data.pdf

Competition and Markets Authority (CMA) (2015b), *Online reviews and endorsements*:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/436238/Online_reviews_and_endorsements.pdf

Competition Commission UK (2008), *Groceries market investigation*: <http://webarchive.nationalarchives.gov.uk/20140402141250/www.competition-commission.org.uk/our-work/directory-of-all-inquiries/groceries-market-investigation-and-remittal/final-report-and-appendices-glossary-inquiry>

Dana J and Orlov E (2009), *Internet penetration and capacity utilization in the US airline industry*, Northeastern U. College of Business Administration Research Paper 08-001.

Danaher P, Wilson I and Davis R (2003), *A comparison of online and offline consumer brand loyalty*, *Marketing Science* 22.4, pp. 461-476.

Davis P and Garcés E (2009), *Quantitative techniques for competition and antitrust analysis*, Princeton University Press.

Degeratu A, Rangaswamy A and Wu J (2000), *Consumer choice behavior in online and traditional supermarkets: The effects of brand name, price, and other search attributes*, *International Journal of Research in Marketing* 17.1, pp. 55-78.

ECAS (2010), *Singapore e-commerce survey 2010 report*: <http://ecommerce.us1.list-manage.com/subscribe?u=334c6c74ca0456a638162faa9&id=be09491fe4>

Edelman B and Wright J (2015), *Price coherence and excessive intermediation*, Harvard Business School Working Paper, No. 15-030, October 2014 (Revised March 2015. First circulated as Price Coherence and Adverse Intermediation in December 2013)

Einav L, Kuchler T, Levin J, Sundaresan N (2011), *Learning from seller experiments in online markets*, No. w17385. National Bureau of Economic Research.

Eisenmann T, Parker T and Van Alstyne M (2011), *Platform envelopment*, *Strategic Management Journal* 32.12, pp. 1270-1285.

Ellison G and Ellison S F (2009), *Search, obfuscation and price elasticities on the Internet*, *Econometrica*, 77(2), 2009, pp 427-52.

Emch E and Thompson T S (2006), *Market Definition and Market Power in Payment Card Networks*, *Review of Network Economics* Vol.5

Euromonitor (2014a), *Retailing in Singapore*, April 2014.

Euromonitor (2014b), *Internet retailing in Singapore*, April 2014.

European Commission (EC) (2015), *A digital single market strategy for Europe*, http://ec.europa.eu/priorities/digital-single-market/docs/dsm-communication_en.pdf

European Data Protection Supervisor (2014), *Privacy and competitiveness in the age of big data: The interplay between data protection, competition law and consumer protection in the Digital Economy*, Preliminary opinion paper,

https://secure.edps.europa.eu/EDPSWEB/webdav/shared/Document/s/Consultation/Opinions/2014/14-03-26_competition_law_big_data_EN.pdf.

Evans D and Schmalensee R (2012), *The antitrust analysis of multi-sided platform businesses*, Coase-Sandor Institute for Law & Economics Working Paper, No. 623, 2012).

Ezrachi A and Stucke M E (2015), *Artificial Intelligence & Collusion: When Computers Inhibit Competition*, The University of Oxford Centre for Competition Law and Policy Working Paper CCLP (L) 40 (http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2591874)

Federal Trade Commission (FTC) (2014), *Data Brokers – A Call for Transparency and Accountability*, available at <https://www.ftc.gov/system/files/documents/reports/data-brokers-call-transparency-accountability-report-federal-trade-commission-may-2014/140527databrokerreport.pdf>

Filistrucchi L (2008), *A SSNIP Test for Two-sided Markets: The Case of Media*, NET Institute Working Paper #08-34.

Filistrucchi L, Gerardin D, van Damme E and Affeldt P (2013), *Market Definition in Two-Sided Markets: Theory and Practice*, Dipartimento di Scienze Economiche, Università degli Studi di Firenze, Working Paper 05/2013.

