Internet Effects on Retail Markets

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Abstract

Researchers from multiple disciplines, including economics, marketing, information systems, operations research, and computer science, have contributed to the academic literature on how the Internet has affected retail markets. In this chapter we build bridges across these various disciplines to provide a common understanding of how the Internet has affected retail markets and to identify important areas for future research.

1 Introduction

The emergence of the information economy is rapidly changing markets for a wide range of industries. Markets as diverse as those for music, movies, television, newspapers, books, travel, health, apparel, groceries, electronics, vehicles, all the way to pulp and paper are being reshaped by the introduction of the Internet and other information and communication technologies.

Paralleling these market transformations there is a growing literature examining Internet effects on consumer goods industries. This literature has not only sought to identify market changes due to Internet adoption, but has further sought to identify the demand and supply mechanisms driving the market changes and to

examine the implications of these changes for consumers and producers in retail industries.

One way the Internet is reshaping market operations is by displacing consumers' need to visit brick and mortar stores in order to purchase products. Instead of having to incur time and transportation costs necessary to visit physical stores, consumers can order products such as clothing, electronics, or physical copies of books on the Internet from their own computers or other Internet-connected devices and have them delivered by mail to their homes.

Of course, transportation costs are not the only important factor consumers consider when making channel selection decisions for their purchases (i.e., choosing to purchase either from the online channel or from physical stores). The Internet is better suited for purchasing some products than others. For instance, while the physical channel may be preferable for purchasing some items where physical examination is more important (e.g., a wedding dress), the physical store channel may not provide such an advantage over the Internet channel when purchasing other items (e.g., a physical book). Similarly, while the Internet channel might be more convenient than the physical store channel for repeat purchases of previously tried products, the physical channel may be preferable to the online channel when consumers seek instant gratification and want to avoid waiting for the products to arrive in the mail. Of course, even these advantages of physical stores can be challenged by online markets as peer-rating systems improve consumers' ability to evaluate products, and digitization allows some products to be delivered digitally

reducing the advantage of physical stores regarding immediate gratification (e.g., digital music, movies, or books).

Another way the Internet is reshaping markets is by affecting the search process. The Internet provides an enormous amount of information to consumers regarding prices and quality, potentially making markets more competitive. Online activities such as price comparison research before purchase, reading reviews, acquiring information from online social networks, or using recommendation systems are currently a matter of daily use. Researching products and placing orders from both physical and Internet channels are deeply intertwined activities. Consumers sometimes engage in online research before visiting and placing orders from physical stores. Other times consumers visit brick and mortar stores in order to physically examine products before placing orders online. (This topic is covered in some detail by Ellison in Chapter 13 of this Handbook.)

When consumers move from offline to online markets they may change the types of products they purchase, changing the distributions of sales across products. For example, the Internet can create markets where a few products take the majority of all the transactions, or it can result in markets where transactions are more evenly distributed across a wide range of products. These "superstar" and "long tail" effects can arise from supply-side mechanisms since the selection of products available from the Internet channel is typically much wider than the selection available at physical stores due to their lower storage and inventory costs. They can also arise from

demand-side mechanisms, such as from differences in the ways consumers search online versus offline.

For information good industries, which produce goods that can be digitized (e.g., music, video, television), the information economy is eliminating the notion of a "physical good." An increasing fraction of the transactions in these markets is happening via the online delivery of digital files (e.g., buying music or movies from iTunes). Production costs decrease for these transactions since there is no need to use a physical medium in order to transfer the content (e.g., print a physical book or encode a movie onto a DVD). Distribution costs also decrease since these transactions have no transportation or mail costs associated with them.[1]

However, for information goods the Internet has also facilitated the distribution of pirated content. While prior to the existence of file sharing networks individuals could share their music or movies with their close network of friends and family, the Internet enabled the mass sharing of pirated content with the whole world. Piracy has profoundly reshaped information goods markets. Questions related to copyright laws, copyright exceptions, and fair use have surfaced.

The special treatment for the sales tax for purchases made on the Internet has also reshaped retail markets. Consumers can sometimes avoid paying sales taxes for their purchases made online, which can distort their online versus physical store channel choices. In this regard, there is a current public policy debate concerning how taxes on the Internet affect channel selection, as well as over the online price

[1] Betancourt provides a related perspective on these issues in Chapter 3 of this Handbook.

elasticity of demand important in determining the size of the deadweight loss due to the sales tax. Moreover, the relationship can also operate in the reverse direction when avoiding paying taxes by using the online channel produces tax revenue losses for the states.

Researchers from multiple disciplines, including economics, marketing, information systems, operations research, and computer science, have contributed to the academic literature on how the Internet has affected retail markets and retail industries. Our goal in this chapter is to build bridges among the contributions in these various disciplines in order to understand how they can be seen as a common body of research that represents our current understanding of how the Internet has affected retail markets.

Because this literature is broad, we cannot cover all its important topics in a single chapter and we thus only focus on a set of topics that we organize in sections. The next section covers the literature on how the Internet and other information and communication technologies have affected the markets for information goods. In Section 3 we present research on how the Internet can change sales patterns, leading to either long tail versus superstar effects. In Section 4 we discuss the literature on online reviews and digital word of mouth. In Section 5 we discuss the research on how taxes affect Internet commerce. In the final section we list some important topics related to how the Internet affects retail markets that we do not address in our chapter.

2 Retail Markets for Information Goods

One could argue that markets for information goods have seen the most significant changes from the introduction of the Internet and other information and communication technologies, and that the disproportionate Internet's impact on this industry can be explained by two idiosyncratic traits of information goods. First, for information goods the Internet introduced an instant online delivery option as an alternative to the physical product. Second, the cost of creating and distributing additional copies of digital products goes to near zero in a digital world, which not only reduces the cost structure for legitimate distributors, but also reduces the cost structure of illegal distribution of information goods, significantly increasing the role of "piracy" in the evolution of these industries.

