

5 Competition and Regulation in Markets for Goods and Services: A Survey with Emphasis on Digital Markets

Nikolaos Vettas

Abstract

In the last couple of decades, competition policy has been receiving increasing attention and has obtained a central role in microeconomic policy in Europe. Ensuring that markets work as competitively as possible is viewed as key for economic growth and welfare. While much progress has been made in the research that studies and shapes competition policy, the nature of competition in markets is also evolving and new issues are emerging. An important novel feature is related to the increase in the size of the digital sectors of the economy and especially to the way that digital technologies and e-commerce practices revolutionize essentially all other sectors of the economy. These developments represent some new challenges for research. One key issue is that with digital markets and technologies we are more likely to have intense competition *'for the market'*, rather than competition *'in the market'*. It follows that we need models that are more dynamic and incorporate to a larger extent network effects, other increasing returns to scale and uncertainty. At the same time, it is important that one does not ignore the lessons of the earlier and current literature, especially in core areas like pricing and vertical relations. On the empirical research side, the availability of relevant data can be expected to increase exponentially, due to the fact that electronic transactions can be recorded almost automatically. The need and opportunity for new empirical studies, given the nature of available data, thus emerges. New technologies also tend to minimize the distances between buyers and sellers in markets and facilitate information flows; *'single market'* issues therefore come to the forefront and their analysis can be controversial. This challenge becomes a clear priority since the Digital Single Market is a stated objective of the European Commission.

5.1 Introduction

Competition and innovation can be identified as the two, closely interrelated, pillars of long-run growth. Over the last decades, in particular, economic policy

has focused systematically and as a priority on how to protect and strengthen the factors that facilitate both competition and innovation. Importantly, the relevant policy design has to take into account that the relation between the two economic forces is complex and typically not monotonic. From a static view, competition among firms allows consumers to have access to goods that are less expensive and of higher quality, while overall reducing profit levels. From a more dynamic perspective, however, it is exactly the profit motive that makes firms proceed in their innovative activities, either in product innovation (that is, offering new and better products) or in process innovation (that is, producing goods more efficiently).

Policy at the European Union (EU) level has made the more efficient functioning of products' markets a clear priority. Worldwide, in the last couple of decades we have also seen very important progress both on the competition policy and the innovation policy fronts. This has led to a more systematic, clear and consistent approach to the design and application of policy, to some convergence of views, and in particular to bringing the legal and the economics-based approaches of the issue closer to each other, with the goal of contributing to a more efficient functioning of markets and to increases in social welfare. In fact, how structural reforms that improve the functioning of markets can lead to sustainable growth is the focus of the modern economics of growth (see e.g., Aghion and Akcigit, 2015).

Regarding competition policy itself, it has grown from an area that was peripheral, of secondary importance and perhaps relatively more important only in the US (building on the more than century-long tradition that followed the Sherman Act of 1890), into one of the most active and important areas in micro-economic policy. In particular, starting in the mid-1980s, the explosion of important research in industrial organization (IO) economics has been gradually and naturally blended with developments in competition policy and law. This research in IO, directly linked to developments in game theory and information economics (with its first wave of key contributions reflected in Tirole, 1988), has contributed towards narrowing the gap between the more formalistic and the '*Chicago school*' approaches, and has proved fruitful.¹ Overall, progress in competition policy in the EU has been made, on a number of important fronts, both at the level of the European Commission (DG-Competition) and the more decentralized level of the National Competition Authorities (NCAs). Recently, a set of new and important challenges have appeared for the application of competition policy, specifically in the context of how markets work in the '*digitalized*' economy and electronic trade.²

The efficient functioning of the digital and online markets is of high importance for welfare and is expected to become increasingly so in the near future; therefore progress in the related research and policy areas should be of high priority. Importantly, not only is it true that digital markets, more narrowly defined, are an increasingly larger part of the economy, but also that the new

technologies tend to change in important ways how all other markets essentially work.³ For instance, ‘cross-channel’ retail sales in Europe (that is, purchases that consumers begin using a digital channel, but do not complete online) are expected to reach € 704 billion by 2020, up from € 457 billion in 2015; combined with online sales, these cross-channel sales are expected to reach € 947 billion, with the result that 53 per cent of total European retail sales over the next five years will be web-impacted.⁴ This chapter focuses, therefore, on how the literature examines some issues related to the economic phenomena that become important due to the development of digital markets, and shape the basis for competition policy. On this policy front, we have seen a series of recent and high-profile cases at the EC against the largest companies in the digital or high-technology sectors.

From an economics perspective, a key distinguishing feature of trade in the digitalized world is the ability of sellers and buyers to access some important information about their trading partners in ways that, for practical reasons, are essentially impossible in traditional markets. As a result, with constraints and incentives for the market participants becoming significantly modified, equilibrium strategies and outcomes are expected to change. In turn, competition policy also has to take a stand on a number of issues that were not present in traditional markets or were much less important.⁵

More specifically, one of the main new areas that pose challenges in their analysis is related to the significantly enhanced ability that firms have to price differently to different clients and under different conditions in a digitalized environment. Possible competition restrictions in e-commerce include geographical targeting both for the digital content and for the online sale of goods. Online sellers may sell goods to different countries using terms that may differ substantially across countries. This also includes the frequent practice of directing buyers from different areas to different websites and also blocking digital content, such as sports or movies. Often an important part of the online distribution of digital content takes place through licensing arrangements that include explicit territorial restrictions.

Related to the above matters are also ‘parallel trade’ restrictions, in e-commerce and otherwise, that prevent a distributor from selling a good outside a particular country. It is often the case in practice that retailers are prevented from distributing a service or a good in a certain territory as a result of a silent understanding, or of a particular contractual restriction. A related recent phenomenon of increasing importance is that of imposing limitations on the sales through third party platforms (or ‘marketplaces’). These limitations include the sale through websites that operate in different countries and the application of ‘most favoured nation’ (MFN) clauses.

More broadly, pricing restrictions and other vertical restraints, such as resale price maintenance (RPM) and types of MFN clauses, have emerged as quite

important in competition policy practice. In fact, NCAs in different EU member states have reached decisions that appear to be moving in opposite directions, especially in the area of vertical pricing practices, indicating that a more solid scientific basis would be useful for the comprehension and analysis of such cases.

In addition to competition policy objectives, a stated core goal in the EU is the promotion of the 'single market'.⁶ This objective is often served by the application of competition and other policy measures, however, it is often viewed as a goal in itself. It can be interpreted in a narrower or a broader way. The narrower way is that all buyers should have access to products and services on the same terms, regardless of the member state where they reside. In close relation to the topic of this chapter, the Single Digital Market objective has been set by the European Commission (EC) as one of its top priorities, as also detailed in its May 2015 Communication,⁷ while the Commission launched at the same time an antitrust competition inquiry into how the e-commerce sector functions in the EU. The inquiry, as already announced by Competition Commissioner Margrethe Vestager in March, will allow the Commission to identify possible competition concerns affecting European e-commerce markets.⁸ While making this issue a priority appears a reasonable policy choice, interpreting the single market objective as a way to eliminate all price discrimination practices is likely too narrow an approach and not based on solid economic principles. Economic analysis does not always offer clear predictions about the welfare effects of price discrimination. If the single market objective is understood to mean uniform prices across all EU areas, then that would be an extreme view; after all, prices are not typically the same even within the same country. Prohibiting price discrimination may not lead to everyone having access to the goods or services at the lower possible price, which is often implicitly assumed. Instead it is possible that it may lead to some markets not being served at all, which would be contrary to the single market principle.

Overall, while in this chapter we are motivated by some important recent cases and emphasize new aspects of how markets work and the need for new research, we also wish to stress the *continuity* that should exist both in the economics analysis and in competition policy: when moving forward to applications in new markets, ignoring past research is not an appropriate way to proceed. Many of the issues that surface as important in digital markets are not absent in other markets and therefore (should) have also already been studied in some way. However, the difference in scale is often so dramatic that from a practical viewpoint the priorities for what matters, the nature of how the market forces interact and the application of policy analysis, is often perceived as a completely different market environment. The challenge therefore is to try to identify the new elements that play the key role for each case. Online travel agencies, for example, make searching for a hotel reservation a

very different activity than it used to be. However, we could in principle have had (and we did have) travel agents before the Internet and also we could have (and we sometimes still have) online searches without online platforms to act as intermediaries.

To argue that the new markets require a whole new set of research that would make the existing one obsolete would not necessarily be a reasonable way to proceed. Instead, the key is how to use existing results, to refine, extend and enrich them in the context of digital markets. In particular, there are at least two important literatures within IO that are relevant here and, by their nature, necessarily closely related to the currently open issues. These refer to the study of vertical relations (integration and vertical restraints) and to pricing practices: in particular, price discrimination and nonlinear pricing. We sketch some of the progress that has been made in areas that are still open and important. The challenges faced by researchers in these areas are not trivial. The study of vertical relations necessarily finds in its way the issue of bargaining between vertically-linked firms. Such firms act both as collaborators, since they trade goods and services with each other, and at the same time as competitors, since they compete in sharing the joint surplus.

Pricing itself has naturally been a core issue in economics. However, we may not have a full understanding of how pricing functions when there is price discrimination and various types of nonlinear pricing under oligopoly competition, when there are vertical relations, or what the welfare implications are of the various restrictions, especially under important dynamic effects.

It is beyond the scope of this chapter to discuss in depth the important related competition cases that have been recently examined or are under examination. Instead, we use these as a motivation to focus on some related ideas and results from the relevant literature. We also discuss areas and topics where further research would be useful and possibly important for policy. This refers both to more basic research (that could be useful across a number of competition policy issues and other cases) and to research that is motivated by specific competition cases.

The remainder of this chapter is organized as follows. The next section starts with a general perspective on competition policy in the EU, before turning to some recent developments there. We discuss digital markets and differentiate according to the features of the goods supplied and other dimensions, since the digital nature of each market does not have to be the same. Then we discuss some recent competition cases in Europe (including e-books and online travel agencies) that can serve as leading examples for the analysis and relate to the Commission's Single Digital Market initiative. We close this section with a comparison between online and offline trade. Section 5.3 sketches some selected results from the IO literature, looking at pricing (with a focus on price discrimination) and at vertical relations (with a focus on restraints). Section 5.4

turns to research that is motivated specifically by recent and current competition issues, such as how to treat online and offline sales, geographical and other pricing restrictions and ‘*most favoured nation*’ clauses. Section 5.5 discusses the main challenges that economics research is facing when analyzing and supporting competition policy in digital markets. Section 5.6 concludes.

5.2 A View on Competition Policy Developments in Europe

5.2.1 *Competition Policy: The General Context*

Policy at the EU level has made the more efficient functioning of product and services markets a priority. Related policy is organized around four areas, collusion and cartels, abuse of dominance, merger control and state aid. Activity has been high in each of these areas, as is also manifested by the several high-profile cases examined and by the increasing level of fines imposed. In terms of the foundations for policy, significant progress has been made in a number of important fronts; the challenges, however, have not been trivial.

A central issue has been the tension between following an economics-based and a more formalistic approach in policy, a distinction that often expresses itself as a choice between a more effects-based and a *per se* approach to competition. While there has been progress on this front, the matter is not resolved and will likely remain a core element of the debate about competition policy for the decades to come. Industrial organization economists have studied systematically topics directly or indirectly related to competition policy, while some policy-makers have appeared open to receiving guidance for their decisions by economic analysis.⁹ The primary area where economic analysis has contributed significantly in the last few years in European policy-making is in identifying economic *efficiencies* and the related trade-offs of policy actions. This was primarily effective in the areas of vertical relations, as well as in mergers and in state aid. However, certainly not everyone agrees on the importance of the progress economic analysis has made, or even how important a role economics could or should play in competition policy decisions in any event.¹⁰

A second important area where progress has been made is in defining the limits of the application of competition policy. The main issue here is the relation between the competition policy principles (which typically refer to ad hoc and ex post interventions) and sectoral regulation (which typically aims to establish economic efficiency by ex ante and often comprehensive interventions). Where should one draw the line between the two approaches and how can one facilitate the transition from a more regulation-based to a more ‘free-market’ operation, that is, without systematic regulation but with an application of competition law when this is needed? This question is central in many markets including telecoms, energy, transport and banking and, of course, affects

the relation between DG-Competition and the other Directorates in the Commission. A related important challenge has been the gradual harmonization of policy between countries, especially with the US and also within the EU.

A third challenge has been to clarify the relation between competition policy and other policy areas. In relation to innovation policy, such as in intellectual property protection, the central question is to understand how static efficiency (where high profit is often a measure of market inefficiency) and dynamic efficiency (where it is exactly the prospect of profit that may drive innovation) are related. Related key challenges have been made evident by the recent financial and macroeconomic crisis. Should one think differently about the application of competition law, especially in the areas of merger control and state aid, when important firms (including banks) or even entire sectors face distress, or is the importance of the rules exactly to offer guidance at the more difficult times, even if this means that a significant part of economic activity will be eliminated?

