The rise of behavioural discrimination
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Introduction

The ongoing developments in e-commerce, big data and big analytics have transformed our online environment and the way we shop for goods and services. By increasing transparency, access to markets, and by reducing market barriers and our search costs, technological developments promise to lower the prices we pay, increase the selection of goods and services we are offered, and yield greater innovation. Indeed, we all expect to be better off in comparison to past decades when competition was less intense and largely confined to local offering by brick-and-mortar shops.

And yet, is it possible that the initial promise of online competitiveness may give way to new dynamics that reduce our welfare? Are we still the winners in this story of innovation, or have we become targets of a new form of discrimination that increasingly extracts our wealth?

In the online world, our anonymity and ability to identify a single competitive price are becoming a thing of the past. Virtual competition heralds the age of personalisation with its benefits and possible pitfalls. As a White House report summarised

"[s]ellers are now using big data and digital technology to explore consumer demand, to steer consumers towards particular products, to create targeted advertising and marketing offers, and in a more limited and experimental fashion, to set personalised prices." ¹

Our article explores how e-commerce and the personalisation of our online environment can give rise to **behavioural discrimination**, a durable, more pernicious form of price discrimination. Online behavioural discrimination, as we explore, will likely differ from the price discrimination we have seen in the brick-and-mortar retail world in several important respects: First is the shift from third-degree, imperfect price discrimination to near perfect price discrimination; second is the overall increase in consumption as the demand curve shifts to the right; and third is the durability of behavioural discrimination.

In Part I we consider the online shift from imperfect price discrimination to near perfect, or first-degree, price discrimination. We explore how online sellers, in tracking us, collecting data about us, and segmenting us into smaller groups can better identify our reservation price.
Part II explores how sellers can use Big Data to target us with the right emotional pitch to increase overall consumption. Part III discusses how, as more online retailers personalise pricing and product offerings, it will be harder for consumers to discover a general market price and to assess their outside options. Personalisation and data-driven network effects can make behavioural discrimination more durable.

Given the differences between price discrimination of yesteryear and online behavioural discrimination, Part IV examines whether we should treat the latter with the same indifference that we have treated price discrimination, or does it merit a fresh look?

I. Near-perfect price discrimination

We are already familiar with third-degree price discrimination, which involves the charging of different prices to different groups. The price can depend, among other things, on your location (i.e. where you live), your age, or your sex. Cinemas, bus services, and restaurants, for example, may charge adults higher prices than children, students or senior citizens. By contrast, in this article, our focus is on the possible shift to perfect, or first-degree, price discrimination—where firms can identify and charge for each individual the most he or she is willing to pay, i.e. the reservation price.

While perfect price discrimination is rarely feasible in the real world, near perfect price discrimination may be within reach in our online environment. As this Part illustrates, under certain conditions, online platforms and sellers may employ sophisticated strategies to approximate our reservation price. The march to "near perfect" behavioural discrimination will involve segregating you in countless ways and placing you, at a given moment, in ever-smaller groupings of consumers. Self-learning pricing algorithms, while not identifying your reservation price, refine the cruder divisions (such as senior citizens and students) to a more detailed, segmented reality, where people are matched to groups which, because of dispositional and situation factors, have similar price sensitivity and purchase behaviour.

How is this possible? As we discuss in our book, Virtual Competition, this is where Big Data, learning by doing, and the scale of experiments come into play to better approximate your reservation price. As the volume, variety, and value of personal data increases, self-learning *486 pricing algorithms can use the data collected on you and other people to identify subgroups of like-minded, like-price-sensitive individuals, who share common biases and levels of willpower. Pricing algorithms can use data on how other people within your grouping react, to predict how you will likely react under similar circumstances. This then enables the self-learning algorithm to more accurately approximate the user’s reservation price, observe behaviour, and adjust.