In this section, we study the markets for information goods and organize our examination by industry: music, movie, and other related markets for information goods.[2]

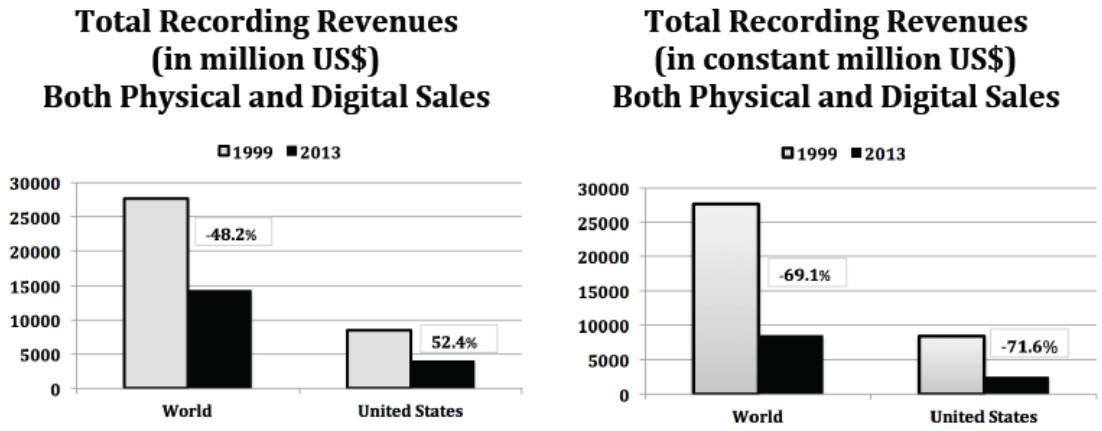
2.1 Music Sales

The academic research on how information and communication technologies have affected the music industry has concentrated on examining piracy effects. This is not surprising given the large decrease in legal music sales that followed the introduction of file sharing technologies in the early 2000s.[3] Figure 1 shows the decrease in music sales, aggregating physical and digital formats, in the United States

[2] There are other markets for information goods that we do not examine in detail in this chapter (e.g., books; video games).
[3] The first file sharing platform (Napster) was introduced in June 1999 and shut down in 2001 (Zentner 2006).

and the world since the introduction of file sharing. It is important to note that this decrease in legal music sales has occurred in a context where nearly everyone agrees that both the overall consumption of music and the size of people's music libraries have increased significantly.[4]

Figure 1: Music Sales Before and After the Introduction of File Sharing



Source: Zentner (2014) based on statistics from the IFPI, reported in millions of U.S. dollars. The figure on the left presents statistics in current dollars and the figure on the right presents statistics in constant dollars.

There is a vast literature investigating how the Internet and piracy affect music sales. Almost all empirical studies in this domain find that file sharing has caused a substantial decrease in music sales. In this chapter we only briefly list the alternative empirical approaches that researchers have used to measure the effect of piracy on music sales. Danaher, Smith, and Telang (2013) provide interested readers with a more comprehensive review of this literature.

[4] These music libraries include a large fraction of unauthorized copies; large music libraries coupled with increased portability facilitate music consumption.

The studies on how piracy affected music sales can be categorized into three main groups based on their empirical strategy and type of data they employ to measure the effect:[5]

a) Some studies examine individual level data from surveys, using instrumental variables to break the inherent endogeneity arising from the likelihood that a strong taste for music drives both file sharing and music purchases. For example, Zentner (2006) and Rob and Waldfogel (2006) use the speed of Internet connections as an instrument, since fast connections induce file sharing and might be unrelated to individuals' music tastes.[6] As an alternative instrument Zentner (2006) also uses individuals' technical sophistication levels which are correlated with individuals' propensities to pirate music online but are arguably uncorrelated to individuals' music tastes.

b) A second alternative is to use panel data on music sales and Internet penetration aggregated at the level of the location (either countries or cities), where Internet penetration rates are used as a proxy for the amount of file sharing in each geographical location. Studies using this empirical strategy examine whether or not music sales decay more rapidly in locations with higher Internet penetration rates (e.g., Hui and Png 2003, Peitz and Waelbroeck 2004, Zentner 2005,

[5] Other studies examine whether or not reasons other than file sharing can explain the observed decline in music sales (e.g., Liebowitz 2006).
[6] Zentner (2003) uses two datasets and two empirical approaches that were later on published as two separate papers: Zentner (2005) and Zentner (2006).

Liebowitz 2008, Zentner 2009), finding that increased Internet penetration is correlated with reduced legal sales.[7]

c) Other studies examine panel data on music sales at the album level. Within this category some studies combine data on music sales with data on piracy rates at the album level, employing instrumental variables in order to account for the endogeneity between album sales and piracy rates. For instance, Oberholzer-Gee and Strumpf (2007) exploit the weeks when German students are on vacation as a supply shock in file sharing networks. They argue that during this holiday period for German students there was an increase in the supply of files available on global file sharing networks, allowing individuals in the United States to download files substantially faster. Blackburn (2005) also uses data on music sales and piracy at the album level, employing the announcement of lawsuits trumpeted by the Recording Industry Association of America (RIAA) during 2003 to address the endogeneity between file sharing and music sales. An alternative within the category of studies using panel data at the album level has been to combine the data on music sales for various countries with law changes affecting piracy rates in some of these countries. For example, Danaher et al. (2014) exploit the introduction of the HADOPI legislation in France (a law seeking to prevent copyright infringement), examining trends in album sales on iTunes in France

[7] There are some differences across these studies. For example, Hui and Png (2003) examine pre-Napster physical piracy and not digital piracy (and therefore this study does not use Internet penetration as a proxy for digital piracy). Peitz and Waelbroeck (2004) use cross-section instead of panel variation.

following HADOPI, relative to trends in album sales on iTunes for a sample of other countries that were used as a control group.

While most studies in the piracy literature focus on how piracy affects music sales, some studies within this literature examine other related metrics. For example, Zentner (2008) examines how Internet use, file sharing, and online sales of records, affected the entry and exit of brick and mortar music specialty retailers in the United States (combining panel data from phonebook records on the location of music retailers with data on broadband connectedness by cities, the number of broadband providers by zip code, and the geographical location of universities). Other studies examine how piracy affects the music concert industry. Records and concerts have always been considered complementary products, and live performances were historically used to promote record sales. Krueger (2005) examines how the Internet and file sharing have altered this business model, showing that the decrease in the demand for legal record sales combined with an increase in unauthorized music listening causes an increase in ticket prices for live performances. Mortimer et al. (2010) and Cho et al. (2012) also examine how new technologies affect the concert industry, focusing on the effect of Internet and piracy on live performances for well-known versus small artists.

Although the literature on how piracy affects the music industry is vast, there are several notable areas with particular promise for future research. We list and discuss these areas below.

File Sharing and the Supply of Copyrighted Products in Retail Markets: Since the literature appears to have reached an understanding that file sharing substantially decreases record sales, an important question is to what extent the lower compensation for artists has affected the supply of new music. This is a challenging question to answer since it is difficult to assess the quality of new music and difficult to disentangle the impact of new technologies on the supply of music from the concomitant impact of piracy on the supply of new music in retail markets.