Overall, and looking across the four core areas (cartels, abuse of dominance, mergers and state aid), the amount of work that has been put in place in the EU over the recent years has been significant, although the issues described above are too deep and complex to be fully resolved. A useful summary of the economic analysis used in DG-Comp in recent years, including both cases based on some innovative economic analysis and new issues, can be found in a sequence of articles: Neven and Albæk (2007); Neven and de la Mano (2009, 2010); Kühn et al. (2011, 2012); Buettner et al. (2013), and Buehler et al. (2014).¹¹

5.2.2 *Digital Trade and Online Markets*

While it is now commonplace for economists and business people to concern themselves with the issues that the digital economy brings, it is important to try to clarify what the term ‘digital markets’ really means and what (if anything) is really fundamentally new there and in online trade (or electronic-trade, e-trade). One way to approach and organize the various aspects of the issue is as follows.

1. A first category refers to cases where *the Internet is used so that the end user has access to a good that is being offered (online) in digital form*. This includes movies, music, news, e-books, scientific articles, and various other such types of goods that would typically have informational or entertainment value. The user goes online and can obtain access directly. Some remarks for this case:
 - i. Goods in this category can typically also be supplied in some other form, through some alternative channel. Access to them in digital form could be made without the Internet (i.e., by using a CD, DVD or some other

such medium). They could also be used in a nondigital form, but in other traditional ways: *Casablanca* was being watched by large audiences years before the digital format became possible; the *New York Times* was published only in paper format for decades. In many cases the two channels, digital and traditional, coexist in the market either complementing or competing with each other.

- ii. Users of these goods obtain access to them typically by paying directly online and this payment could take the form of either paying for each item separately, or by purchasing a subscription. Some other times the end user could have access to the good without making any payment and the supplier only benefits indirectly.¹²
 - iii. How convenient and secure the payment is can be crucial for the efficient operation of such markets. Therefore, the development of electronic payments systems is complementary to such markets.¹³
2. A second category involves markets where the end good that will be consumed is *not* in digital form and instead the online operation *merely facilitates search and purchasing*. In cases such as searching or booking for hotel stays, travel, car rentals, housing, clothes or theaters, the Internet can be used either for providing information about the good (directly from the supplier or indirectly through other sources) or by proceeding to a booking and possibly payment. The actual consumption in all of these cases is not made online but in the 'real' world. In this sense, digital markets can affect literally any other market and they are offering a complementary good, which is the facilitation of the contact between the supplier and the potential buyer.
- One possibility in this case is that online search could only serve comparison purposes, without completing the actual transaction. The search would typically be about information for the goods' characteristics and prices. It may include access to information that is not only provided by the supplier, but also by past users or by third-party experts. For the search to be more useful, at some level some comparison should be possible between alternative purchases and substitute goods.
 - Another possibility is that, in addition to the information provided, a booking or a full purchase is made online. In this case, and depending on the physical nature of the good, the actual consumption will then take place either with the end-user travelling to it (visit a hotel or a theatre) or with the final good being transferred to the user (e.g., clothes shipped to home). Some comments for this case follow:
 - i. The sale could be made online through a website that is operated exclusively by the supplier. In the same way that the selling company could have a traditional brick-and-mortar store, it may (also) have an online store.

- ii. The online sale could also be made through a platform which allows the comparison and sale of goods offered by several competing brands and items. In this case, the platform plays the role of an intermediary, a type of 'online shopping mall'. The platform acts as an agent for the various suppliers and would typically charge a fee for the service. The delivery of the actual good could be the responsibility of either the platform (e.g., Amazon shipping a book) or the supplier (a hotel providing services purchased through Booking.com).
3. A third category may involve digital markets only at the wholesale level (B2B). These may take various forms (e.g., they may be exclusive, or open, with or without paying a subscription fee) and their goal is to facilitate trade between businesses, such as suppliers and distributors. Many of these markets do not employ the Internet but other internal electronic systems. Several also existed independently and before the explosion of online trade at the retail level.¹⁴
4. Online auctions (at the retail or wholesale level) are also a distinct category. Auctions, even when organized offline, are market activities that operate on the basis of some clear and precise rules, and their conduct online mainly provides some gains in terms of lower transaction costs. However, the changes that are being introduced relatively to the traditional format are in general less important than in other markets, where the rules are initially less formal in the traditional format.¹⁵

Given the above categorization and description of characteristics, it would be useful to make some initial remarks. A key feature of digital markets from an economics viewpoint is the much lower search and transaction costs, relative to how these markets tend to operate offline. At the same time, suppliers and intermediaries have much easier access to potential buyers than before and also to key data about their characteristics. Issues related to vertical restraints and price discrimination become central.¹⁶ In many cases we tend to have two-sided market features. In addition, whether content is sold online, or the online nature simply is confined to facilitating trade, intellectual property issues become very important and an analysis of the effects of patents and copyrights may be necessary. This feature becomes even more important due to the cost structure, which is tilted heavily towards the fixed components and not the marginal ones. Finally, whoever controls pricing and access to the means via which trade takes place is important, including the question of pricing internet access.

The nature of the concerns that competition authorities express in recent cases in this broad digital context varies. In the electronic-books markets (e.g., Apple, Amazon), the main concern is about the format in which pricing takes place (e.g., wholesale pricing vs. agency); in the online travel agency cases (e.g., HRS) the concern has been about 'best price' (or MFN) clauses in contracts between the platform and the hotels. In distribution cases (e.g., Adidas

or Asics) the main concern is if it could make economic sense for a supplier not to allow some broader platform to offer their products. We turn next to a description of some recent cases.

5.2.3 *Some Recent Competition Cases*

A number of high-profile competition cases have been recently examined or are currently open in Europe and are related, directly or indirectly, to online trade and similar issues. While the details in each case are different, online pricing raises issues of possible abuse of a firm's dominant position: a theme that often emerges is that of pricing restrictions that tend to exclude some suppliers or distributors, or tend to discriminate among categories of buyers.

MasterCard: Cross-border Rules and Inter-regional Interchange Fees

In July 2015, the EC sent a Statement of Objections to MasterCard, expressing the view that MasterCard's rules prevent banks from offering lower interchange fees to retailers based in other Member States, where interchange fees may be higher. This follows a series of important previous actions on interchange fees, while there is also an on-going investigation into Visa Inc.'s interregional interchange fees policy.¹⁷

According to the preliminary view of the EC, retailers cannot benefit from lower fees in other areas and cross-border competition between banks may be restricted. It is also stated that MasterCard's interchange fees for transactions in the EU using MasterCard cards issued in other regions of the world (e.g., in the US or Russia) breach European antitrust rules by setting an artificially high minimum price for processing these transactions. It is further explained that payments by card play a key role in the Single Market, both for domestic purchases and for purchases across borders, or over the Internet. Banks use MasterCard to set on their behalf the interchange fees that apply between them. The Commission takes the preliminary view that the practices outlined violate Article 101 of the Treaty on the Functioning of the European Union (TFEU) that prohibits cartels and other anticompetitive business practices.

Two interrelated concerns were raised in the statement. First, interchange fees vary considerably from one Member State to another. MasterCard's rules prevent retailers in a high-interchange fee country from benefitting from lower interchange fees offered by an acquiring bank located in another Member State. A second concern is about the high levels of MasterCard's 'inter-regional interchange fees'. These fees are paid by an acquiring bank for transactions made in the EU with cards issued in other regions of the world. High interregional fees may increase prices for retailers and may in turn lead to higher prices for products and services for all consumers, according to the EC.

This case follows recent important developments in the markets for digital payments and, in particular, regarding how market competition is related to the appropriate regulation of interchange fees.¹⁸ The more controversial part of the new case may be that, under the current practice, banks in one EU Member State are prevented from offering lower interchange fees to a retailer in another EU country where interchange fees may be higher. If this practice is found to violate the law, a move towards high concentration is expected to be observed. In particular, banks from all Member States may move towards acquirers in other Member States where, because of their currently larger volume of transactions, fees can be set at lower rates. This possibility generates an interesting tension for policy-makers. On the one hand, the single market initiative should allow any agent to have access to lower prices at any level and available anywhere in the EU. On the other, in a market where a large installed base plays a crucial role and smaller players cannot survive, removing all barriers may lead to greatly increased concentration and ultimately to lower welfare, at least for consumers in some Member States.

Amazon: e-books

In June 2015, the EC opened an investigation into Amazon's electronic book contracts with publishers in the EU. According to the announcement, the main concern is about clauses requiring publishers to inform Amazon of terms with its competitors that may be more favourable, known as '*most favoured nation*' (MFN) clauses. The view of the EC is that the use of such clauses may make it more difficult for other e-book distributors to compete with Amazon by developing new and innovative products and services.¹⁹ It is stated that certain clauses included in Amazon's contracts with publishers concerning such e-books could constitute a breach of EU antitrust rules that prohibit the abuse of a dominant market position and restrictive business practices. In particular, the investigation focuses on clauses which may shield Amazon from competition from other e-book distributors, such as clauses granting it the right to be informed of more favourable or alternative terms offered to its competitors or the right to terms and conditions at least as good as those offered to its competitors.

MFN clauses were at the centre of the ruling against Apple and five major US publishers in 2013. Apple settled a big e-book antitrust case in the US that was driven in part by Amazon's complaints over Apple's deals with publishers. In December 2011, the EC had also opened proceedings in the sector, because it had concerns that Apple and five international publishing houses (Penguin Random House, Hachette Livres, Simon & Schuster, HarperCollins and Georg von Holtzbrinck Verlagsgruppe) may have colluded to limit price competition at the retail level for e-books. In December 2012 and July 2013, respectively, the companies offered a number of commitments, to make changes to their

contracts with Apple, which addressed the Commission's concerns. Overall, the significant increase in e-book reading in Europe has drawn the attention of the EC. The new case will focus mainly on the largest markets for books, in English and German.

Cross-border Provision of Pay-TV Services

In July 2015, the EC sent a Statement of Objections to Sky UK and six major US film studios (Disney, NBC Universal, Paramount Pictures, Sony, Twentieth Century Fox and Warner Bros). The Commission's preliminary view is that the studios and Sky UK have bilaterally agreed to put in place contractual restrictions that prevent Sky UK from allowing EU consumers located elsewhere to access, via satellite or online, pay-TV services available in the UK and Ireland. Without these restrictions, Sky UK would be free to decide on commercial grounds whether to sell its pay-TV services to such consumers requesting access to its services, taking into account the regulatory framework including, as regards online pay-TV services, the relevant national copyright laws.²⁰

US film studios tend to license audio-visual content to a single pay-TV broadcaster in each Member State (or combined for a few Member States with a common language). The investigation identified clauses in licensing agreements between the six film studios and Sky UK which require Sky UK to block access to films through its online pay-TV services ('geo-blocking') or through its satellite pay-TV services to consumers outside its licensed territory. Such clauses may restrict Sky UK's ability to accept unsolicited requests for its pay-TV services from consumers located abroad, that is, from consumers located in Member States where Sky UK is not actively promoting or advertising its services ('passive sales'). Some agreements also contain clauses requiring studios to ensure that, in their licensing agreements with broadcasters other than Sky UK, these broadcasters are prevented from making their pay-TV services available in the UK and Ireland. As a result, these clauses grant 'absolute territorial exclusivity' to Sky UK and/or other broadcasters. They eliminate cross-border competition between pay-TV broadcasters and partition the internal market along national borders.²¹

In related cases, the EC currently investigates licensing agreements between the film studios and other major European broadcasters (Canal Plus of France, Sky Italia of Italy, Sky Deutschland of Germany and DTS of Spain). In its October 2011 ruling on the Premier League / Murphy cases, the EU Court of Justice addressed the issue of absolute territorial restrictions in licence agreements for broadcasting services. The Court held that certain licensing provisions preventing a satellite broadcaster from providing its broadcasts to consumers outside the licensed territory enable each broadcaster to be granted absolute territorial exclusivity in the area covered by the licence, thus eliminating all competition

between broadcasters and partitioning the market in accordance with national borders.

Google: Online Comparison Shopping

In April 2015, the EC sent a Statement of Objections to Google concerning its comparison shopping service. The allegation is that the company is abusing its dominant position in the market for general internet search services by systematically favouring its own comparison shopping product in its general search results pages. The view expressed is that such conduct infringes EU antitrust rules, because it stifles competition and harms consumers.