The more time we spend online—chatting, surfing, and purchasing—the more times the algorithm can observe what you and others within your grouping do under various circumstances; the more experiments it can run; the more it can learn through trial and error what your group’s reservation price is under different situations; and, the more it can recalibrate and refine (including shifting you to another group).

To better train their algorithms and categorize even smaller groups of individuals, firms will need personal data. Among other things, this trend will accelerate the "Internet of Things", as firms compete to collect data on consumers’ activities at home, work, and outside. Smart appliances, cars, utensils, and watches can help firms refine their consumer profiles and gain a competitive edge.

Thus in making use of our demographics, physical location (via our phones), browser and search history, friends and links on social networks, and online reviews and blog posts, firms can target us with personalised
advertisements with ever increasing proficiency. Also, at the point of sale, the categorisation can help sellers approximate our price sensitivity. Such discriminatory approach may result in some groups being offered different (“high” or “low” end) products and services at different prices. Importantly, by controlling the interface and obtaining information about one’s price sensitivity, online sellers may adjust their pricing based on the users’ likely knowledge of outside options. In other words, differential pricing, when achievable, will be displayed. In contrast, when customers are more sensitive to outside options and perceive discriminatory pricing as unfair, the seller can employ vouchers, promotion codes, coupons and other means to prompt the sale. In this data-driven economy, the algorithm—to maximise profitability—will estimate the likelihood of our shopping elsewhere or being aware of better deals and accordingly provide us with a convincing sales pitch.

II. Shifting the demand curve to the right

Besides approaching near perfect price discrimination, online behavioural discrimination has a second distinct feature, namely sellers using our personal data to induce us to buy more products or services than we otherwise would have purchased. One popular internet quote is “[w]e buy things we don’t need with money we don’t have to impress people we don’t like.” To increase demand for their products and services, companies will likely appeal to our emotional wants.

The field of behavioural economics, as one of its pioneers, Amos Tversky, noted, has quantified what every good advertiser and car salesman already knew: most of us are not rational, self-interested individuals with willpower. We have cognitive biases—which refer to our tendency to react, think, or operate in a certain way—which diverge from assumed rationality. Biases can be observed. Businesses and governments can trigger consumers’ biases to achieve certain goals. As Robert Cialdini noted, factors such as relative pricing, reciprocity, and the illusion of scarcity play a powerful role in the persuasion game.

In 2015, while we were discussing with competition agencies the likelihood of behavioural discrimination, one competition authority official observed that the behavioural economics literature identifies over 100 human biases linked to decision making, information processing, memory, and social interaction. He noted that it would be only reasonable to expect companies to identify a number of biases to better discriminate online.

To illustrate this possibility, we explore a few consumer biases, which firms may exploit to promote consumption:

Use of decoys — We rarely choose goods and services in absolute terms. Instead, we often base our choices on the product’s relative advantage or disadvantage to other things. How firms position their products can influence our purchase decision. By adding an expensive (albeit inferior) choice, for example, the marketer can encourage consumers to opt for a more expensive second choice. Companies already use these tactics in brick-and-mortar shops. Going forward, online sellers, with the vast information at their disposal, can experiment in personalising the use of decoy products to nudge different groups of consumers to purchase higher-margin products. So we may have originally intended to purchase a cheaper item, but chose a more expensive item with perhaps a few more attributes, as it was relatively more attractive than the personalised decoy option.
Price steering — Firms can nudge consumers closer to their reservation price by the way they present options online. As the UK’s competition authority noted:

"[f]irms may do this by restricting the products that are displayed to consumers or by varying the order in which products are listed on their website to display relatively poorer or better quality products first depending on the information they collect about consumers. This raises the possibility of some consumers being exploited with low quality products that are sold at the same price as higher quality products."

For example, for consumers with higher reservation prices, the online seller would likely present first the premium, more expensive brands. One older example was the travel website Orbitz, which steered Mac OS X users toward "more expensive hotels in select locations by placing them at higher ranks in search results." One 2014 study found additional evidence of price steering and price discrimination by other popular e-commerce sites. With price steering in mind, one wonders what determines the classification of our search results and the way they are often displayed by "order of relevance".