Forman C, Ghose A, and Goldfarb A (2009), *Competition between local and electronic markets: How the benefit of buying online depends on where you live*, *Management Science* 55.1 (2009), pp. 47-57.

Forrester (2014a), *Building the B2B omni-channel commerce platform of the future, B2B buyer expectations are driving sellers to deliver functional omni-channel experiences:*

<http://www.accenture.com/SiteCollectionDocuments/PDF/Accenture-Building-Omni-Channel-Commerce-Platform-Future.pdf>

Forrester (2014b), *Customer desires Vs. Retailer capabilities: Minding the omnichannel commerce gap:* http://www.accenture.com/us-en/landing-pages/Documents/Seamless/Accenture-hybris-Forrester-new_2014.pdf

Frontier Economics (2000), *E-commerce and its implications for competition policy*, Office of Fair Trading Discussion Papers.

FTC (2000), *Entering the 21st century- Competition policy in the world of B2B electronic marketplaces.*

Gans J and King S (2004), *Supermarkets and shopper docket: The Australian experience*, *Australian Economic Review* 37.3, pp. 311-316.

Goh, H C C (2005), *An exploratory study of business to consumer e-commerce adoption by businesses in Singapore:*

<http://scholarbank.nus.edu.sg/bitstream/handle/10635/15391/GohHCC.pdf>

Goldfarb A and Tucker C (2011), *Substitution between offline and online advertising markets*, Journal of Competition Law and Economics, 7.1 pp. 37-44.

Goldmanis M, Hortacsu A, Syverson C and Emre O (2010), *E-Commerce and the market structure of retail industries*, The Economic Journal, 120.545 pp. 651-682.

Granados N, Gupta A and Kauffman R (2012), *Online and offline demand and price elasticities: Evidence from the air travel industry*, Information Systems Research 23.1, pp. 164-181.

Grunes A P and Stucke M (2015), *No Mistake About It: The Important Role of Antitrust in the Era of Big Data*, The Antitrust Source: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2600051

Hannak A, Soeller G, Lazer D, Mislove A, Wilson C (2014), *Measuring Price Discrimination and Steering on E-commerce Web Sites*, Proceedings of the 2014 Conference on Internet Measurement Conference. ACM.

Haucap J and Heimeshoff U (2014), *Google, Facebook, Amazon, eBay: Is the Internet driving competition or market monopolization?*, International Economics and Economic Policy 11.1-2 pp. 49-61.

IDA, (2011), *Annual survey of infocomm usage by enterprises*.

IDA, (2011), *Annual survey of infocomm usage in households and by individuals*.

IDA, (2012), *Annual survey of infocomm usage by enterprises*.

IDA, (2012), *Annual survey of infocomm usage in households and by individuals*.

IDA, (2013), *Annual survey of infocomm usage by enterprises*.

IDA, (2013), *Annual survey of infocomm usage in households and by individuals*.

ITU (2001), *The e-City: Singapore internet case study*.

Jindal N and Bing L (2008), *Opinion spam and analysis*, Proceedings of the 2008 International Conference on Web Search and Data Mining, ACM.

Kagan J (2010), *Bricks, mortar, and Google: Defining the relevant antitrust market for Internet-based companies*, NYL Sch. L. Rev. 55 271.

Kowtha N R and Choon W I (2001), *Determinants of website development: A study of electronic commerce in Singapore*, Journal of Information and Management, Vol. 39, pp. 227-242.

KPMG (2006), *Grocery retailing in Asia Pacific*: <http://www.kpmg.com/CN/en/IssuesAndInsights/ArticlesPublications/Documents/Retailing-Asia-Pacific-200610.pdf>

Kraemer K, Dedrick J and Dunkle D (2002), *E-commerce: A mile wide and an inch deep. Globalisation of e-commerce*, The Center for Research on Information Technology and Organizations (CRITO) at the University of California, Irvine.