Waldfogel (2012a) studies the temporal evolution of the supply of new music, using three approaches to control for music quality. The first approach consist in creating an index to measure the quantity of high-quality music by using quality evaluations from critics' retrospective lists under the assumption that critics' tastes are similar to those of consumers in the market. The other two approaches consist in using historical diffusion patterns for music sales and radio airplay, comparing historical yearly shares of music sales and radio airplay for albums released in different vintages (e.g., comparing the share of music sales and radio airplay taken by newly released album versus older albums before and after the introduction of file sharing). The findings from this study suggest that there has been an increase in the quantity of high quality music since the introduction of Napster in 2001.

In addition to the challenge in measuring the quality of new music, a finding suggesting that the supply of high quality music in retail markets did not decrease in recent years is not easy to interpret (Zentner 2014). One plausible interpretation is that the supply of new artists, and therefore new content, is inelastic to monetary

incentives. However, an alternative interpretation is that artists' monetary incentives did not decrease in spite of the decrease in music sales. Basically, revenues and costs determine an artist's monetary compensation:

$$\pi = Revenues - Costs$$

and it is unclear whether or not the net monetary compensation for music creation has decreased since the introduction of file sharing because:

a) New technologies reduced the costs of producing and distributing musical recordings, implying that π in the equation above could have remained constant despite the decrease in revenues from music sales due to piracy; or
b) Revenues from other sources such as live performances might have increased to an extent that compensates for the entire decrease in revenues from selling musical recordings due to piracy.[8]

The File Sharing Effect on Music Prices. Varian (2005) outlines the history of the introduction of the U.S Copyright Act in 1790, when it only protected American and not foreign authors' work. He argues that during these times works from foreign authors were subject to intense competition in the United States, highlighting that "in

[8] The nature of live performances might have also changed in response to piracy and the resulting greater reliance on revenues from concerts: a large fraction of live performances today appear to have adopted elaborate visual elements versus concentrating more exclusively on sound.

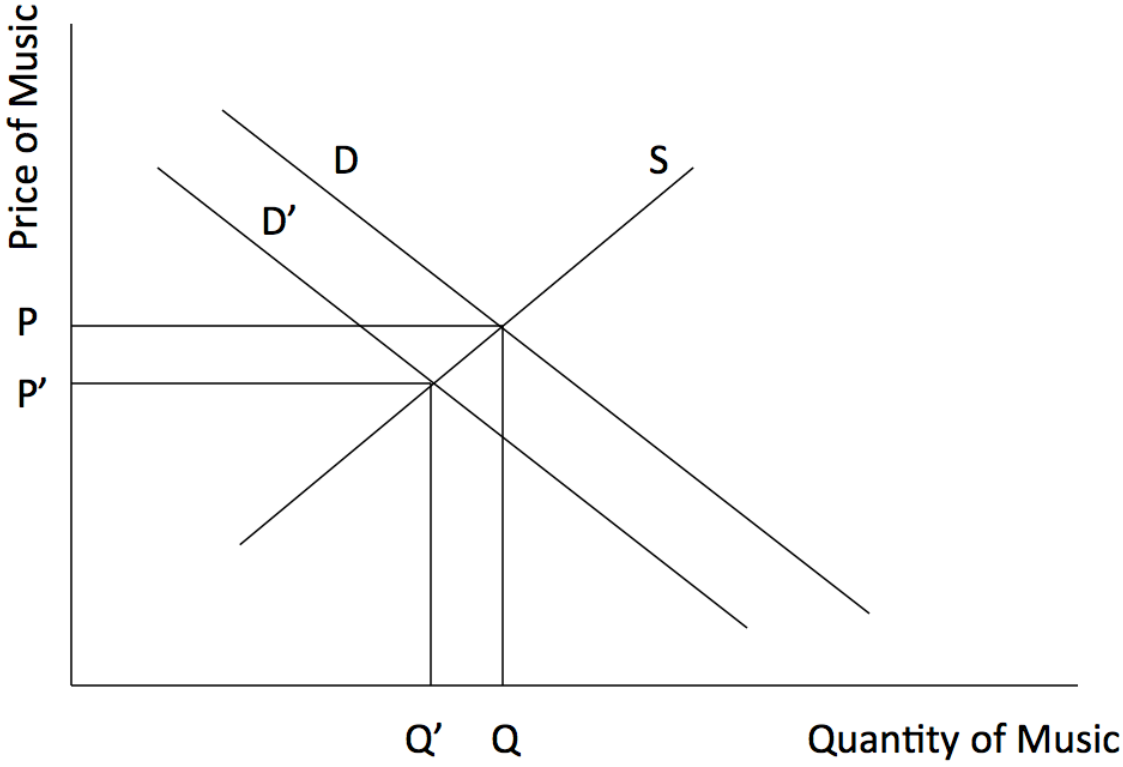
1843, Dicken's Christmas Carol sold for six cents in the United States and $2.50 in England."[9]

Zentner (2010) discusses how virtually all papers examining the file sharing effect on music sales focus on measuring effects on quantities. However, revenues rather than quantities compensate artistic creation, and file sharing can decrease music revenues by both decreasing music quantities and prices. We explain this in Figure 2, which represents the legal music market.

In this figure the introduction of file sharing provides a free or cheap substitute for legal music shifting the demand for originals from D to D'.[10] Virtually all papers in the file sharing literature quantify the decrease in original music consumption from Q to Q', ignoring that file sharing can also alter the price of originals. In Figure 2 the price of music decreases from P to P' and revenues decrease from the rectangle P times Q to the rectangle P' times Q'.

[9] Varian (2005) highlights that part of the large price disparity may be due to the quality of the binding (the American edition was published in pamphlet form).
[10] Theoretically, the demand for music could also shift to the right due to sampling.

Figure 2 The Legal Music Market



In a similar way, in the absence of piracy the prices for legal digital music might have been substantially different than those observed in the presence of piracy. For instance, competition from peer-to-peer file sharing networks might have reduced the bargaining power of record labels against both streaming services and paid digital download stores regarding music licensing and unbundling. Legal downloads might therefore have been more expensive than they are had file sharing not been introduced. Examining how file sharing affects prices is a fruitful area for future research.

2.2 Movie Sales

The movie industry has also been substantially affected by the Internet and piracy. Movies are released sequentially in different formats (movie theaters, DVDs, video downloads, premium cable, regular cable, and network television), and Internet channels and digital piracy can affect the markets for each of these formats in different ways. Although movie theaters are a service industry, and not technically retailers, they are affected by the introduction of the Internet in ways that are related to, and informative about, the impact of the Internet on the retail businesses. For example, the streaming of movies via the Internet may have affected video retail stores to a greater extent than movie theaters, since online streaming is a closer consumption experience to watching a DVD than to watching a movie at a theater (movies are available on both DVD and streaming networks after the release in theaters; both movies in DVD and from streaming networks are watched at home).