According to the EC, comparison shopping products allow consumers to search for products on online shopping websites and compare prices between different vendors. The preliminary conclusion of the Commission is that Google gives systematic favourable treatment to its own product ‘Google Shopping’, for example, by showing Google Shopping more prominently on the screen. It may therefore artificially divert traffic from rival comparison shopping services and hinder their ability to compete on the market. The Commission is concerned that users do not necessarily see the most relevant results in response to queries – this is to the detriment of consumers, and stifles innovation. Further, the Commission’s preliminary view is that to remedy such conduct, Google should treat its own comparison shopping service and those of rivals in the same way.

Online Marketplaces and Selective Distribution

Some important cases in Germany, in July 2014, considered the terms of distribution via online marketplaces. The German Federal Cartel Office (*Bundeskartellamt*, or BKartA) and the Schleswig Court of Appeals (*Oberlandesgericht*, or OLG Schleswig) have held that Adidas, ASICS and Casio must allow their approved resellers to use internet auction sites and online marketplaces to resell their goods. These cases suggest that a supplier may not prohibit, but merely regulate, such online resale by way of a selective distribution system in which requirements and restrictions on online sales do not exceed similar obligations imposed on resellers for other, namely offline, distribution channels.

These cases, as well as the ruling of the Berlin Court of Appeals (*Kammergericht*, KG) in 2013, on Scout satchels (Case 2 U 8/09 Kart), suggest that a supplier may only restrict the use of internet platforms and marketplaces in a selective distribution system in which the criteria imposed on online sales are at least overall equivalent to criteria imposed for other sales channels, for example, sale in physical shops, as explained in the Guidelines of the European Commission on vertical restraints.

In a statement relating to the Adidas case, BKartA took the view *'that the trading possibilities offered by the Internet create new challenges for both manufacturers and retailers'* and that it is its *'task to keep markets and opportunities open for the benefit of retailers and consumers'*. The statement continues, *'It goes without saying that manufacturers can select their distributors according to certain quality requirements. However, both under European and German competition law they are prohibited from largely eliminating a principal distribution channel such as the web.'*

5.2.4 Online Travel Agencies and MFNs

In a series of cases across Europe, competition authorities have looked at MFN clauses and other pricing restrictions in relation to the operation of online travel agencies. In January 2015, the Düsseldorf Higher Regional Court rejected the appeal of Robert Rague GmbH's Hotel Reservation Service (HRS) against the decision of the Federal Cartel Office (*Bundeskartellamt*) of December 2013. In its decision, the authority had prohibited HRS from continuing to apply its 'best price' clause and at the same time initiated proceedings against the hotel booking portals, Booking.com and Expedia, for applying similar clauses in their contracts with their hotel partners. Under the 'best price' clauses the hotels are obliged to always offer the hotel portal their lowest room prices, maximum room capacity and most favourable booking and cancellation conditions available on the Internet.

The Düsseldorf Higher Regional Court decision has confirmed that HRS's 'best price' clauses restrict competition to such a degree that they cannot be exempted under the TFEU Block Exemption Regulation, or as an individual exemption. The Federal Cartel Office originally issued a statement of objections against HRS in early 2012 focusing on the company's policy which bans hotels from offering better deals to customers who book directly through the hotel or through another booking platform. The concern was that, while the clauses used (also by other travel websites) may appear to benefit consumers, in reality they may eliminate competition for lower room prices between the hotel booking portals. Consumers are worse off because they cannot get a better price or better quality service conditions by exploring alternative reservation paths.²²

Several other competition authorities in Europe have also recently conducted similar investigations against hotel booking platforms in relation to their 'best price' clauses. These include the UK's Office of Fair Trading case against Expedia Inc. and Booking.com in coordination with InterContinental Hotels Group PLC and the Swiss Competition Commission's case against several online travel agencies, including Booking.com, Expedia and HRS.²³

How competition policy should treat the employment of MFN clauses (by online platforms or otherwise) is not a simple matter and how economic

analysis can help the formulation of policy will be discussed in subsequent parts of the chapter. Many interesting applied policy analyses have also appeared; for example, P. Akman in a July 2015 article considers the acceptance of commitments offered by Booking.com to the French, Swedish and Italian competition authorities.²⁴ She argues that these commitments may represent at best an ineffectual solution to any problem existing on the relevant market.²⁵ Booking.com has agreed not to use the 'broad' MFN clauses in its contracts with its hotel partners for a period of five years, from 1 July 2015. As a result, Booking.com can no longer require hotels to offer Booking.com the best price across platforms or the best price that the hotel charges through its offline channels. Yet, the commitments do not stop Booking.com from imposing MFN clauses to the extent that the clause seeks parity between the prices on Booking.com and the prices on the hotel's online channels such as the hotel's own website. This commitment is different from the infringement decision taken by the Bundeskartellamt in the HRS case and does not prevent Booking.com from seeking parity between prices on Booking.com and the hotel's online channels, whereas the Bundeskartellamt's infringement decision prohibited all types of MFN clauses.

Resale Price Maintenance

Resale price maintenance (RPM) is a common vertical restraint which has received much attention in competition policy. The view is often adopted that minimum RPM or fixed RPM, since it is a restraint, is bad for competition and violates the law. In particular, in a recent series of cases, some NCAs find that fixed price or minimum RPM directly violates the law, even when the market shares of the related firms are low, focusing, in other words, only on contractual freedom and without a reference to efficiencies and other economic implications. In other cases, some NCAs have recently taken a different route. In particular, in October 2014, the Swedish Competition Authority adopted a reasoned priority decision not to pursue the investigation of a complaint regarding RPM.²⁶ In April 2015, the Dutch Competition Authority published a paper setting out its strategy and enforcement priorities relating to vertical agreements. It confirms its relatively lenient economic approach towards vertical restraints and assumes that vertical restraints are generally pro-competitive in the absence of market power. This claim includes typical hard-core restraints, such as resale price maintenance.²⁷

5.2.5 The Digital Single Market Initiative

Partly motivated by some cases like the ones described above, the EC considers that too many barriers still block the flow of online services and entertainment across national borders. The Digital Agenda is set to update the EU Single

Market rules for the digital era and creating a Digital Single Market is stated as one of the priorities of President Juncker.²⁸ According to the EC, its Digital Agenda is one of the seven pillars of the Europe 2020 Strategy. The Digital Agenda proposes to better exploit the potential of Information and Communication Technologies in order to foster innovation and growth. The main objective is to develop a digital single market in order to generate '*smart, sustainable and inclusive growth*' in Europe and is made up of seven pillars. A key consideration towards achieving the digital single market goal is that internet access should not 'stop' at Member States' borders. Instead it becomes a goal that consumers should 'benefit from the best content, deals and services, wherever we are in the EU, without being geo-blocked. Businesses should be able to market and share their bright ideas across the EU.'

The associated Sector Inquiry, announced in May 2015 by the EC, could help reveal possible problems with competition in digital markets in Europe and where interventions may be warranted at present or future times. This could become an important document, if it is guided by sound and state of the art economic analysis. It should be noted, however, that the Single Market objective does not always coincide with the application of competition principles as understood by economists, in particular welfare maximization, especially when it comes to enforcing uniformity of market outcomes across Member States.²⁹

5.2.6 *Distinguishing Features of Digital Markets*

While there are differences between how markets operate and should be regulated in the digital world and in the 'traditional' context, there are also of course similarities. All markets share some common features and more traditional economic analysis never relied on the assumption that sellers and buyers would meet at the same physical space. Frictions, search costs and asymmetries in information have always been part of how economists would analyze a market. So what may be the distinguishing features of digital markets? Are there characteristics that may make our current understanding of how markets work obsolete?

It would be useful to distinguish some of the main features, also building on some previous approaches. Lieber and Syverson (2012), for example, offer a review of the basic facts, as well as a related analysis.³⁰ One could attempt to present the following list.

1. The supply of digital products typically involves a specific cost structure: fixed costs tend to be high while the marginal cost of supply can be trivial (often practically zero).
2. When it comes to the production of content (news, scientific, entertainment, etc.) this fixed cost is typically sunk when the market operates. In

this sense, copyrights and other forms of intellectual property protection are essential for the functioning of many digital markets.

3. When selling nondigital products online, distribution and storage costs are typically much lower than when selling through traditional ‘brick-and-mortar’ stores.
4. Search costs for buyers, at least in reference to prices, can be much lower than through traditional stores where a physical visit would be required.
5. Distance (the ability to have contact only online) makes it difficult for buyers to inspect some products, with respect to some important characteristics. Therefore, asymmetric information may be high. Reputation and having the trust of the buyers is essential for the success of any firm selling online, often much more than a firm selling through traditional stores, where physical inspection is possible.
6. When selling physical goods online, delivery will take some time; having a large enough size that allows economies of scale and scope in delivery could be important.
7. Online sellers could collect key data for their potential buyers, either by tracing their past browsing and purchasing history, or from other sources. These data may be valuable when designing pricing strategies, in particular for price discrimination. Data collection and processing may often represent a market opportunity in itself.
8. Significant privacy issues may be raised that may concern online buyers. Personal data protection is important.
9. Services are often provided by multi-sided platforms. Size may play an important role, and often competition *for the market* may be more relevant than competition *in the market*.
10. Online and offline sale activities could be substitutes but also often complements.

We next briefly turn to the IO literature, which is important and relevant, even when not produced only having competition policy in digital market issues in mind. Subsequently, in Section 5.4, we review some work that has been motivated by specific aspects of how competition policy should approach digital markets.

5.3 Approaches in Industrial Organization

There are at least two important related literatures within IO that by their nature are closely related to the currently open competition issues. These refer to the study of vertical relations (integration and vertical restraints) and to pricing practices, in particular, price discrimination and nonlinear pricing. We sketch

some of the issues that have been analyzed in these areas and discuss some open topics in relation to policy.

5.3.1 Pricing

Pricing is naturally an important concern in economics. However, we may not yet have a complete understanding of how pricing functions when there is price discrimination and various types of nonlinear pricing under oligopoly competition, when there are vertical relations, and what the welfare implications are of the various related restrictions, especially when we may have important dynamic effects. Overall, a key challenge is how to determine the welfare effects of (direct or indirect) price discrimination or of price restrictions, especially in rich environments where the technology significantly facilitates the identification of buyers or groups of buyers by (some of) the sellers and where the technology may make possible (often inexpensive or automatic) price comparison practices (e.g., through websites). The matter is complex and, not surprisingly, the literature is not conclusive.

An obvious starting point for the review of the broad issues in price discrimination is Tirole (1988, Ch. 3), Varian (1989) and Armstrong (2008b) and on nonlinear pricing, Wilson (1993) and Armstrong (2015). Prices play two interrelated roles in economics: they determine how surplus is divided between buyers and sellers, for a trade that takes place and, at the same time, what trades will and what will not take place. With price discrimination, two identical (in practice, ‘similar’) products have the same marginal cost to produce but are sold by a seller at different prices. This definition is generalized to cover the case of different costs: then the proportional mark-ups should not be different. The impact that price discrimination has on consumers’ surplus, rival firms and welfare is mixed. In general, price discrimination will tend to allow more trades to take place, but at the same time allows the sellers that employ this practice to capture more of the surplus created (see e.g., Varian, 1985).

Price discrimination is important for competition policy for at least three reasons (see Armstrong, 2008a). First, one may consider price discrimination as part of an ‘exploitative’ abuse by a dominant firm. However, in practice and probably for good reasons, this path is only rarely followed by most competition authorities, although the legal framework in Europe may allow it. Second, as also discussed earlier in this text, promoting the single market across the EU is stated as an independent objective by the EC. It is often expressed in practical terms as not allowing firms to set different prices across regions, or at least to not prevent arbitrage across regions that would tend to indirectly equalize prices. Third, and a matter that has received much attention from competition authorities, price discrimination can be used by a dominant firm to ‘exclude’ (or weaken) actual or potential rivals. The question that arises is in which cases

price discrimination can be an effective way to put rivals at a disadvantage so as to make them exit the market or compete less aggressively.

For price discrimination to be possible and effective, three factors are known to be important and required, (and are all related, in fact, to the study of digital markets). First, pricing firms have to have some market power (otherwise they will have to be price takers). In digital markets, we typically have one, and sometimes two firms with significant market power (or at least with high market shares), and these could in principle price discriminate, while some other players are too small for that. Second, there has to be some information about buyer values (either directly or indirectly, e.g., through past sales or some other correlated characteristic of the buyer population). In digital markets, information about the identities of actual or prospective buyers tends to be much easier to obtain (e.g., through web-browser cookies or the exact purchasing history of end users), and this is why price discrimination comes to the centre of the picture in the analysis. At the same time, 'geo-blocking', where access to content can be allowed to users residing only in some areas, even though technologically a wider access would be very easy is an important issue. Third, there have to be restrictions on arbitrage, which would otherwise tend to undo the effect of discrimination. Some vertical restraints and other pricing restrictions are very important in this regard.