Lagerweij R (2013), *Case Study: Social Networks in Lending Decisions*, Fico World 2013 Highlights: http://www.fico.com/en/wp-content/secure_upload/008_Case_Study_Social_Networks_in_Lending_Decisions.pdf

Lee H G (1998), *Do Electronic Marketplaces Lower the Price of Goods?*, Communications of the ACM, vol. XLI, n. 1, p. 73-80.

Lendle A, Schropp S, Olarreaga M, Vézina P L (2012), *There goes gravity: How eBay reduces trade costs*, World Bank.

Lerner A, (2014), *The Role of 'Big Data' in Online Platform Competition*, SSRN 2482780.

Levin J (2011), *The economics of internet markets*, NBER Working Paper Series 16852 (2011).

Levy M and Powell P (2003), *Exploring SME internet adoption: towards a contingent model*, Electronic Markets, Vol. 13(2) pp. 173 – 181.

Lieber E and Syverson C (2012), *Online versus offline competition*, The Oxford Handbook of the Digital Economy (2012).

Luca M (2011), *Reviews, reputation, and revenue: The case of Yelp.com*, No. 12-016. Harvard Business School.

Manne G and Wright J (2011), *Google and the limits of antitrust: The case against Google*, Harv. JL & Pub. Pol'y 34 171.

Martens B (2013), *What does Economic Research tell us about Cross-border e-Commerce in the EU Digital Single Market? A Summary of Recent Research*, European Union - Institute for Prospective Technological Studies (IPTS).

Mastercard World Insights (2008), *Online shopping in Asia/Pacific – Patterns, trends, and future growth*: http://www.mastercard.com/us/company/en/insights/pdfs/2008/Asia_Pacific_Online_Shop.pdf

Mayzlin D, Dover Y and Chevalier J (2014), *Promotional Reviews: An Empirical Investigation of Online Review Manipulation*, American Economic Review, 104(8)

McKinsey (2013), *The future of online groceries in Europe*: http://www.mckinsey.com/client_service/retail/latest_thinking/perspectives_second_edition/~/_media/mckinsey/dotcom/client_service/retail/articles/perspectives%20book/05%20online%20grocery.ashx

Mehra, S (2015), *Antitrust and the Robo-Seller: Competition in the Time of Algorithms*, Minnesota Law Review, Vol. 100, Forthcoming (available at SSRN: <http://ssrn.com/abstract=2576341>)

Mikians J, Gyarmati L, Erramilli V and Laoutaris N (2012), *Detecting price and search discrimination on the Internet*, Proceedings of the 11th ACM Workshop on Hot Topics in Networks, ACM.

Mikians J, Gyarmati L, Erramilli V and Laoutaris N (2013), *Crowd-assisted search for price discrimination in e-commerce: first results*, arXiv preprint arXiv:1307.4531.

Newman N (2014), *How Big Data Enables Economic Harm to Consumers, Especially to Low-Income and Other Vulnerable Sectors of the Population*, available at

https://www.ftc.gov/system/files/documents/public_comments/2014/08/00015-92370.pdf

Nielsen (2014), *E-commerce: evolution or revolution in the fast-moving consumer goods world?*, August 2014

Nielsen (2014), *E-commerce: evolution or revolution in the fast-moving consumer goods world?*, Summary on Singapore:

<http://www.nielsen.com/content/dam/nielsen-global/sg/docs/press-releases/2014/nielsen-singapore-e-commerce-press-release-august-2014.pdf>

NZCC (2014), Determination: *Expedia, Inc and Wotif.com Holdings Limited [2014]* NZCC 30:

<http://www.comcom.govt.nz/dmsdocument/12896>

Odlyzko A (2003), *Privacy, economics, and price discrimination on the Internet*, Proceedings of the 5th international conference on Electronic commerce. ACM.

OECD (2009), *Two-sided markets*, Policy Roundtables.