The studies investigating how information and communication technologies have affected retail markets for movies can be grouped into two main categories. A first category includes studies concentrating on examining structural changes in the industry due a broad range of Internet-enabled technologies, such as how automated recommendation lists influence consumers' choices regarding movies (Fleder and Hosanagar 2009) or how consumers changed the consumption of long tail or superstar movie titles when they move from physical stores to online (Zentner at al. 2013). A second category includes studies concentrating on how piracy affected retail sales of movies. We postpone our discussion of the first category of studies until Section 3, and here we concentrate on discussing studies related to movie piracy.

The examination of whether or not file sharing has had an impact on retail sales of movies relates closely to the research studying the effect of file sharing on music sales. However, there are some important differences, such as those regarding repeated play (which is less typical for movies than for music) and the importance of language (which is more important for movies than it is for music). Similarly, there are more notable differences across formats in the movie industry than in the music industry. This is important since various factors suggest that piracy is likely to have heterogeneous effects across different release windows and formats (e.g., video rental; video retail; or movie theaters):

a) Files available for downloading on file sharing networks may come from different sources and have different qualities. For example, copies can be made from DVDs sent to movie critics, by taping movies in theaters using a camcorder, or from the original DVD after the movie is released in DVD format. The quality of pirated copies is typically higher following the release of DVDs than it is during the theatrical window.
b) Watching a movie obtained online is a closer consumption experience to watching a DVD (rental or retail) than to watching the movie at a theater (e.g., both are watched at home).
c) Both pirated movies and purchased DVDs allow for repeated play, but consumers can only see a movie once per payment at the theater.

There are far fewer studies examining movie piracy than music piracy. However, similar to the research on music piracy, studies of movie piracy fall into three main categories based on their empirical strategies and the data they employ:

a) Some studies use individual level data from surveys. Bounie et al. (2006) use survey data from 620 French individuals collected in 2005, finding in their sample that file sharing has no impact on theatrical attendance but a large impact on both retail video rentals and video sales. Rob and Waldfogel (2007) use individual-level survey data for 2002 through 2005 on movie consumption for 500 students in the US, finding that one pirated movie consumption reduces paid movie consumption by approximately one. Although this paper finds that the rate of displacement is large, it also finds that the amount of displacement is small, which is explained by the low level of pirated consumption in their sample: only 5.2 percent of total movie consumption in their sample is unpaid/pirated. Bai and Waldfogel (2009) use two samples of Chinese consumers, a sample of college students and a sample of Internet users, documenting that nearly three quarters of movie consumption in their samples is unpaid (and mostly obtained via downloading) but finding that the displacement is small: each unpaid consumption displaces 0.14 paid consumption instances in the sample of college students and the displacement is roughly zero in the Internet sample.
b) Other papers in this literature use data at the location level. For example, Smith and Telang (2010) use data on DVD sales in American cities from 2000 through 2003, a period before widespread digital piracy of movies, finding

that increases in broadband penetration had a positive association with retail DVD sales during their study period. Zentner (2010) uses country-level data from theatrical, video rental, and video retail markets, and compares the impacts of increased high-speed online connectedness replacing slow-speed Internet connectedness before and after the 2003 introduction of BitTorrent, a service that made movie file sharing practically feasible by massively increasing the downloading speed. While he finds negative effects of piracy on retail video sales, he does not find negative file sharing effects on either video rentals or box-office receipts. Danaher and Smith (2014) use data at the country level on digital movie sales comparing digital movie sales before and after the Megaupload shutdown (a file-hosting service provider accused of copyright infringement). They find that revenues from digital sales increase more significantly for countries that had higher pre-shutdown Megaupload usage rates.

2.3 Related Markets for Information Goods

While not retail markets in the traditional sense, markets for television viewing and newspaper consumption have also been affected by markets for digital information goods in ways that may be informative to researchers analyzing retail markets for related products. These interactions help shed light on the degree to which digital channels for information goods impact physical consumption of those products.

With regard to consumption of traditional television broadcasts, the Internet can affect television viewing via various mechanisms. One mechanism is competition between the Internet and television programing as entertainment alternatives. For instance, spending time surfing the web (e.g., on social media) may decrease the time individuals spend watching television programming. Liebowitz and Zentner (2012) examine this question using city-level panel data on television viewing and Internet penetration disaggregated by age groups for the United States. They find that Internet adoption has had only a small impact on the amount of television viewing of individuals younger than 34 (reducing it by 17.4 minutes per day) and no effect on the viewing of older individuals.

The Internet can also be used as a medium to watch television programing (e.g., watch a television show on the television station's web page or on an online platform), which might affect the amount of time consumers spend watching traditional offline television. Waldfogel (2009) studies this question and finds that when individuals watch more television online they only slightly decrease their offline television viewing by only seven minutes per week.

The Internet might also impact television viewing by increasing programming choices available on the Internet and allowing asynchronous consumption as opposed to at a set broadcast time. This additional variety can affect both the amount of television viewing time and the specific shows that individuals choose to watch. Liebowitz and Zentner (2013) seek to predict how Internet-induced increases in programing variety affect the amount of time spent watching television by examining

how the historical increase in variety brought about by the deployment of cable and satellite services affected television viewing. Using country-level panel data they find that the additional variety from historical increases in cable and satellite penetration had virtually no impact on the amount of time spent watching television.

As with retail movie and music sales discussed above, changes in television distribution may also impact illegal distribution of "pirated" television programming over the Internet. In this regard, Danaher et al. (2010) study piracy of television shows, examining how changes in the availability of NBC's television shows on iTunes store triggered piracy and DVD sales after NBC removed their television shows from the iTunes store in December 2007 and subsequently restored their content to the iTunes store in September 2008. Their findings show that piracy increases significantly when retail consumers are unable to purchase shows from iTunes stores.

Similarly, for newspaper consumption, several researchers have analyzed the impact of digital consumption on markets for physical copies. Gentzkow (2007) provides an early examination of this question using individual-level data on print and online newspaper readership from a survey conducted in Washington D.C., and finds a low substitution rate between print and online newspaper readership.