That new technologies allow firms to have detailed digital information about their customers, whether they are returning or new, is an important feature which provides mechanisms for price discrimination. When firms can have reliable information about consumers' previous buying behaviour at low costs, they would benefit from using this information to offer different prices or products to consumers with different purchase histories. With web-browser cookies and other technologies firms can collect and process important information about consumers, and can affect the prices and products offered to them, individually or as groups.³¹

In terms of some fundamental results, Hart and Tirole (1988) have considered the problem of pricing over time when consumer valuations are not changing across periods, and a monopoly seller can trace the identity (although not the exact reservation value) of those who have bought in the past. Competition has been introduced into this problem by Villas-Boas (1999) and Fudenberg and Tirole (2000), where firms learn both about the values of the buyers that buy from them but also from rivals. Chen and Percy (2010) extend the theory model by allowing variation of values across time periods. Buyers may also wish to act strategically, as in Villas-Boas (2004). The more relevant part of this literature perhaps is when learning about consumers' values may be active, that is the firms strategies include how much information about key buyer characteristics they may obtain. Relevant two sided market issues can be found, for example, in Armstrong (2006) and subsequent work.

Geographical restrictions imposed by firms are an application of price discrimination strategies in order to separate across market segments where demand elasticities may differ. Parallel trade, in turn, is a way to seek alternative channels, so that the buyers can seek the most favourable price or product characteristics, in the context of arbitrage that would tend to undo price discrimination. Parallel trade specifically has been studied among other work in Ahmadi and Yang (2000), also by Valletti and Szymanski (2006), while an early paper on '*most favoured nation*' clauses across markets is by Akman and Hviid (2006).

5.3.2 Vertical Relations

Along a 'vertical chain' there is a need to analyse the relation between a wholesaler and a retailer, or more abstractly an 'upstream' and a 'downstream' firm. Vertical chains differ in many ways: how many stages there are before reaching the final consumer, whether firms are vertically separated (independent) or vertically integrated (one firm that operates both upstream and downstream) and whether trade is exclusive (with an exclusive supplier or exclusive buyer or both). Any study of vertical relations necessarily finds in its way the issue of the distribution of power across vertically linked firms and possibly of bargaining among them. An excellent starting point for the review of the broad issues in vertical relations and in particular of vertical restraints are the analyses and reviews of Motta (2004, Ch. 6), Rey and Tirole (2008), Rey and Vergé (2008) and Lafontaine and Slade (2008).

Under vertical separation and linear pricing, when we have a constant price for each additional unit sold, vertical separation leads to higher final product prices than those we would have under vertical integration (VI). This '*double marginalization*' is a fundamental result in the literature (Spengler, 1950). It relies on each firm acting independently from the others, in the sense that it seeks to maximize its own profit and not that of the entire chain. It implies prices for the final consumers that are *higher* than the prices that would emerge under vertical integration. In this sense, vertical separation with linear pricing can hurt both the consumers and the firms, because independent firms fail to internalize the vertical externality between them. Thus, one solution to this problem would be vertical integration.³² However, the problem can also be eliminated or greatly minimized if alternative pricing schemes are used instead, like two-part tariffs. Under such arrangements, and in the absence of uncertainty, if the per-unit price is set at the competitive level (cost) and the fixed fee is set just a little lower than the total monopoly profit, the monopoly solution can be recovered, without having formally a vertical integration arrangement. Another way to address the double marginalization problem would be some vertical restraint, in particular a RPM that would fix the final market price at

the monopoly level. Importantly, the outcome depends on the distribution of bargaining power across the chain. If, for example, we allow the downstream firm to have the price setting power, against both the final consumers and the upstream firm, only one profit margin can be applied and there is no additional distortion relative to the standard monopoly. Finally, when the downstream firm is able to participate in setting the price at which it transacts with the upstream firm, the formal or informal bargaining procedure that is expected to take place between the upstream and the downstream firm would restrict the market power of the upstream firm and would lead to the internalization, at least partially, of the final market price considerations. As a result, the final price will be *lower* in the equilibrium of the game when the bargaining power is balanced between the upstream and the downstream firm, or when the downstream firm is more powerful than the upstream firm.

In a typical market, of course, one encounters much richer vertical structures than the simple one-supplier-one-distributor chain. Thus, in addition to the basic vertical double marginalization effect, there may also be horizontal externalities in the competition among wholesalers or among retailers, a phenomenon that we could call ‘intra-brand’ competition. In such cases, it is not only the vertical strategic interaction between suppliers and distributors that matters, but also all the horizontal relations.³³ In cases where only intra-brand competition downstream is important, nonlinear pricing schemes or other vertical restraints could be effective in ‘softening’ the competition in the final market and, by implication, maximizing the suppliers’ (upstream) profits. With a two-part tariff, the wholesale price can control the horizontal externality and soften competition between the distributors, while profit may be shifted upstream in the form of a fixed fee. RPM, or other resale restrictions set by the supplier, such as restrictions on the retailers’ discretion to set a price, or restrictions imposing that each retailer only deals with a part of the final demand, in a territorial or other sense, could also lead to higher downstream prices and higher profit for the entire chain.³⁴ Rey and Vergé (2008) provide an excellent analysis of how vertical restraints operate and a review of recent work in the area, focusing on the horizontal externalities that such constraints may affect along with the vertical contracting issues.³⁵

Resale price maintenance is a common vertical restraint which has received much attention in competition policy. The economics literature finds that there are both anti-competitive and pro-competitive effects from the use of RPM.³⁶ On the one hand, a possible anti-competitive effect could be related to the solution of the ‘commitment problem’ of a monopolist, which would impede even a monopolistic supplier from enjoying full monopoly profits. This is because this supplier would have the temptation to reduce the wholesale price set to one distributor to allow that distributor to expand its market share, even when this hurts rival distributors (see Hart et al., 1990). A market-wide RPM, if credible to

all parties, could solve this problem because it could prevent the opportunistic behaviour on the part of the supplier. RPM may also soften competition when two or more suppliers sell their products to two or more distributors ('interlocking relationships'). RPM might also facilitate collusion, either among suppliers or among distributors (see e.g., Jullien and Rey, 2007). In particular, collusion among suppliers may be easier to achieve because RPM can help offer a superior monitoring of deviations from the collusive agreement. On the other hand, however, there may be very important pro-competitive effects, since RPM may help protect necessary 'specific investments' by preventing opportunistic or free-riding behaviour among distributors. It may also help by signalling the quality of products, or help establish a price reputation and the overall brand image for the supplier's product.

The publication of the Commission Regulation No 2790/1999, on the application of Article 81(3) of the Treaty to certain categories of vertical agreements and concerted practices,³⁷ was an important development in the area of vertical relations. This 'Block Exemption Regulation' (BER) was intended to provide a 'safe harbour' to firms with less than a 30 per cent market share and was accompanied by the relevant Guidelines on Vertical Restraints.³⁸ The BER was viewed as the first of a new generation of block exemption regulations and guidelines, inspired by an 'effects-based' approach, where economic analysis should play an important role and it has been followed by similar reforms in other areas of competition policy. The core of this approach is that, in order to reach an assessment about a given vertical agreement, the precise potential effects of the agreement on the market should be analyzed, thus moving away from the old formalistic approach. The 1999 BER established that article 81(1) (now article 101 TFEU) did not apply to vertical agreements in which the supplier does not hold more than 30 per cent market share, since vertical agreements are likely to harm welfare only if the firms using them possess substantial market power. In addition, in its Article 4, it also stated that the exemption should not apply to some vertical agreements that the Commission considered harmful. These 'blacklisted' or 'hardcore' clauses include in particular RPM (more precisely resale price fixing and minimum resale price) and vertical clauses, which aim at restricting 'active' sales from one territory to the other.³⁹

The revised BER, No 300/2010 of April 2010, still contains a list of restrictions that are 'blacklisted', including RPM and other (that is, nonprice) resale restrictions.⁴⁰ The view is still taken that there should be a presumption in the EC law that they should be prohibited. Specifically, according to Paragraph 47 of the Guidelines, if an agreement contains a 'blacklisted' restriction, the agreement presumptively falls within the scope of prohibited agreements under Article 101(1) as having actual or likely negative effects, and it presumptively does not satisfy the justification standards of Article 101(3). It follows that once a

hardcore restriction is established, the agreement is presumptively both anti-competitive and unjustifiable. Nevertheless, it is recognized that this double presumption is rebuttable and the parties can bring forward evidence that the positive effects of the agreement under examination outweigh the presumed negative effects. Regarding minimum price and fixed price RPM, in particular, the Guidelines offer a detailed exposition about evidence that could be put forward in RPM cases.⁴¹ However, a restriction on passive sales (responding to ‘unsolicited’ requests from customers outside the specified territory or consumer group) would be considered a hard-core restriction. Regarding selective distribution, the BER allows suppliers to have a selective distribution system, where distributors are selected according to some specified criteria.⁴² On the basis of academic research, many economists would not necessarily agree with the approach taken by the EC Guidelines regarding the treatment of RPM and would favour a less formalistic approach that recognizes efficiencies.

Perhaps one of the important areas where research can offer greater clarity is the more detailed definition and study of online sales. Treating all online sales as ‘passive’, and with restrictions on these not being allowed, the assessment of practically any restriction of cross-border online sales is a one way street which does not necessarily lead to a correct assessment. Resale price maintenance is also an important topic for further research, with part of the relevant economic approaches not being always aligned with the direction of the Guidelines or with some recent policy practice. Naturally, especially with the presence of both online and offline sales, when competition is examined, it is also important to examine the relevant *investment incentives* by the suppliers, since quality improvement may often be at least as important an issue as pricing.

5.4 Recent Research on Competition Issues Related to Digital Markets

Some recent work specifically considers the effects that the ability to price discriminate or restrictions to this ability (because of strategic or regulatory reasons) may have on markets with vertical relations. In particular, Edelman and Wright (2015) examine the implications of ‘price coherence’, the constraint that the purchase from an intermediary has to occur at the same price as the purchase of the same good directly from the initial supplier or through some alternative, competing, intermediary. This pricing practice is often used in payment card systems, travel reservation systems, rebate services and other related services. It differs from some other vertical restraints like RPM. RPM would restrict the absolute prices (not necessarily at the same level for every intermediary), while price coherence restricts relative price differences.

In the Edelman and Wright (2015) model, an intermediary provides a benefit to buyers when they purchase from sellers using the intermediary’s technology,

relative to the possibility of a direct purchase. They show that the intermediary would want to restrict sellers from charging buyers more for transactions that it intermediates. With this restriction, an intermediary can profitably raise demand for its services by eliminating any extra price that the buyers may face for purchasing through the intermediary. The authors show that this leads to inflated retail prices, excessive adoption of the intermediaries' services, overinvestment in benefits to buyers, and a reduction in consumer surplus and even sometimes welfare. Since there is no surcharge for the services of the intermediary, consumers tend not to consider the cost of the intermediary's services and thus consumers tend to use more such services. This allows the intermediary to extract more fees from sellers than what would be the case without price coherence. In equilibrium, prices are higher under price coherence, ultimately harming consumer welfare. Competition among intermediaries intensifies these problems by increasing the magnitude of their effects. In a setup with price coherence, competition among intermediaries is focused on offering more benefits, such as rebates etc., to consumers, rather than reducing costs. As a result, prices increase further, to cover the higher benefit offers. Nevertheless, the model discussed by the authors only fully applies to cases where buyers tend to rely on a single intermediary, while sellers can join many intermediaries to reach buyers. Moreover, the model does not account for the potentially beneficial effects of price coherence, as a tool to address the problem of consumers using the intermediary's services to identify or test a product, and then buy the product directly from the seller (the problem of '*showrooming*').

There are now also several papers motivated by the Apple e-books case and other related cases in markets where content providers supply content via online platforms.⁴³ We review some representative ones.⁴⁴ Several analyses compare, in different models, standard wholesale pricing schemes, where the upstream firm (say a publisher, or other content provider) charges a wholesale price for the good to the downstream retailer, who then sets a final price for the good, to agency contracts. In agency contracts, in contrast, the retailer sets a percentage commission that he will collect from the sales of the good, and the upstream firm is free to set the good's final price. Effectively, via the agency model, upstream firms choose the retail prices of their products (that is, we have effectively RPM) subject to a fixed revenue-sharing rule. The matter has received significant attention, with competition policy-makers being generally adverse to the agency model.