OECD (2011), *Remedies in merger cases*, Policy Roundtables.

OECD (2012), *The Digital Economy*, Hearings.

OECD (2013), *Vertical Restraints for On-Line Sales*, Policy Roundtables.

OECD (2014a), *Airline Competition Note* by Australia, Directorate for Financial and Enterprise Affairs, Competition Committee.

OECD (2014b), *Airline Competition Note* by United Kingdom, Directorate for Financial and Enterprise Affairs, Competition Committee.

Office of Fair Trading (OFT) (2010a), *Online targeted advertising and pricing*, OFT1231.

Office of Fair Trading (OFT) (2010b), *Advertising of prices*, OFT1291.

Office of Fair Trading (OFT) (2012), *Airlines/Payment Surcharges: Investigation into pricing practices by 14 airlines:*

<http://webarchive.nationalarchives.gov.uk/20140402142426/http://www.oft.gov.uk/OFTwork/consumer-enforcement/consumer-enforcement-completed/card-surcharges/>

- Office of Fair Trading (OFT) (2013), *The economics of online personalised pricing*, OFT1488.
- Orlov E (2011), *How does the internet influence price dispersion? Evidence from the airline industry*, *The Journal of Industrial Economics* 59.1, pp 21-37.
- PaRR (2014), *PaRR Special Report*, Global Trends Monitor 2014: <http://admin.parr-global.com/files/cases/795236/PaRR%202014%20Trend%20Report.pdf>
- PayPal (2011) *Online and mobile shopping in Singapore*. See summary at: <http://www.mediabuzz.com.sg/asian-emarketing-latest-issue/1247-paypals-first-comprehensive-study-on-online-and-mobile-shopping-in-singapore>
- Payvision (2013) *Cross-border eCommerce in Asian markets: Singapore and Malaysia*: <http://www.payvision.com/cross-border-ecommerce-singapore-malaysia>
- Payvision (2014) *Key business driver and opportunities in cross border ecommerce, international expansion into emerging markets 2014*: <http://www.payvision.com/cross-border-ecommerce-report-survey-2014>
- Picker R (2008), *Competition and Privacy in Web 2.0 and the Cloud*, University of Chicago Law & Economics, Olin Working Paper 414.
- Plaut V C and Bartlett R P (2011), *Blind Consent? A Social Psychological Investigation of Non-Readership of Click- Through Agreements*, Law and Human Behaviour
- Pozzi A (2007), *Channel selection and price sensitivity: an application to online grocery*: http://www.webmeets.com/files/papers/EARIE/2007/67/pozzi_EARIE.pdf
- Pozzi A (2010), *Shopping cost and brand exploration in online grocery*: http://are.berkeley.edu/SGDC/pozzi_August2010.pdf
- Pozzi, A (2011), *Who Is Hurt by E-commerce? Crowding out and Business Stealing in Online Grocery*, Social Science Research Network (SSRN): <http://193.196.11.222/pub/zew-docs/veranstaltungen/ICT2011/Papers/Pozzi.pdf>
- Pressey A and Ashton J (2007), *Competition policy implications of electronic business-to-business marketplaces: Issues for marketers*, CCP Working Paper 07-15.
- Ranganathan C, Teo T S H and Dhaliwal J (2011), *Web-enabled supply chain management: Key antecedents and performance impacts*, *International Journal of Information Management*, Vol. 31 pp. 533-545.