A related but broader question is how Internet use, not just reading newspapers online, affects print newspapers readership.[11] George (2008) and Cho et al. (2014) study this question using data on Internet adoption and newspaper

[11] Zentner, Joaquin et al. (2014) examine how the Internet affects the consumption of pulp and paper. The consumption of paper may be affected by changes in the consumption of print newspapers as well as by an array of other Internet-related factors (e.g., paperless billing; online advertising; online phonebooks).

circulation by cities in the United States (George) and by countries (Cho et al.). Both studies find substitution between online and print newspapers, although similar to Gentzkow (2007), they find lower substitution rates than might have been anticipated from popular accounts.

3 Bricks, Clicks, Superstars, and Long Tails: How Consumption Patterns Change as Consumers Move Online

A historical trait for a wide range of markets has been that the top-selling products take the majority of the market's revenues. For instance, top-selling movies, books, and music albums have traditionally taken a large share of their respective industries' revenues. These top-selling products are called superstar products (Rosen 1981).

The Internet may affect this historical sales distribution trait, and from the emergence of the World Wide Web some researchers have observed the Internet's potential to affect traditional trade patterns. Specifically, producers' cost structures and consumers' choices might be different for online versus offline commerce, implying that the shift from brick and mortar transactions and to Internet transactions might change which products end up being produced and sold.

The move toward Internet transactions could lead to consumer purchases that are more spread out across products (e.g., Bryjolfsson et al. 2003) — a phenomenon Chris Anderson coined as "the long tail effect" (Anderson 2006). From a theoretical

perspective these long tail Internet effects could derive from a variety of factors that can be grouped into either demand-side or supply-side factors.

The supply side-factors that can cause long tail e-commerce effects are related to the greater selection of products that is typically available for purchase in online relative to offline marketplaces. Online stores can generally offer greater variety than physical stores can because online retailers face lower relative costs for carrying a wide selection of products. For example, online stores have lower storage costs and fewer shelf-space limitations than brick and mortar stores do since online retailers can mail the products purchased on the Internet from remote warehouses as opposed to needing to supply them from the limited local shelf-space in the prime locations used by brick and mortar stores. Similarly, inventory costs should be lower for online retailers because a single national warehouse or a few large regional warehouses (the typical organization structure of online retailers) should have lower stock-outs and excess inventories than many smaller retail physical locations. The law of large numbers implies that physical stores' stocks-outs and excess inventories will tend to cancel out at the aggregate level.

In addition to these supply side effects, demand-side factors can also lead to sales distributions exhibiting long tail effects as consumers move toward online markets. For instance, even though physical stores sometimes carry both popular and niche products, consumers' choices may be skewed toward popular products when these have better shelf visibility within the store than do niche products. Online search tools such as recommendation or personalization engines can facilitate

increased product discovery and produce long tail sales distributions as they are sometimes designed to promote the discovery of niche products.

While greater variety on the supply side is always expected to lead to long tail e-commerce effects, factors from the demand side can sometimes lead to an increase in the concentration of sales as retail transactions move from physical stores toward the Internet (i.e., superstar effects). For example, the sales of popular products can increase relative to the demand for niche products when consumers base their choices on online top seller lists. Search engines also sometimes promote sales of popular products because these engines base their recommendations on actual transactions and there is limited data for niche products with low historical transactions (Fleder and Hosanagar 2009; Oestreicher-Singer and Sundararajan 2012).

Online markets can therefore lead to either an increase or a decrease in the concentration of sales across products when considering all the supply- and demand-side theoretical forces at play. The growing empirical literature focusing on measuring how e-commerce affects the distribution of sales across products also finds mixed results regarding how e-commerce affects the concentration of sales across products. For example, Brynjolfsson, Hu, and Smith (2003) find long-tail e-commerce effects for the book industry. They show that around 40% of books sales at Amazon.com occurred for titles that would not have normally been stocked in the limited selection at brick-and-mortar book stores, and that in 2000 the annual consumer surplus gains from these "newly available" titles was between $700 million

to $1 billion. Conversely, Elberse and Oberholzer-Gee (2007) find superstar effects for the video retail industry. While they find that there has been an increase in the number of titles with positive sales coinciding with the growth of the Internet between 2000 and 2005, they also find that the proportion of transactions taken by superstar products has increased during the same time period.

The long tail results in Brynjolfsson et al. (2003) may arise from variety differences across online and physical store channels on the supply side, and they may also arise from consumer choice differences across channels on the demand side. Brynjolfsson at al. (2011) examine data from a clothing retailer that offers the same selection of products in its catalog and Internet channels in order to disentangle whether the long tail effects come from the demand versus the supply side. They find that the distribution of sales has a longer tail for the Internet channel relative to the catalog channel, demonstrating that demand-side differences across channels can cause long tail effects when consumers move toward Internet transactions.

Brynjolfsson et al. (2003) and Brynjolfsson at al. (2011) use cross-section data, and the long tail effects they find could be due to selection effects from either the types of consumers who decide to use the Internet channel or from the types of products consumers select to purchase online. Zentner et al. (2013) examine the video rental industry while controlling for these two selection effect types. Specifically, Zentner et al. (2013) use customer-level rental panel data obtained from a large national video chain as it was closing many of its local stores, and examine how rental behavior changes when store closures force consumers to move from

brick-and-mortar to online consumption. They find long tail effects when controlling for selection: consumers rent a larger variety of DVDs when store closures force them to rent from the online channel.

Other papers examining sales patterns online versus offline include Brynjolfsson et al. (2009), Forman et al. (2009), Fleder and Hosanagar (2009), Oestreicher-Singer and Sundararajan (2012), Tucker and Zhang (2011), Waldfogel (2012b), Pozzi (2012), and Goldfarb et al. (2013). Brynjolfsson et al. (2009) study the nature of competition between brick-and-mortar and Internet retailers in the clothing industry, showing that Internet retailers face more significant competition from brick and mortar retailers when selling popular products than when selling niche products. Forman et al. (2009) use location- and product-level data from Amazon.com on book sales, showing that when a physical store opens locally people's online purchases of the nationally most popular products decline relative to the purchases of products unlikely to be either popular or available offline. Both Fleder and Hosanagar (2009) and Oestreicher-Singer and Sundararajan (2012) analyze how peer-based automated recommendation lists influence online choices for long tail versus superstar products. The former authors find that recommendation lists can either increase or decrease sales of niche products, and the latter authors finding that product categories that are more sensitive to recommendation networks are also more likely to have higher sales of niche products. Tucker and Zhang (2011) study the impact of popularity information on sales, arguing that titles with niche appeal may benefit more from being listed as popular product than do products with general appeal. Waldfogel (2012b) shows that Internet markets decrease the concentration of

music sales in a few artists. Pozzi (2012) examines brand exploration online and offline by using panel data on grocery shopping, finding that brand exploration for groceries is more prevalent at physical stores than in online markets. Goldfarb et al. (2013) demonstrate that embarrassment might change consumers' choices in physical stores, showing how e-commerce might produce long tail effects by decreasing social inhibitions.