Johnson (2013) contrasts wholesale and agency agreements. The paper extends standard models of product differentiation (spatial competition) to incorporate bilateral oligopoly in order to investigate the agency model of pricing when there is consumer lock-in. For example, in the e-book market lock-in may exist because a consumer becomes accustomed to using, for example, Amazon's e-book store or e-book reading app. The equilibrium analysis shows

that the agency model raises prices initially, but lowers them in the future. The author points out that in markets where consumers are locked in a particular retailer's platform, wholesale agreements, in letting retailers determine prices, allow retailers to exert market power in the long run, ultimately harming consumer surplus. In a market with significant consumer lock-in, under wholesale agreements retailers would compete intensely in early periods, lowering prices, in order to lock in more consumers, so that these consumers may be harvested in the future. In contrast, under agency agreements suppliers have no such incentive to subsidize early consumption, as suppliers sell through many retailers. However, in later periods, agency agreements ensure that robust competition exists between suppliers, leading to lower prices. Suppliers setting prices and selling through many retailers are not influenced by consumer lock-in in either retailer. In contrast, wholesale agreements allow retailers in later periods to internalize competition between suppliers and further harvest consumers. Therefore, while price increases are a natural consequence of the transition from the wholesale to the agency model, it is not correct to conclude that consumers are worse-off overall. Indeed, consumers are better off under agency agreements, despite price increases in the early stages following the move to the agency model, as they benefit from competition between suppliers in the long run.

In a related model, Johnson (2014) focuses on the use of MFN clauses and their impact under both agency and wholesale agreements. The author finds that the agency pricing model does not eliminate double marginalization. The reason is that the revenue-sharing contracts that the retailers select distort the perceived marginal cost of suppliers. Under revenue-sharing, the supplier receives only a fraction of the sold product's price. This has similar effects to an increase in the supplier's marginal cost. When retailers compete in revenue shares, however, adopting the agency model lowers retail prices and industry profit, while retailers' profits increase, compared with the wholesale model. MFN clauses that impose retail price parity can facilitate the emergence of high industry prices, as retail price parity eliminates retailer competition on revenue shares. Without price parity, a retailer offering his suppliers a lower revenue share, will induce a higher perceived marginal cost to the supplier, resulting in higher prices for that retailer, relative to his competitors. Retail price parity eliminates this downside. However, in some cases it may also raise market-entry incentives and in this way eventually benefit consumers. These results provide an explanation for why many online retailers have adopted both the agency model and MFN clauses.

Abhishek et al. (2015) study entry and compare equilibrium outcomes under wholesale and agency agreements when a monopolist producer sells online goods through two competing distributors (e-retailers). They find that when sales in the electronic channel lead to substantial stimulation of demand in the

traditional channel, e-retailers prefer reselling. Under the agency model, in the presence of such positive cross-effects on demand, a producer would set low prices in the e-channel, in order to benefit from increased demand in the traditional channel. Yet, this would trim the e-retailer's profits, hence the e-retailer prefers reselling. Conversely, when the e-channel has a negative cross-effect on demand in the traditional channel, it is optimal for the e-retailers to adopt the agency selling agreement. The authors also find that as the intensity of competition among e-retailers increases, they prefer agency selling over reselling. Using the agency model and thus letting the producer set retail prices, allows e-retailers to mitigate retail competition. In addition, under an agency arrangement, e-retailers set the agency fees first and the producer then sets prices. Therefore e-retailers under agency are in a sense Stackelberg leaders, enjoying the strategic advantage that goes with being an early mover. Furthermore, the authors find that agency selling is beneficial for consumers, as prices are lower under agency selling and consumer surplus is higher.⁴⁵

Foros et al. (2014) also study the equilibrium properties of the agency pricing model and the impact of market competition at both the retailing and the publishing (upstream) level. They study a set of alternative assumptions, depending on how intense competition is at each stage and on how contract terms are selected. They show that employing the agency pricing model leads to higher prices if the competitive pressure is relatively higher downstream than upstream. The authors also demonstrate that upstream firms earn positive surplus even when platform providers have all the bargaining power. In addition, with asymmetric business formats, that is when only some platform providers use the agency model, an MFN clause at the retail level leads to retail prices that resemble the outcome under industry-wide RPM.

Gaudin and White (2014) study more closely the effects of Apple's entry into the e-book market in 2010 and the related equilibrium pricing incentives. Like the work of Foros et al. (2014), they contrast agency and wholesale vertical agreements. The model equilibrium is characterized both in the presence and in the absence of an 'essential device' sold by the retailer. This part of the model corresponds to the fact that, before the Apple entry, Amazon, who was a dominant retailer, controlled an essential access device (the Kindle) while agreements regarding e-book pricing followed wholesale pricing. Subsequently, two distinct changes took place, first no device was any longer essential (with the introduction of the iPad) and second Amazon's pricing agreements with publishers took the agency form. The novel aspects of the model are the interaction between the device and pricing contracts (with the device prices endogenous in the analysis) and also that properties of the downstream demand favouring one or the other pricing arrangement are identified. There are two main results. First, the comparison between price levels arising under agency and wholesale contracting arrangements hinges crucially on whether one of the firms

controls a complementary market (that is, the device). Second, a demand feature is identified (loosely, that demand does not become too convex too quickly – more formally that the elasticity of demand strictly decreases as quantity increases, up to the point where marginal revenue reaches zero) as the key for the pricing comparison. The basis for the first main result is that, when the good can be consumed without using the essential device (or equivalently when there is competition among substitute devices), there is double marginalization under both forms of pricing. Moreover, the authors' model shows that an increase in e-book prices can be explained by heightened competition for reading devices. Depending on the shape of demand, final prices under wholesale may be higher than under agency.

Condorelli et al. (2013) also study alternative pricing terms when the downstream firm has more information about the final demand than the upstream firm. The analysis provides a justification for the prevalence of the agency model in online markets. In the model, a seller has an object for sale and can reach buyers only through intermediaries, who also have private information about buyers' valuations. Intermediaries can either mediate the transaction by buying the object and reselling it, or refer buyers to the seller and release information for a fee, the agency model. The merchant model suffers from double marginalization. The agency model suffers from adverse selection, since intermediaries would like to refer low-value buyers, but retain high-value ones and make profits from resale. In equilibrium, intermediaries specialize in agency. Joint profits equal the seller's profits when he has access to all buyers and all intermediaries' information and the division of profits depends on seller's and intermediaries' relative bargaining power.

Kwark et al. (2015) demonstrate that the choice of pricing model, wholesale or agency, can serve as a strategic tool for online retailers, allowing them to benefit from third-party information, such as product reviews posted online and used by consumers to help them make more informed decisions. Consumers collect third-party information both regarding the quality of products and regarding the extent to which products are fit for their individual needs and tastes. When product quality is more important than fit to particular consumer tastes, reliable third-party information regarding product quality intensifies upstream competition. When upstream competition is strong, retailers benefit from the wholesale model of pricing. Conversely, when product fitness is relatively more important than quality, third-party information regarding product fitness heterogenizes consumers' estimated fit to the products, thus softening upstream competition. Under such circumstances, retailers benefit from agency pricing.

Lu (2015) compares the wholesale and the agency pricing models in the setup of a bilateral duopoly with differentiation at both the upstream and the downstream level. The author finds that suppliers benefit from the wholesale model

and retailers benefit from the agency model, so long as upstream differentiation is sufficiently high. Under the wholesale structure, high upstream differentiation benefits suppliers and harms retailers and, similarly, high downstream differentiation benefits retailers and harms suppliers. However, under the agency structure the incentives of suppliers and retailers are better aligned. The author stresses that if the degree of differentiation at both levels is high enough, agency is a more efficient business format.

Wang and Wright (2014) examine why platforms, such as Amazon or Visa, rely predominantly on fees proportional with transaction prices (ad-valorem fees), rather than fixed fees per transaction, despite facing small per-transaction costs. The authors demonstrate that ad-valorem fees serve as tools that allow efficient price discrimination, when the costs and valuations of the goods a platform deals with vary widely. A fixed per-transaction fee would result in a disproportionate amount being charged on low-cost, low-value goods, and thus demand elasticity for such goods being too high, compared to high-cost, high-value goods. Nevertheless, the authors show that ad-valorem fees can also lead to higher welfare, and argue that welfare did increase due to the use of such fees in the cases of Amazon and Visa.

Wirl (2015) compares the wholesale and agency pricing models in a setup with an upstream oligopoly and Bertrand competing retailers, where retailers can increase demand by incurring a cost and thus the retailers' efforts matter (the model was inspired by the e-book market). Wholesale pricing can be preferable to agency pricing, despite double marginalization, because wholesale pricing can help incentivize retailers to exert effort and increase demand (or equivalently add value to the product).

Adner et al. (2015) study how platforms decide to make their content available to the users of competing platforms. In the authors' setup, designed to describe the e-book market, two competing platforms generate profits both through royalties from content sales and through hardware sales. Depending on what the primary source of profit for each platform is, incentives may arise to establish one-way compatibility. One-way compatibility leads to greater social welfare and in some circumstances, one-way compatibility may be more profitable for both platforms than incompatibility.⁴⁶

Finally, some work studies pricing in payment systems or other platforms. For example, Bourguignon et al. (2014) study the incentives of merchants to differentiate price based on the payment method used. Assuming that consumers are imperfectly informed about the merchants' payment policy (cash only, credit card acceptance etc.), the authors identify the conditions under which merchants, concerned about missed sales, will be willing to accept card payments and examine how cash discounts, card surcharges and platform fees are set. The authors find that a ban on surcharges for card payments intensifies merchants' incentives to accept card payments. Furthermore, platforms tend to

charge higher fees for credit cards than for debit cards and merchants always prefer to apply a card surcharge than to offer a cash discount.

In another study on card payment platforms, Ding and Wright (2014) examine a monopolist card platform that can price discriminate, setting different interchange fees (fees a merchant's bank pays to the card-holder's bank) for different types of retailers. The authors find that the platform would tend to set interchange fees too high, resulting in low fees for card usage and excessive usage of cards. Compared to the case where only a single interchange fee can be set, price discrimination by the platform can result in a lower average interchange fee, but also in lower welfare.

One of the main issues in digital markets is the use of personal data and related privacy issues. Access to data about buyers (e.g., from past purchases) can be used by the buyers themselves, however such datasets certainly have a value and, depending on the legal restrictions, could be transferred to third parties.⁴⁷ Spiegel (2013) examines how privacy issues are related to the choice between selling new software commercially and bundling it with ads and distributing it for free. The willingness of buyers to offer access to personal data may also be dependent on their understanding of the market and legal environment. See Cabral and Hortaçsu (2010) and Cabral (2012) for reputation issues and Belleflamme and Peitz (2012) for digital piracy. The matter is also related to behavioral approaches to markets and competition (see e.g., Eliaz and Spiegel, 2008, Acquisti, 2010, Zhang, 2011 and Koszegi, 2014).

The work reviewed above is on the theory side of the analysis. Viewed as a set, the results obtained in this recent literature generally cast doubt on the view that one pricing model leads to higher prices or lower welfare compared to another and in particular to the standard wholesale pricing model. The analyses are conducted with different model specifications, such as with buyers' switching costs, asymmetric information, complementary goods, and demand interaction between online and traditional sales. It follows that competition policy may need to seek more guidance when it comes to banning pricing according to the agency model.

On the empirical side, there is still only very little work on the topic of how different pricing arrangements affect equilibrium prices, profits and welfare. This is despite the fact that the theory analysis offers mixed results, as explained above, with the outcomes depending crucially on some parameters; therefore the empirical guidance towards the formulation of policy would be very useful. One notable study on the empirical side is by De los Santos and Wildenbeest (2014). They perform a difference-in-differences analysis to estimate the impact of the switch from the agency agreements to wholesale pricing on e-book prices. The dataset used in the analysis contains daily prices of e-books for a large number of titles, collected in the US across some major online retailers. The analysis exploits cross-publisher variation in the timing

of the return to the wholesale model to estimate its effect on retail prices. It is found that e-book prices for titles that were previously sold using the agency model on average decreased – by 18 per cent at Amazon and 8 per cent at Barnes & Noble. The results illustrate a case where upstream firms prefer to set higher retail prices than retailers. In this way, the analysis helps clarify some of the conflicting predictions in the theory work described above.

The authors also investigate the pricing strategies of the retailers and publishers in some greater depth, examining some alternative theories. The data shows that due to the relatively higher commission kept by the retailers, on average e-book profit margins for the publishers were lower during the agency period than afterward. The analysis does not provide evidence that the pricing strategies of the retailers are primarily intended to lock-in consumers, as argued in the analyses by Johnson (2013) and Gaudin and White (2014) sketched above. In particular, Amazon's retail prices decreased after it regained the ability to set retail prices, and have remained consistently low despite having reduced means to leverage the Kindle platform due to the availability of Kindle apps for mobile phones etc. The paper therefore characterizes as likely that other factors explain the publishers' adoption of the agency model, such as fears that lower e-book prices may cannibalize print book sales or diminish the perception of the books' value. Another important effect may be the one examined by Jullien and Rey (2007), where upstream firms may engage in RPM at high retail prices as part of a collusive upstream agreement that prevents them from engaging in secret wholesale price cuts. Yet the analysis does not find any indication that wholesale prices went up, even though publishers' coordinated move towards the agency model raised retail prices. Clearly, more empirical studies of other related cases would be extremely useful.