- Rochet JC and Tirole J, (2003), *Platform competition in two-sided markets*, Journal of the European Economic Association, Vol.1, n°4, juin 2003, pp. 990-1029.
- Rochet JC and Tirole J, (2006), *Two-Sided Markets: A Progress Report*, The RAND Journal of Economics, Vol. 35, n°3, 2006, pp. 645-667.
- Rosch T (2010), *Intel, Apple, Google, Microsoft, and Facebook: Observations on Antitrust and the High-Tech Sector*, Federal Trade Commission.
- SAP and Hybris Software (2014), *State of e-commerce in South East Asia*:
http://hybris.com/medias/sys_master/8805671829534/Econsultancy-State-of-Ecommerce-in-South-East-Asia.pdf
- Scarber A and Le Blanc L (2011), *Logistics and order fulfilment strategies for online grocery retailing*, Proceedings of the 46th Annual Conference, Canadian Transportation Research Forum.
- Sengupta A and Wiggins S (2006), *Airline pricing, price dispersion and ticket characteristics on and off the internet*, Price Dispersion and Ticket Characteristics On and Off the Internet, .NET Institute Working Paper 06-07.
- Singapore Department of Statistics (2015), March 2015 Statistics Singapore Newsletter, Household expenditure survey 2012/2013 – Observations on prevalence of online purchases, ISSN 0218-6812.
- SP eCommerce (2014), *The changing face of ecommerce and logistics in Asia Pacific. An overview of Asia Pacific's ecommerce potential and the key factors driving it's rapid growth*:
<http://www.specommerce.com/the-changing-face-of-ecommerce-and-logistics-in-asia-pacific/>
- Teo T S H (2006) *To buy or not to buy online: Adopters and non-adopters of online shopping in Singapore*, Behaviour & Information Technology, Vol. 25, No. 6, November – December 2006, pp 497 – 509.
- Teo T S H and Pian Y J (2004), *A model for web adoption*, Journal of Information and Management, Vol. 41, pp. 457-468.
- Teo T S H and Ranganathan C (2004), *Adopters and non-adopters of business-to-business electronic commerce in Singapore*, Journal of Information and Management, Vol. 42, pp. 89-102.
- Teo T S H, and Tan M (1998), *An empirical study of adopters and non-adopters of the Internet in Singapore*, Journal of Information and Management, Vol. 34(6) pp. 339–45.
- Teo T S H, Lin S and Lai K H (2008), *Adopters and non-adopters of e-procurement in Singapore: An empirical study*, Omega 37 (2009) 972-987.

Teo T S H, Ranganathan C and Dhaliwal J (2006), *Key dimensions of inhibitors for the deployment of web-based business-to-business electronic commerce*, IEEE Transactions on Engineering Management, Vol 53(3), August 2006.

The Paypers (2014), *Cross-border ecommerce report, critical facts and insights for international expansion*:

<http://www.thepayers.com/ecommerce-facts-and-figures/singapore/16>

Thépot F (2012), *Market power in online search and social-networking: A matter of two-sided markets*, Centre for Law, Economics and Society Working Paper Series 4/2012.

Tsai J, Egelman, S, Cranor L and Acquisti A (2010), *The effect of online privacy information on purchasing behaviour: An experimental study*, Information Systems Research

Tucker C, *The economics value of online customer data*, OECD Roundtable Background Paper #1 (2010).

UBS (2014) *ASEAN ecommerce, is ASEAN at an inflection point for ecommerce?*: <http://simontorring.com/wp-content/uploads/UBS-report-2014.pdf>

Verlinda J and Lane L (2004), *The effect of the Internet on pricing in the airline industry*:

http://papers.ssrn.com/sol3/papers.cfm?abstract_id=965788

Weyl E G (2010), *A price theory of multi-sided platforms*, The American Economic Review, pp. 1642-1672.

Wong P K (1996), *Implementing the national information infrastructure vision: Singapore's experience and future challenges*, Information Infrastructure and Policy, Vol. 5(2), pp. 95-117.

Wong P K (2003), *Global and national factors affecting e-commerce diffusion in Singapore*, Information Society, Vol. 19 pp. 19-32

Wong P K and Ho Y P (2004), *E-commerce in Singapore: impetus and Impact of Globalisation*, The Center for Research on Information Technology and Organizations (CRITO) at the University of California, Irvine.