Most of the literature on changes in sales patterns as consumer move online has focused on examining industries selling products with attributes that consumers can equally evaluate online and at physical stores — these attributes are called digital product attributes (e.g., Lal and Sarvary 1999; Lee and Bell 2013; Bell, Gallino, and Moreno 2013). However, non-digital product attributes that are more difficult to transmit via the Internet are prevalent for some industries (e.g., fit or texture for the clothing industry), and for these industries the channel choice may be closely linked to the specific product of interest. Defining product popularity for these types of industries is challenging because product-based channel choice might create large differences between the products that are popular online versus offline: a product can be superstar from one channel and niche from the other. Soysal and Zentner (2014) examine the apparel industry using customer- and transaction-level panel data, showing that in this industry there are wide differences between the products that are popular in online versus offline channels. They also demonstrate that the traditional metrics used for defining product popularity can generate substantial biases and lead to spurious long tail or superstar effects when these metrics are used to examine markets where product popularity differs by channel. For example, using

data from offline sales exclusively to determine product sales ranks might mechanically create large long tail effects when there are differences between the products that are popular online and offline, since consumers will decrease purchases of products that are popular in the offline market as they move online (although these consumers might increase the purchase of products that are popular in the online market when they move online).

Examining the supply and demand differences between physical store and online channels, as well as how these differences affect trade patterns when consumers move across channels, is an active area of academic research that has capture the attention of researchers in multiple disciplines. Examining these topics is also important for managerial practice, as the results are useful for the prediction of demand changes.

4 Digital Word-of-Mouth

The Internet has profoundly affected how product information, including price and quality information, is shared among consumers. Although consumer-to-consumer information sharing has always played an important part in the consumption decision process, the Internet has radically increased the reach of messages transmitted over these information exchanges from small networks of family, friends, and acquaintances to global networks of consumers.

Researchers have recognized that the Internet has a superb capacity to improve word of mouth communication ever since the inception of the World Wide Web. The existing body of academic research concerning the digital word of mouth domain has raised a set of important questions, including: how online reviews affect sales, what are the characteristics of reviews (including the role of biased, promotional, or manipulated reviews), who provides online reviews, and what are the reviewers' incentives to disseminate information.

Although examining how online reviews affect product sales is not an easy task because reviews might both affect product sales and be an indicator of product sales, this question has received a substantial amount of academic attention.

Chevalier and Mayzlin (2006) represent an early and important study examining how online word of mouth affects sales. Their study uses data from the book industry including information on online reviews and online sales to investigate how the number of reviews for a book title and the valence of these reviews (the star rating indicating whether the consumer had a positive or negative experience with the product – typically one to five stars) affect sales of the book title. Specifically, they collected publicly available data from the online book sellers Amazon and Barnes and Nobles during three time periods, and examined whether an increase in the number of reviews for a book title over time and within a seller, or an increase in the valence of these reviews, decreases the sales rank for the book within the platform (i.e.,

increased unit sales).[12] Their data show that a majority of online reviews are positive, and that an increase in the number of reviews and in the average rating for a book within a platform increases the sales for the title at that platform.

Other papers examining how online reviews affect consumer behavior include Godes and Mayzlin (2004), Liu (2006), Duan et al. (2008), and Chintagunta et al. (2010). Godes and Mayzlin (2004) study the effect of online word of mouth on TV ratings for television shows. They find that word of mouth has a greater effect on TV ratings when the online posts are more dispersed across online threads, conditional on the aggregate word of mouth volume. Liu (2006) combines weekly data for the movie industry including information on online word of mouth and box-office revenues by movie titles. He documents that audiences' expectations change following the theatrical release of movies, from high expectations before the movie release to more critical reviews after the release. In addition, he finds that the volume of online ratings has more power for explaining box-office revenues than does the valence of online ratings. Duan et al. (2008) examine the bidirectional interdependences between online reviews and box-office revenues for the movie industry by estimating a system of simultaneous equations. Similar to Liu (2006), Duan et al. (2008) find that the online ratings' volume influences revenues, while the online ratings' valence is merely an indicator of movie quality.

[12] Because their data does not include information on book sales they must rely on information on sales ranks. Chevalier and Goolsbee (2003) demonstrate how to translate sales ranks into sales quantities, showing that the relationship between the logarithm of sales ranks and the logarithm of sales rankings is approximately linear.

The findings in Liu (2006) and Duan et al. (2008) suggest that online reviews increase sales by increasing product awareness, which is consistent with the notion that "all publicity is good publicity."[13] Conversely, also focusing on the movie industry Chintagunta et al. (2010) find that movie online ratings' valence is more important in predicting box office revenues than online ratings' volume, which suggests that reviews persuade consumers to change their consumptions choices rather than increase product awareness. Chintagunta et al. (2010) use box-office data by movies disaggregated by geographic areas (Designated Market Areas), and argue that the use of data aggregated at the national level in conjunction with sequential releases of movies across geographic areas can bias estimates of the valence effect.[14]

Although online reviews can have heterogeneous impacts by product categories, the existing literature has not examined this factor in detail. An exception is Zhang and Zhu (2010) who focus on the video game industry, and show that online reviews have a greater effect on sales of less popular video games than on sales of more popular video games. Zhang and Zhu (2010) also find that online reviews have a greater impact on sales of video games that can be used to play both online and offline than on sales of video games that can be used to play offline exclusively. They argue that this latter finding suggests that online reviews have a greater effect on inducing purchases from more experienced Internet users.

[13] In a similar context, although not focusing on *online* reviews, Berger et al. (2010) argue that negative reviews can increase sales by increasing product awareness. Using data on book sales and book reviews at the *New York Times*, they show that for unknown or new authors even negative reviews increase book sales.

[14] For instance, if reviews for a movie become more critical following its release and the national level box office revenues for this movie concurrently increase due to the movie being released in new geographic areas, a regression of box-office revenues on negative reviews would find a spurious positive effect.