Baye et al. (2015) study empirically how different online platforms that consumers use to search for books and booksellers operate. They find that the use of these platforms is shifting over time. The data they present suggest that, as a result of digitization, consumers are increasingly conducting searches for books at retailer sites and closed systems and not so much in general search engines. This paper also identifies and discusses some areas where more work would be needed in relation to the pricing of e-books and digital media but also specific challenges that will make it difficult for researchers to measure internet-based search behaviour in the future.⁴⁸

5.5 Challenges for Research on Competition Issues in Digital Markets

It is useful to discuss here the main novel challenges that research has to face in order to analyze and support the design of competition policy in digital markets. These markets tend to be characterized by strong network effects:

platforms provide the basis for aggregating and delivering content and services, acting as intermediaries between providers and end users; the related network effects, direct or indirect, will tend to promote high concentration, consumers may be locked-in and first mover advantages may be of critical importance. Service providers may have different interrelated routes for delivering digital services, with some key market positions being contestable – one may expect that ‘*tipping*’ is a frequent phenomenon following some innovation. Combining the above features, it is crucial for competition policy to prevent the creation or reinforcement of entry barriers: it is not actual competition that matters so much, but making sure that entry is allowed for efficient and innovating new players. As a result, the more traditional analysis of competition policy, even when proceeding to market definition and measuring market shares, may face significant difficulties, since the boundaries are fluid. It is, in fact, important to understand the underlying dynamics of the market in terms of technology and strategic incentives.

Access to end user data is valuable since it may greatly facilitate price discrimination and also versioning according to individual needs. Established, large players in the market will tend to obtain a very significant advantage through the access to such data relative to newcomers. In addition, by proceeding to the combination of user data from multiple platforms, an owner of such multiple platforms will tend to be able to offer a more valuable service. The much enhanced ability to sell to wider sets of diverse buyers makes price discrimination, or blocking access to content, or other services, a higher concern relative to traditional markets. In particular, such practices that fragment the markets, pose, almost by definition, challenges to the single market goal. However, neither the literature nor practice necessarily suggests that imposing price or content uniformity across all areas is necessarily the optimal policy. Instead, imposing uniform prices and qualities across otherwise different areas too soon, may prove an obstacle for market development.

Suggestions about how research can proceed could be organized around four distinct themes. *First*, ‘digital’ markets may be different but they are still markets and some of the issues arising in ‘digital’ markets can be found, in some form, even if less systematically, in other markets. Therefore, the stock of knowledge from the existent IO literature is valuable. This statement may be obvious, but the temptation may emerge to ignore economic principles altogether and to follow a completely formalistic approach, using the idiosyncrasies of these new markets as a pretext.⁴⁹

What economics analysis has to offer is primarily the identification of efficiencies that should be considered. Placing the maximization of economic welfare as an anchor, it ensures that there is some consistency in legal approaches that may otherwise run the risk of becoming too formalistic. Especially with market shares that tend to be quite high, it may be too easy for competition

policy to position itself against pricing and other strategies of large firms that may not be viewed as safe, simply because they are not well-enough understood.

Second, while the application of competition policy should be characterized by continuity whenever possible, the coexistence of some systematic characteristics implies that there are some high challenges that the digital economy poses, which at least require a change in focus and priorities. So the creation of some fundamental new theory is most likely needed. When network effects and economies of scale or scope are very strong, the analysis of equilibrium in markets and of the optimum economic welfare becomes more challenging. ‘Standard’ economic models often rely on optimization over ‘concave sets’ or proceed by ruling out local deviations. Under conditions such as the ones that digital technologies imply, the optimum may in principle involve large market shares by firms, or even ‘near monopolies’. This is for two reasons, both so that economies of scale are adequately exploited and as a reward to successful (but costly and risky) innovative activity.

In terms of theory, in digital markets we are more likely to see competition ‘*for the market*’ (and races where the occasional winner ‘takes it all’) rather than competition ‘*in the market*’. This feature, in turn, has two implications. First, that in the application of competition policy, more attention should be given to ensure that innovative activity is high and entry barriers (including, of course, those created strategically by rivals) are as low as possible. This appears to be the first-order effect, while any other within market conduct effects are of second order. Second, the economic models for analyzing the matter need to be more dynamic. Naturally this comes at a cost. Increased complexity is an important issue, especially when the results and model implications eventually need to be informing policy-making and legal documents and decisions. A related problem will likely be the lack of robustness. Moreover, in other fields in economics, where dynamic analysis is the norm, like in macroeconomics, it is only rarely the case that analytical model results can be obtained and often the situation is understood through numerical simulations. It is unclear if the profession (e.g., in terms of publication standards for IO work in top journals) and policy-makers are fully ready to accept such a shift in emphasis and in modelling approaches. Currently, at any rate, it appears that there is a gap in the literature, since essentially no IO approaches on which competition policy builds put the emphasis on a fully dynamic analysis of the relevant markets.

Nonetheless, the above analysis strongly suggests that, quite likely, we do not currently have the suitable theory background to deeply understand how policy should proceed in markets with many of the features that we encounter in digital markets. The challenge for economic theory is significant – perhaps the building of some new ‘price theory’ is indeed needed to understand how product markets work.⁵⁰ The general foundation for economic research in competition

policy has been the fundamental price theory analysis in general equilibrium theory and the associated welfare analysis. Under certain conditions regarding technology and consumers' preferences, a competitive equilibrium exists and is efficient. Competition policy starts from this point and attempts to correct or prevent local deviations. In other words, the role of competition policy has been viewed as trying to bring markets as close as possible to the competitive equilibrium benchmark. However, when the fundamentals of markets are very different from the generally accepted assumptions (and this does happen when we have network externalities, significantly increasing returns to scale in production and competition for the market), a competitive equilibrium may not exist or may not be efficient. Thus, the need to fully rethink and characterize what we consider as the optimum in markets emerges as a priority. With the characteristics of digital markets, it is not obvious if the way that these markets work fits the standard microeconomic paradigm. It may even be that temporary monopolies, especially when they respond to competition for their markets by other firms who are attempting to replace them, represent the optimal organization in markets. In this light, competition policy has to be extra careful to find some solid ground on which to base its arguments so that it does not risk doing more harm than good.

Third, there are also important implications for empirical current research. Empirical research that can inform competition policy, and such research in industrial organization more generally, has been constrained by the limited availability of data. In addition, the particular techniques developed have also been developed partly to respond to this limitation. This is in contrast to other fields, like in financial economics or labor economics where some important data is easier to find. With digital markets becoming the norm, this picture may become quite different, since retail transactions may become much easier to record. In principle, a researcher can have access to a wealth of data that do not refer only to the prices and quantities in each market transaction, but also key characteristics of the buyers and sellers, like their age, past purchases, or location. As a result, the opportunity arises for new methods to be developed and for a sequence of important empirical papers to be written that would shed significant light on how markets work in practice.

Fourth, with online sales, 'single market' issues emerge as even more important than before. Online sellers could, in principle, reach buyers across geographical and perhaps language barriers, typically without a significant additional cost. This is a development consistent with the notion of a single market, which is central in EC policies. The idea is to allow buyers and sellers to have market access regardless of their location or other characteristics. However, it is not clear what such a development could imply for pricing and investment incentives. A standard result from economics research is that if a 'single market' is understood to imply uniform pricing, the implications for the

market participants and for welfare will tend to be mixed. Removing the ability to price discriminate from the toolkit of firms, will tend to raise the price for some buyers (or to prevent them from having access at all) and may reduce social welfare, especially if it leads to a reduction in traded volume. This observation is important and very relevant because if the objective of the Single Digital Market currently pursued by the EC is viewed as a way to impose price uniformity across all areas and market participants, the implications may not be positive. Further, price discrimination may be a mechanism to ensure the profit level required for the necessary initial investments to be made, thus in its absence a market may not operate efficiently. Some of the competition cases that are currently open in Europe, such as the cross border pay-TV cases, primarily have such a 'single market' character.⁵¹

5.6 Conclusion

Despite the important progress that has been made in academic research and in competition policy itself, developments that modify the way that markets work are calling for additional work and a modification of the approaches that should be used. New issues, related to the size increase in the digital sectors of the economy, and especially the way that digital technologies and e-commerce practices revolutionize essentially all other sectors of the economy, imply some new and important challenges for academics and policy-makers. Many of the issues that surface as important in 'digital markets' are not absent in more traditional markets. However, the systematic presence of some key new features significantly modifies the nature of the models that should be used.

Overall, research on the topic has to achieve a delicate balance. On the one hand, important central results from the existing industrial organization research have to be used, even if reorganized, reinterpreted and understood under some new light. On the other hand, the problems studied often call for some completely new approaches, where the analysis should focus on the strong economies of scale and scope, network effects and other features that create nonconvexities in the models and imply that some assumptions underlying parts of our standard analysis are not valid. Overall, competition becomes more dynamic and often more discontinuous in nature than we currently recognize in standard models and incorporate in our intuition when designing and applying policy.

It would certainly be misguided to argue that the shift to digital markets makes old results in economics research obsolete and that only a formalistic approach to the application of competition policy could work well. Such an approach would be especially wrong if it is accompanied by a tendency to block innovative strategies employed by firms in their effort to be more competitive. While these may not fall directly in the range that competition policy

typically understands as pro-competitive, they may very well lead to significant welfare improvements via innovation. This can be done by offering new services to consumers or by leading to significant efficiencies. Especially with strong network effects and economies of scale and scope present, and a tendency for high market concentration and strong positive cross-market effects, what becomes relatively more important is to ensure that innovation is possible and attractive for businesses and that any unnecessary entry barriers are removed. The benefits from innovation, even if they tend to be high to successful innovators themselves and imply high market shares and profits, can also be equally high for the consumers. These benefits can often be much higher than the static benefits one might expect from the application of standard price competition arguments. It follows that economic analysis has to incorporate to a much greater extent dynamics in order to be more useful for the understanding and formulation of competition policy. Competition policy itself, in turn, should have as a prime objective to ensure that firms have the incentive and the room to innovate, offer new products and open new markets. In digital markets, in particular, this not only means innovation on the technology side, but often in experimenting with new approaches about how various needs of consumers can be served. Overall, the ground that has to be covered is significant, and the research prospects appear quite exciting.

Acknowledgements

This chapter was prepared in the context of the COEURE Coordination Action, funded by the European Commission's FP7 SSH Programme and aiming at evaluating European research in economics from the perspective of its contribution to key EU economic policy issues. The author is grateful to Jacques Crémer, Marc Ivaldi, Kai-Uwe Kühn, Damien Neven, Lars Sørgard, Yossi Spiegel, Frode Steen, and other participants in the September 2015 COEURE workshop in Brussels for their very helpful ideas, suggestions, comments and criticism. All omissions, misrepresentations and other shortcomings, however, are exclusively the responsibility of the author.

Notes

1. This earlier work is summarized in relevant chapters in Schmalensee and Willig (1989). More recent texts, like Belleflamme and Peitz (2010), nicely blend new contributions into the past stock of knowledge in IO, while how developments in IO theory have shaped competition policy can be found in texts like Motta (2004).
2. See e.g., Italianer (2014), summarizing the relevant issues.
3. See e.g., Cohen et al. (2004).
4. According to a survey by Forrester Research published in July 2015. It is also expected that northern European countries will see more of their total retail sales

- impacted by the web compared with southern European markets, while the UK will have the largest proportion of web-impacted sales by 2020.
5. On recent issues in the development of digital markets, see also Ng (2014).
 6. See http://ec.europa.eu/internal_market/20years/singlemarket20/facts-figures/what-is-the-single-market_en.htm.
 7. See http://ec.europa.eu/priorities/digital-single-market/index_en.htm.
 8. Some first results would be expected in 2016 – http://europa.eu/rapid/press-release_IP-15-4921_en.htm.
 9. See Motta (2004) for an overview that connects the policy and the economic analysis sides of this relation.
 10. A case to be noted is Intel, which has been considered as a critical test for the EC effects-based approach in abuse of dominance cases, as set out in its 2009 Guidelines. This approach was in contrast to the prior case law which was form-based and left little room for an analysis of the competitive nature of potentially exclusionary conduct. In a key recent (June 2014) General Court judgment, the EC 2009 Intel decision was confirmed. In particular, the 2009 decision had found the computer-chip producer to infringe competition rules by granting anti-competitive rebates to computer manufacturers in an attempt to exclude its rival AMD from the market. The General Court's Intel judgment holds that the Commission rightly found that the chip producer breached competition rules. Importantly, however, the judgment also notes that the effects-based analysis was redundant given the particular form of rebates used. Thus, from a policy perspective, the Court re-asserts the form-based standard and finds that effects-based analysis is largely unnecessary for these types of rebates. See http://europa.eu/rapid/press-release_MEMO-14-416_en.htm.
 11. There is now a number of high-quality competition policy textbooks and handbooks with articles describing the progress in specific areas, see, for example, Buccirosi (2008).
 12. Some 'hidden costs' of free goods, and associated antitrust implications, are examined in Gal and Rubinfeld (2015).
 13. See, for example, Bolt and Chakravorti (2012).
 14. See, for example, Garicano and Kaplan (2001) and Jullien (2012).
 15. See, for example, Bajari and Hortaçsu (2004).
 16. See Fudenberg and Villas-Boas (2006).
 17. See http://europa.eu/rapid/press-release_IP-15-5323_en.htm.
 18. In September 2014, the European Court of Justice upheld a 2007 decision by the EC that MasterCard's multilateral interchange fees on cross-border transactions breached competition rules. Overall, through a sequence of decisions, caps have been placed in EU Member States to interchange fees of 0.3 per cent of the value of credit-card transactions and 0.2 per cent for debit-card transactions.
 19. See http://europa.eu/rapid/press-release_IP-15-5166_en.htm.
 20. See http://europa.eu/rapid/press-release_IP-15-5432_en.htm.
 21. Broadcasters also have to take into account the applicable regulatory framework beyond EU competition law when considering sales to consumers located elsewhere. This includes, for online pay-TV services, relevant national copyright laws, a matter related to EC's proposal to modernize EU copyright rules, as part of its Digital Single Market Strategy.
 22. According to a statement in 2013 by FCO President Andreas Mundt, 'Such clauses make the market entry of new suppliers offering innovative services, such as

- last-minute offers via smartphone, considerably more difficult, as these new competitors are not able to offer hotel rooms at better rates.’ ‘The competition between the hotels is also hindered because they are not free to set their prices independently and cannot respond flexibly to new competition developments.’
23. Booking.com is currently the largest online hotel agency in the world. Expedia Inc., including Expedia.com, Hotels.com and Venere, ranks second. HRS is a Germany-based travel agency.
 24. The French, the Italian and the Swedish Competition Authority coordinated their investigations and on 21 April 2015 adopted parallel decisions accepting identical commitments from the market-leading online travel agent Booking.com and making them binding in their respective jurisdictions. The EC assisted the authorities in coordinating their work. In the course of the investigations, Booking.com conducted a customer survey of 14,000 consumers in 9 Member States and produced economic papers to argue that parity between room prices in hotels’ own sales channels and prices offered on Booking.com’s platform is important in preventing free-riding on Booking.com’s investments and ensuring the continued supply of search and comparison services free of charge to consumers. The adopted commitments prevent Booking.com from requiring hotels to offer better or equal room prices via Booking.com than they do via competing online travel agents. In addition, Booking.com cannot prevent hotels from offering discounted room prices provided that these are not marketed or made available to the general public online. The discounted prices can be offered online to members of a hotel’s loyalty scheme or via offline channels.
 25. See ‘*Are the European Competition Authorities making a less anticompetitive market more anticompetitive? The Booking.com saga*,’ Competition Policy Centre, University of East Anglia, *Competition Policy Blog*, 8 July, 2015.
 26. The case concerned the market for the manufacture and sale of sports nutrition products such as protein and carbohydrate-based products and other performance enhancing products. The authority was informed that 13:e Protein Import AB, a manufacturer of sports nutrition products under the brand ‘SELF Omminutrition’, had sent a minimum resale price list for protein powder products to its online buyers, asking them not to adopt prices below the prices on the price list. The preliminary investigation indicated that 13:e Protein Import AB had a low market share, below 3 per cent, in the upstream market for the manufacture of protein powder products. The findings indicated that both the upstream and downstream markets for protein powder products were highly fragmented. Based on these facts, the Authority concluded that the case did not merit prioritization.
 27. See <https://www.acm.nl/en/publications/publication/14226/ACMs-strategy-and-enforcement-priorities-with-regard-to-vertical-agreements/>.
 28. See <https://ec.europa.eu/digital-agenda/en/digital-single-market>.
 29. A Study conducted for the DG for Internal Policies, *A Digital Single Market Strategy for Europe*, see European Commission (2015) was published in July 2015. It describes the challenges for competition policy in relation to the digital economy and also some neighboring policy areas such as intellectual property and data protection. Another useful and relevant policy paper was published by the German Monopolies Commission in June 2015 (Competition policy: The challenge of digital markets, pursuant to Section 44(1)(4) ARC, 1 June 2015, see Monopolkommission, 2015). The report puts emphasis on the analysis of markets in which services are provided by multi-sided platforms. This set includes search engines, social

- networks, and some areas of e-commerce. It takes the view that the multi-sided nature of services and the importance of data must be taken into account to a more significant extent by competition policy.
30. See also Smith et al. (2000) for an earlier review.
 31. See, for example, Fudenberg and Villas-Boas (2012) for a rich analysis of the main forces in terms of theory.
 32. See Riordan (2008), for a review of the issues related to vertical integration.
 33. See Bonanno and Vickers (1988), for strategic delegation issues in the context of vertical separation.
 34. Mortimer (2008) examines related issues in the context of the video rental industry.
 35. Mathewson and Winter (1984, 1988), Shaffer (1991), Martin et al. (2001), Marx and Shaffer (2004, 2007), Dobson and Waterson (2007) are among the main contributions. For some recent applications see Asker and Seitz (2013) and Asker and Bar-Isaac (2014).
 36. See e.g., the analysis in the EAGCP report by Motta et al. (2009) prepared in the context of the revision of the verticals BER.
 37. Official Journal L 336, 29.12.1999, pp. 21–25.
 38. Official Journal C 291, 13.10.2000, pp. 1–44.
 39. Vertical agreements containing such hardcore restrictions were not exempted from the application of Article 81(1), even if the firms concerned had an arbitrarily small market share, since the *de minimis* Notice (2001/C 368/07) does not apply to such hardcore restrictions. According to the Guidelines, paragraph 46, ‘Individual exemption of vertical agreements containing such hardcore restrictions is also unlikely’, thus implying a regime which is in practice very close to *per se* prohibition for these black-listed restrictions.
 40. See also Vettas (2010).
 41. Paragraph 224 of the Guidelines describes various possible ways in which RPM may restrict competition, while Paragraph 225 states that justifications will be considered and that the possible efficiencies will be assessed under Article 101(3). Similar to RPM, the BER generally does not cover agreements that restrict the buyer’s ability to sell in some territories or to some consumers the goods or services that the agreement refers to. However, there are a number of important exceptions, where such restrictions are not considered hard-core, with the most important ones being systems of ‘exclusive distribution’ and ‘selective distribution’.
 42. The revised BER pays particular attention to the matter of online (internet) sales, since the Resale Restrictions’ rules apply to both online and (traditional) store sales. Once distributors have been authorized, they must be free to sell on their websites as they do in their traditional shops and physical points of sale. For selective distribution, this means that manufacturers cannot limit the quantities sold over the Internet or charge higher prices for products to be sold online.
 43. Nocke et al. (2007) examine the impact of different platform ownership structures as this also depends on the strength of the underlying two-sided network effects.
 44. For a discussion of recent developments in the e-books market, including sales trends, impact on traditional booksellers, the implications of the complementarity between e-books and e-readers, a discussion on Amazon’s monopsony power and publishers’ strategies to confront it and the implications of Apple’s entry into the market and of the recent antitrust cases against Apple and publishers, see Gilbert (2015).

45. See Jin and Kato (2007) for an analysis of dividing online and offline sales, also, see Loginova (2009).
46. Baye and Morgan (2002) study firms that pay a fee to list prices at a price comparison site and can price discriminate between consumers who do and don't use the site. They show that prices listed at the site are dispersed but lower than at the firms' websites.
47. See Taylor (2004) and Acquisti and Varian (2005) for early approaches to the issue and Acquisti et al. (2015) for a comprehensive survey.
48. See also Clay et al. (2001) and Chevalier and Goolsbee (2003) for empirical approaches to price dispersion.
49. A related misguided approach was used in the 90s, when some finance analysts evaluating internet industries claimed that the laws of economics need not apply to the dot.coms, contributing to the creation of a bubble.
50. This paragraph includes some ideas that Jacques Crémer presented at the COEURE September 2015 workshop in Brussels. I am grateful for his insights, though responsible for any misinterpretations.
51. See also Langus et al. (2014).

References

- Abhishek, V., Jerath, K., and Zhang, Z. J. 2015. Agency Selling or Reselling? Channel Structures in Electronic Retailing. *Management Science*, **62**(8), 2259–2280.
- Acquisti, A. 2010. *Privacy and Behavioral Economics: The Paradox of Control and Other Studies*. Conference Presentation. Paduano Symposium, Heinz College / CyLab, Carnegie Mellon University.
- Acquisti, A., and Varian, H. R. 2005. Conditioning Prices on Purchase History. *Marketing Science*, **24**, 367–381.
- Acquisti, A., Taylor, C., and Wagman, L. 2015. The Economics of Privacy. *Journal of Economic Literature*, **54**(2), 442–492.
- Adner, R., Chen, J., and Zhu, F. 2015. *Frenemies in Platform Markets: The Case of Apple's iPad vs. Amazon's Kindle*. Working Paper 15-087. Harvard Business School.
- Aghion, P., and Akcigit, U. 2015 (June). *Innovation and Growth: The Schumpeterian Perspective*. Draft Survey for Discussion. COEURE Coordination Action, Harvard University and University of Chicago.
- Ahmadi, R., and Yang, R. B. 2000. Parallel Imports: Challenges from Unauthorized Distribution Channels. *Marketing Science*, **19**(3), 279–294.
- Akman, P., and Hviid, M. 2006. A Most-Favoured-Customer Clause with a Twist. *European Competition Journal*, **2**(1), 57–86.
- Armstrong, M. 2006. Competition in Two-Sided Markets. *RAND Journal of Economics*, **37**(3), 668–691.
- Armstrong, M. 2008a. Interactions between Competition and Consumer Policy. *Competition Policy International*, **4**(1), 97–147.
- Armstrong, M. 2008b. Price Discrimination. In: Buccirossi, P. (ed), *Handbook of Antitrust Economics*. Cambridge, Massachusetts: The MIT Press, pp. 433–468.
- Armstrong, M. 2015. *Nonlinear Pricing*. Working Paper. Department of Economics, University College London.

- Asker, J., and Bar-Isaac, H. 2014. Raising Retailers' Profits: On Vertical Practices and the Exclusion of Rivals. *American Economic Review*, **104**(2), 672–686.
- Asker, J., and Seitz, S. 2013. Vertical Practices and the Exclusion of Rivals Post Eaton. *CPI Antitrust Chronicle*, **2**(July).
- Bajari, P., and Hortaçsu, A. 2004. Economic Insights from Internet Auctions. *Journal of Economic Literature*, **42**(2), 257–286.
- Baye, M. R., and Morgan, J. 2002. Information Gatekeepers and Price Discrimination on the Internet. *Economics Letters*, **76**(1), 47–51.
- Baye, M. R., De los Santos, B., and Wildenbeest, M. R. 2015. Searching for Physical and Digital Media: The Evolution of Platforms for Finding Books. In: Goldfarb, A., Greenstein, S., and Tucker, C. (eds), *NBER Book Economic Analysis of the Digital Economy*. University of Chicago Press, pp. 137–165.
- Belleflamme, P., and Peitz, M. 2010. *Industrial Organization. Markets and Strategies*. Cambridge: Cambridge University Press.
- Belleflamme, P., and Peitz, M. 2012. Digital Piracy: Theory. In: Peitz, M., and Waldfoegel, J. (eds), *The Oxford Handbook of the Digital Economy*. Oxford University Press.
- Bolt, W., and Chakravorti, S. 2012. Digitization of Retail Payments. In: Peitz, M., and Waldfoegel, J. (eds), *The Oxford Handbook of the Digital Economy*. Oxford University Press.
- Bonanno, G., and Vickers, J. 1988. Vertical Separation. *Journal of Industrial Economics*, **36**, 257–265.
- Bourguignon, H., Gomes, R. D., and Tirole, J. 2014 (October). *Shrouded Transaction Costs*. Discussion Paper DP10171. CEPR.
- Buccirossi, P. (ed). 2008. *Handbook of Antitrust Economics*. Cambridge, Massachusetts: The MIT Press.
- Buehler, B., Koltay, G., Boutin, X., and Motta, M. 2014. Recent Developments at DG Competition: 2013-2014. *Review of Industrial Organization*, **45**, 399–415.
- Buettner, T., Federico, G., Kühn, K.-U., and Magos, D. 2013. Economic Analysis at the European Commission 2012-2013. *Review of Industrial Organization*, **43**, 265–290.
- Cabral, L. 2012. Reputation on the Internet. In: Peitz, M., and Waldfoegel, J. (eds), *The Oxford Handbook of the Digital Economy*. Oxford University Press.
- Cabral, L., and Hortaçsu, A. 2010. The Dynamics of Seller Reputation: Evidence from eBay. *Journal of Industrial Economics*, **58**(1), 54–78.
- Chen, Y., and Percy, J. A. 2010. Dynamic Pricing: When to Entice Brand Switching and When to Reward Consumer Loyalty. *RAND Journal of Economics*, **41**, 674–685.
- Chevalier, J., and Goolsbee, A. 2003. Measuring Prices and Price Competition Online: Amazon and BarnesandNoble.com. *Quantitative Marketing and Economics*, **1**, 203–222.
- Clay, K., Krishnan, R., and Wolff, E. 2001. Prices and Price Dispersion on the Web: Evidence from the Online Book Industry. *Journal of Industrial Economics*, **49**(4), 521–539.
- Cohen, D., Garibaldi, P., and Scarpetta, S. (eds). 2004. *The ICT Revolution. Productivity Differences and the Digital Divide*. Oxford: Oxford University Press.
- Condorelli, D., Galeotti, A., and Skreta, V. 2013 (May). *Selling through Referrals*. Working Paper 2451/31774. NYU.