Other strands of research on online reviews focus on examining the anatomy of online reviews. On this topic, Li and Hitt (2008) develop an analytical model to examine how online reviews might provide biased information regarding product quality assessments when the early consumers writing the reviews have different preferences than the late consumers who use these reviews to make their purchase decisions. They test their model using data on sales and online reviews from the book industry, finding that early reviews are positively biased towards the product. Delarrocas et al. (2008) investigate whether consumers are more likely to post reviews for superstar versus niche movies. They find that the relationship between the propensity of posting online reviews and the amount of box-office revenues exhibits a U-shape (the propensity of posting online reviews decreases when box-office revenues increase for low levels of box-office revenues and the propensity of posting reviews increases when box-office revenues increase for high levels of box-office revenues). They argue that this review distribution shape may arise from a combination of two factors: an inclination for reviewing obscure products, and a tendency to join popular conversations.[15]

Relative to other topics in the literature on reviews, the examination of what motives drive individuals to engage in online word of mouth has received less academic attention. Among the papers that address this topic, Hennig-Thurau et al. (2004) use survey data and investigate eleven motives that might drive word of

[15] Focusing on offline communication, Anderson (1998) documented that extremely satisfied or dissatisfied consumers are more likely to share their experiences, which produces a U-shaped relationship between product satisfaction and the probability of engaging in word of mouth communication.

mouth.[16] Related to this topic, a few studies discuss how consumers and firms may be motivated to write promotional, dishonest, or fake reviews (e.g., Dellarocas 2003 and 2006). Mayzlin et al. (2014) study online reviews' manipulation in detail using data from the hotel industry. They examine differences in online reviews distributions in Expedia.com versus TripAdvisor.com, exploiting the fact that Expedia.com only allows reviews for a hotel from individuals who previously booked at least one night at the hotel through the platform, whereas TripAdvisor.com is open to reviews from anyone. They argue that hotels have incentives to promote themselves by writing reviews disguised as customers, and that because of this one expects to find more fake reviews on TripAdvisor.com since its openness lowers the cost of posting fake reviews. They control for the differences in the populations of individuals using Expedia.com and TripAdvisor.com by comparing hotels with and without geographic neighbor hotels (given that competition may increase the incentives to write fake reviews) and they also use hotel characteristic such as ownership and chain affiliation that are likely to affect the incentives to write fake reviews. They find that hotels with geographic neighbors have more negative reviews on TripAdvisor.com than in Expedia.com, consistent with the existence of negative review manipulation. They also find that hotels from small owner/management companies have more positive reviews on TripAdvisor.com than on Expedia.com consistent with the existence of positive review manipulation.

[16] These motives are: concern for other consumers, desire to help the company, social benefits received, exertion of power over companies, post purchase advice seeking, self-enhancement, economic rewards, convenience in seeking redress, hope that the platform operator will serve as a moderator, expression of positive emotions, and venting of negative feelings.

Because digital word of mouth and reading online reviews before purchasing products represent important drivers of online market behavior, we believe that more research is warranted on this topic. For instance, topics ranging from how dishonest reviews affect consumption choices, how new platform architectures can induce trust by inducing honest feedback and restricting dishonest feedback, and exactly how online reviews affect the sales of various product categories (e.g., commodity versus less commodity type products) are all topics that deserve further academic attention.

5 E-Commerce and Online Sales Taxes

Another important question that has received attention among researchers examining Internet markets is how online sales taxes affect online and offline trade patterns.

In the United States, under the current tax practices for Internet commerce, consumers have incentives to place their online orders from businesses located across state borders to save on sales taxes. These incentives derive from U.S. Supreme Court decisions predating the birth of Internet commerce, which assert that states cannot collect sales taxes for sales to state residents from sellers that have no physical operations within the state (referred to as nexus in legal parlance).[17] The online purchases from businesses with no physical presence within the state where the consumers reside are not tax-free. Rather consumers are legally responsible for

[17] Goolsbee (2000) references two US Supreme Court decisions as background for the current Internet commerce sales tax practices: National Bellas Hess, 386 U.S. 753 from 1967, and Quill, 504 U.S. 298 from 1992.

self reporting these transactions to their own states. However, and not surprisingly, consumer self-reporting noncompliance is commonplace.

Internet commerce today represents approximately 6% of the total retail commerce and this share is growing rapidly (U.S. Census Bureau 2014). Further, revenues from sales taxes represent a major source of income for the state and local governments, amounting to an average of 34% of the total state and local government revenues in 2010.[18] To the extent that sales taxes are not collected for transactions made in online markets, the combination of online transactions representing a considerable and growing share of the total retail commerce, and sales tax revenue representing one of the main sources of income for state and local governments can imply a substantial amount of forgone tax revenues for subnational governments.

Goolsbee (2000) conducted an early empirically study of how sales taxes affect Internet trade flows. His study examines a cross-section survey of individual-level data (from Forrester Research Inc.), finding that, consistent with theory, individuals who live in places with high sales tax rates are more likely to buy goods online than are individuals who live in places with low sales tax rates. He also shows that the greater probability of buying goods online in locations with high sales tax rates cannot be explained by either individual-level or locality-level characteristics. Moreover, the probability of buying online in places with high sales tax rates is greatest for the types of products that are more likely to save the consumer from paying sales tax; for example, cross-state tax rates differences do not explain

[18] http://taxfoundation.org/article/sources-state-and-local-tax-revenues

purchase probability differences for goods that are exempt from sales taxes. Regarding the size of the purchasing sensitivity to sales taxes, Goolsbee (2000) finds that Internet purchases are quite sensitive to taxes: 24% of the online buyers would not have made their online purchases if they had to pay the existing sales tax rates. He argues that this estimate translates into a price elasticity of 3.5, a magnitude that resembles the high elasticities (as high as 6) found in research on tax responses in border geographical locations predating the introduction of the Internet.[19]

Because the own-price elasticity of demand is one of the necessary ingredients for determining the size of the Harberger's triangle measuring the deadweight loss from the imposition of a tax (Harberger 1964), information regarding the price elasticity of demand for Internet commerce is important for tax policy design. From an economic welfare perspective the imposition of taxes on markets with high demand elasticity creates larger inefficiencies than the imposition of taxes on markets with low demand elasticity. Specifically, Ramsey's optimal taxation rule prescribes setting tax rates across markets in proportion to the inverse of the elasticity of demand of each market (Ramsey 1927).

Given its importance for policy design, it is not surprising that several researchers followed Goolsbee (2000) in attempting to estimate how elastic online purchases are to online sales taxes. Some papers seeking to estimate the sensitivity of online purchases to online sales taxes employed individual-level data from the Current Population Survey from the U.S. Census and the Bureau of Labor Statistics

[19] See Goolsbee (2000) for references regarding how physical transactions respond to sales tax differences in border geographical locations.

(e.g., Alm and Melnik 2005; Ballard and Lee 2007; and Scanlan 2007). Alm and Melnik (2005) and Ballard and Lee (2007) find that online purchases are sensitive to sales taxes, but in terms of magnitude their estimates for the price elasticity of demand are substantially lower than those in Goolsbee (2000) — they find elasticities ranging from 0.2 through 1. Scanlan (2007) finds no sensitivity of online purchases to sales taxes, except in areas with very high sales tax rates.