- De los Santos, B., and Wildenbeest, M. R. 2014 (December). *E-book Pricing and Vertical Restraints*. Working Paper. Kelley School of Business, Indiana University.
- Ding, R., and Wright, J. 2014 (March). *Payment Card Interchange Fees and Price Discrimination*. Working Paper. NUS.
- Dobson, P., and Waterson, M. 2007. The Competition Effects of Industry-Wide Vertical Price Fixing in Bilateral Oligopoly. *International Journal of Industrial Organization*, **25**(5), 935–962.
- Edelman, B., and Wright, J. 2015. Price Coherence and Excessive Intermediation. *Quarterly Journal of Economics*, **130**(3), 1283–1328.
- Eliasz, K., and Spiegel, R. 2008. Consumer Optimism and Price Discrimination. *Theoretical Economics*, **3**(4), 459–497.
- European Commission. 2015 (July). *A Digital Single Market Strategy for Europe*. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Study prepared by Nicolai Van Gorp and Olga Batura.
- Foros, Ø., Kind, H. J., and Shaffer, G. 2014. *Turning the Page on Business Formats for Digital Platforms: Does Apple's Agency Model Soften Competition?* Working Paper 06/14. NHH, Norwegian School of Economics.
- Fudenberg, D., and Tirole, J. 2000. Customer Poaching and Brand Switching. *RAND Journal of Economics*, **31**, 634–657.
- Fudenberg, D., and Villas-Boas, J. M. 2006. Behavior-Based Price Discrimination and Customer Recognition. Chap. 7 of: Hendershott, T. (ed), *Handbooks in Information Systems: Economics and Information Systems*. Amsterdam, The Netherlands: Elsevier.
- Fudenberg, D., and Villas-Boas, J. M. 2012. Price Discrimination in the Digital Economy. In: Peitz, M., and Waldfogel, J. (eds), *The Oxford Handbook of the Digital Economy*. Oxford University Press.
- Gal, M. S., and Rubinfeld, D. L. 2015. *The Hidden Costs of Free Goods: Implications for Antitrust Enforcement*. Working Paper 403. Law and Economics Working Papers, New York University.
- Garicano, L., and Kaplan, S. N. 2001. The Effects of Business-to-Business E-Commerce on Transaction Costs. *Journal of Industrial Economics*, **49**(4), 463–485.
- Gaudin, G., and White, A. 2014 (September). *On the Antitrust Economics of the Electronic Books Industry*. Working Paper 147. Dusseldorf Institute for Competition Economics.
- Gilbert, R. J. 2015. A Tale of Digital Disruption. *Journal of Economic Perspectives*, **29**(3), 165–184.
- Hart, O., Tirole, J., Carlton, D. W., and Williamson, O. E. 1990. Vertical Integration and Market Foreclosure. *Brookings Papers on Economic Activity. Microeconomics*, 205–286.
- Hart, O. D., and Tirole, J. 1988. Contract Renegotiation and Coasian Dynamics. *Review of Economic Studies*, **55**, 509–540.
- Italianer, A. 2014. *Competition Policy in the Digital Age*. Conference Presentation. 47th Innsbruck Symposium 'Real Sector Economy and the Internet – Digital Interconnection as an Issue for Competition Policy', Innsbruck, March 7.
- Jin, G. Z., and Kato, A. 2007. Dividing Online and Offline: A Case Study. *Review of Economic Studies*, **74**(3), 981–1004.

- Johnson, J. P. 2013 (March). *The Agency Model and Wholesale Models in Electronic Content Markets*. Working Paper. Johnson Graduate School of Management, Cornell University.
- Johnson, J. P. 2014 (January). *The Agency Model and MFN Clauses*. Working Paper. Johnson Graduate School of Management, Cornell University.
- Jullien, B. 2012. Two-Sided B to B Platforms. In: Peitz, M., and Waldfoegel, J. (eds), *The Oxford Handbook of the Digital Economy*. Oxford University Press.
- Jullien, B., and Rey, P. 2007. Resale Price Maintenance and Collusion. *RAND Journal of Economics*, **38**(4), 983–1001.
- Koszegi, B. 2014. Behavioral Contract Theory. *Journal of Economic Literature*, **52**(4), 1075–1118.
- Kühn, K.-U., Albæk, S., and de la Mano, M. 2011. Economics at DG Competition, 2010–2011. *Review of Industrial Organization*, **39**, 311–325.
- Kühn, K.-U., Lorincz, S., Verouden, V., and Wilpshaar, A. 2012. Economics at DG Competition, 2011–2012. *Review of Industrial Organization*, **41**, 251–227.
- Kwark, Y., Chen, J., and Raghunathan, S. 2015. *Platform or Wholesale? A Strategic Tool for Online Retailers to Benefit from Third-Party Information*. Working Paper. University of Texas at Dallas.
- Lafontaine, F., and Slade, M. 2008. Exclusive Contracts and Vertical Restraints: Empirical Evidence and Public Policy. In: Buccirossi, P. (ed), *Handbook of Antitrust Economics*. Cambridge, Massachusetts: The MIT Press, pp. 391–414.
- Langus, G., Neven, D., and Poukens, S. 2014 (March). *Economic Analysis of the Territoriality of the Making Available Right in the EU*. Technical Report. European Commission DG-MARKT. Charles River Associates Report, prepared for the EC DG-MARKT.
- Lieber, E., and Syverson, C. 2012. Online versus Offline Competition. In: Peitz, M., and Waldfoegel, J. (eds), *The Oxford Handbook of the Digital Economy*. Oxford University Press.
- Loginova, O. 2009. Real and Virtual Competition. *Journal of Industrial Economics*, **57**(2), 319–342.
- Lu, L. 2015. *A Comparison of the Wholesale Structure and the Agency Structure in Differentiated Markets*. Working Paper 15-7. Centre for Competition Policy, School of Economics, University of East Anglia.
- Martin, S., Normann, H.-T., and Snyder, C. 2001. Vertical Foreclosure in Experimental Markets. *RAND Journal of Economics*, **32**, 466–496.
- Marx, L., and Shaffer, G. 2004. Opportunism in Multilateral Vertical Contracting: Nondiscrimination, Exclusivity, and Uniformity; Comment. *American Economic Review*, **94**, 796–801.
- Marx, L., and Shaffer, G. 2007. Upfront Payments and Exclusion in Downstream Markets. *RAND Journal of Economics*, **38**(3), 823–843.
- Mathewson, F., and Winter, R. 1984. An Economic Theory of Vertical Restraints. *RAND Journal of Economics*, **15**, 27–38.
- Mathewson, F., and Winter, R. 1988. The Law and Economics of Resale Price Maintenance. *Review of Industrial Organization*, **13**, 57–84.
- Monopolkommission. 2015. *Competition Policy: The Challenge of Digital Markets. Special Report by the Monopolies Commission Pursuant to Section 44(1)(4) of the Act Against Restraints on Competition*. Special Report 28.

- Mortimer, J. H. 2008. Vertical Contracts in the Video Rental Industry. *Review of Economic Studies*, **75**, 165–199.
- Motta, M. 2004. *Competition Policy. Theory and Practice*. Cambridge: Cambridge University Press.
- Motta, M., Rey, P., Verboven, F., and Vettas, N. 2009. *Hardcore Restrictions under the Block Exemption Regulation on Vertical Agreements: An Economic View*. Technical Report. Economic Advisory Group on Competition Policy, DG-Competition, European Commission.
- Neven, D., and Albæk, S. 2007. Economics at DG Competition, 2006–2007. *Review of Industrial Organization*, **31**, 139–153.
- Neven, D., and de la Mano, M. 2009. Economics at DG Competition, 2008–2009. *Review of Industrial Organization*, **35**, 317–347.
- Neven, D., and de la Mano, M. 2010. Economics at DG Competition, 2009–2010. *Review of Industrial Organization*, **37**, 309–333.
- Ng, I. C. L. 2014. *Creating New Markets in the Digital Economy. Value and Worth*. Cambridge: Cambridge University Press.
- Nocke, V., Peitz, M., and Stahl, K. 2007. Platform Ownership. *Journal of the European Economic Association*, **5**(6), 1130–1160.
- Rey, P., and Tirole, J. 2008. A Primer on Foreclosure. In: Armstrong, M., and Porter, R. H. (eds), *Handbook of Industrial Organization*, vol. 3. Elsevier.
- Rey, P., and Vergé, T. 2008. Economics of Vertical Restraints. In: Buccirossi, P. (ed), *Handbook of Antitrust Economics*. Cambridge, Massachusetts: The MIT Press, pp. 353–390.
- Riordan, M. H. 2008. Competitive Effects of Vertical Integration. In: Buccirossi, P. (ed), *Handbook of Antitrust Economics*. Cambridge, Massachusetts: The MIT Press, pp. 145–182.
- Schmalensee, R., and Willig, R. D. (eds). 1989. *Handbook of Industrial Organization*. Vol. 1 and 2. Amsterdam: Elsevier.
- Shaffer, G. 1991. Slotting Allowances and Resale Price Maintenance: A Comparison of Facilitating Practices. *RAND Journal of Economics*, **22**, 120–136.
- Smith, M. D., Bailey, J., and Brynjolfsson, E. 2000. Understanding Digital Markets: Review and Assessment. In: Brynjolfsson, E., and Kahin, B. (eds), *Understanding the Digital Economy*. Cambridge, Massachusetts: The MIT Press, pp. 99–136.
- Spengler, J. J. 1950. Vertical Integration and Antitrust Policy. *Journal of Political Economy*, **58**(4), 347–352.
- Spiegel, Y. 2013. Commercial Software, Adware, and Consumer Privacy. *International Journal of Industrial Organization*, **31**, 702–713.
- Taylor, C. R. 2004. Consumer Privacy and the Market for Customer Information. *RAND Journal of Economics*, **35**, 631–650.
- Tirole, J. 1988. *The Theory of Industrial Organization*. Cambridge, Massachusetts: The MIT Press.
- Valletti, T. M., and Szymanski, S. 2006. Parallel Trade, International Exhaustion and Intellectual Property Rights: A Welfare Analysis. *Journal of Industrial Economics*, **54**(4), 499–526.
- Varian, H. R. 1985. Price Discrimination and Social Welfare. *American Economic Review*, **75**(4), 870–875.

- Varian, H. R. 1989. Price Discrimination. Chap. 10 of: Schmalensee, R., and Willig, R. D. (eds), *Handbook of Industrial Organization*, vol. 1. Amsterdam: Elsevier, pp. 597–654.
- Vettas, N. 2010. Developments in Vertical Agreements. *Antitrust Bulletin*, **55**(December), 843–874.
- Villas-Boas, J. M. 1999. Dynamic Competition with Customer Recognition. *RAND Journal of Economics*, **30**, 604–631.
- Villas-Boas, J. M. 2004. Price Cycles in Markets with Customer Recognition. *RAND Journal of Economics*, **35**, 486–501.
- Wang, Z., and Wright, J. 2014 (May). *Ad-Valorem Platform Fees, Indirect Taxes and Efficient Price Discrimination*. Working Paper. NUS.
- Wilson, R. 1993. *Nonlinear Pricing*. New York: Oxford University Press.
- Wirl, F. 2015. Downstream and Upstream Oligopolies when Retailer's Effort Matters. *Journal Of Economics*, **116**(2), 99–127.
- Zhang, J. 2011. The Perils of Behavior-Based Personalization. *Marketing Science*, **30**(1), 170–186.