In a comprehensive study in this literature, Einav et al. (2014) use a large dataset from eBay containing information on trillions of interactions events, millions of buyers, and a large number of both sellers and product categories. They conduct two complementary analyses: one at the item level using browsing data, and a second which aggregates the data by county and by state-to-state trade flows. In their analysis at the item level they exploit the fact that consumers on the eBay platform only find out the location of the seller and the associated sales tax rate after revealing interest in a specific item by clicking on the item's page. These consumers are therefore surprised by a tax rate after clicking on an item's page, and Einav et al. (2014) examine browsing data to study how these tax surprises affect consumers' subsequent choices. They find that the probability of buying the item decreases by 2% for every percentage point increase in the surprise sales tax rate. They further examine to what extent the likelihood of proceeding with the purchase varies across various product categories, finding greater elasticities for more commodity-type products. This result is as expected since it is easier to find an alternative seller for these products.

A second analysis in Einav et al. (2014) uses aggregated data and achieves identification from both cross-section variation in local tax rates and changes over time in local tax rates within localities. Using this empirical strategy they find an overall elasticity of online purchasing to sales taxes of 1.8. This estimate for the size of the price elasticity is smaller than that found in Goolsbee (2000), but substantially larger than the elasticity estimates found in the studies referenced above using data from the Current Population Survey. Einav et al. (2014) acknowledge that their estimate of the elasticity of demand appear low considering the competitive nature of their focal marketplace. They argue that the low elasticity might be explained by the lower saliency of taxes relative to retail prices, causing the price elasticity of demand to differ from tax elasticity of demand, a point also made by other researchers (e.g., Ellison and Ellison 2009).

Several papers in this literature examine the sensitivity of online purchases to sales taxes by focusing on markets for a single product. For example, Smith and Brynjolfson (2001) focus on the market for books, Ellison and Ellison (2009) focus on the market for computer memory modules, Anderson et al. (2010) focus on the market for clothing, and Goolsbee et al. (2010) focus on the market for cigarettes. Smith and Brynjolfson (2001), Ellison and Ellison (2009), and Anderson et al. (2010) all find that online purchases are highly sensitive to sales taxes. Goolsbee et al. (2010) find that the rise in Internet use has increased consumer sensitivity to sales taxes. Interestingly, the results in Smith and Brynjolfson (2001) suggest that the online purchase sensitivity to increases in the listed pre-tax price is lower than the sensitivity to increases in the sales tax, when both increases cause identical increases

in the gross of tax price. Conversely, regarding consumer sensitivity to increases in listed pre-tax prices versus increases in sales tax, Ellison and Ellison (2009) find that online purchases are more sensitive to increases in pre-tax prices than to increases in sales taxes.

In spite of the existence of several studies examining how online sales taxes affect e-commerce, we believe there are several important research opportunities to contribute to this literature. For instance, we are aware of only two studies — Goolsbee et al. (2010) and Anderson et al. (2010) — that examine how local tax rates influence sellers' decisions about where to locate stores.[20] Goolsbee et al. (2010) document that "the number of Internet cigarette merchants located on Native American reservations (where state excise taxes levied on wholesalers often do not apply) and in states with low cigarette taxes have dramatically increased." Similarly, Anderson et al. (2010) use a panel of multi-channel firms and show that firms are reluctant to open their first store in a high tax rate location.[21]

In addition to this question, we believe there are important opportunities to examine how distance interacts with online taxes in reshaping interstate trade flows. Ellison and Ellison (2009) and Einav et al. (2014) find that the distance between the seller's and buyer's locations is an important determinant of the state-to-state trade flows. It would be useful to examine the interaction between taxes and distance in reshaping these trade flows (Hortacsu et al. 2009 briefly examines this topic). Among

[20] Entry games and location decisions of brick-and-mortar retailers are discussed in detail in Chapter 10 of this Handbook, by Aguirregabiria and Suzuki.

[21] Opening a first store produces a change in the tax treatment under current tax practices; sellers must begin collecting taxes following the opening of a first store.

other things, this information would be useful for coordinating tax policies across subnational governments. Since the distance between the location of the buyer and the seller should be less relevant for goods that can be digitally downloaded from the Internet (e.g., music or movie downloads), combining sales of physical goods and digital downloads could help in the identification of these interaction effects.[22]

6 Other Internet Effects

In this chapter we have discussed several important research topics relating to the Internet's impact on retail markets: the increasing importance of online markets and piracy for digital information goods, the impact of Internet markets on the consumption of "superstar" and "long tail" products, the role of digital word-of-mouth online, and the impact of sales tax policies on Internet consumer behavior.

This is, of course, not an exhaustive list of research topics relating to the Internet and retail markets, and we conclude our chapter by listing some of the unaddressed topics. First, we note that the Internet has had a significant impact on consumers' search processes and on price dispersion, and refer interested readers to Chapter 13 in this Handbook, by Ellison, which discusses these important research issues. The Internet has also had a significant impact on advertising (see Goldfarb 2014 for a review of this literature), allowing for more customer targeting (e.g., Lambrecht and Tucker 2013) and raising issues associated with measuring the

[22] This literature has typically assumed that tax policies are exogenous, although subnational governments might design and change these tax policies based on their expected effects on online and offline trade flows.

effectiveness of online advertisements (e.g., Lewis and Rao 2014), cross channel advertising synergies (e.g., Lewis and Nguyen 2014), and optimizing ad placement (e.g., Yang and Ghose 2010, Agarwal at al. 2011); some of these issues are discussed by Hwang in the next Chapter of this Handbook. Online social media is also changing advertising and information discovery in retail markets, and has opened a wide research agenda on issues related to measuring contagion and leadership in networks (e.g., Aral and Walker 2012); see also Tadelis's review of auctions and networks in Chapter 22 of this Handbook. The introduction of mobile Internet-connected devices brought about an additional set of research topics, such as mobile customer targeting (e.g., Luo et al. 2014) and location-based product search (e.g., Ghose et al. 2011). Finally, the Internet has increased the availability of consumer purchase and browsing information, raising a variety of privacy issues including unwanted tracking and behavioral targeting that could represent an invasion of privacy (e.g., Mcdonald and Cranor 2010, Goldfarb and Tucker 2011), or facilitate discrimination (e.g., Acquisti and Varian 2005, Acquisti and Fong 2013) and identify theft (e.g., Solove 2003).

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