Increasing complexity — To better discriminate, companies can take advantage of consumers’ difficulty in processing many complex options. Companies may deliberately increase the complexity by adding price and quality parameters, with the intent to facilitate consumer error or bias and manipulate consumer demand to their advantage. By increasing their products’ complexity, firms can also make it difficult to appraise quality and compare products, increase the consumers’ search and evaluation costs, and nudge consumers to rely on basic signalling that benefits the firms. Once the customer is snagged, the complexity in contract terms can increase the customers’ switching costs and increase the likelihood of customers retaining the personalised default option. This enables firms to inch closer to perfect behavioural discrimination. Here, the customer may initially welcome the personalised product or service. Its many features are seemingly tailored to the user’s unique tastes. Ultimately, however, companies can, by designing the number and types of options they offer, better exploit consumers’ cognitive overload. In increasing complexity, the firms can also increase consumers’ search and switching costs, thereby reducing the visibility (and attraction) of outside options, and giving them more latitude to exploit consumers.

Imperfect Willpower — Consumers with limited patience will often pay a higher price. People could save money by waiting until a movie appeared in a second-run theatre, or for the fiction hardcover to appear in paperback. Thus, the more the online site can encourage impulse purchases (such as "scarcity marketing" that promotes the dwindling stockpile of items and the many buyers looking at the item), the less likely the consumer will comparison-shop and become aware of outside options. Likewise, online retailers may shroud their behavioural discrimination by offering discounts to consumers with greater willpower.

Thus firms can exploit our imperfect willpower and bounded rationality to increase consumption. They can also use "framing effects" to discriminate without triggering resentment from customers. The behavioural economics literature suggests that "framing effects" (how the issue is worded or framed) do matter. Credit cards are one example. Moreover, consumers’ incentive to search for the outside option will vary, depending on whether prices increase versus a discount being eliminated. Consumers typically base a deal’s "value" on the deviation from an established reference point (for example, a sale of 20 per cent off the regular price). Many consumers may be less concerned when the steady discounts are eliminated (such as the 20 per cent discount) than when list prices increase (although both have the same net effect). Deviations from the perceived reference point are marked by asymmetric price elasticity: consumers are angrier about,
and more sensitive to, price increases than to the elimination of a discount or the maintenance of prices during periods of deflation. 27

When discriminating, online companies may not impose a surcharge on those willing to pay more. Instead, they likely will start with a higher list price, and then selectively vary the level or size of discounts. The road to near-perfect behavioural discrimination will be paved with personalised coupons and promotions: the less price-sensitive online customers may not care as much if others are getting promotional codes, coupons, and so on, as long as the list price does not increase. Online sellers will increasingly offer consumers with a lower reservation price a timely coupon—ostensibly for being a valued customer, a new customer, a returning customer, or a customer who won the discount. The coupon may appear randomly assigned, but only customers with a lower reservation price are targeted. Indeed, the price discrimination can happen on other, less salient aspects of the purchase. Retailers can offer the same price, but provide greater discounts on shipping (or faster delivery), offer complimentary customer service, or better warranty terms to attract customers with lower reservation prices, greater willpower, or more outside options.

Another way to frame behavioural discrimination in a palatable manner is to ascribe the pricing deviations to shifting market forces. Few people pay the same price for corporate stock. They accept that the pricing differences are responsive to market changes in supply and demand (dynamic pricing) rather than price discrimination (differential pricing). So once consumers accept that prices change rapidly (such as airfare, hotels, etc.), they have lower expectations of price uniformity among competitors. One hotel may be charging a higher price because of its supply of rooms (rather than discriminating against that particular user). When your friend asks about the same room, the different price could reflect an interim change in supply or demand. Rarely will you and others simultaneously search on the same website for the same room and communicate your findings. Thus, we may not know when pricing is dynamic, discriminatory, or both.

III. The durability of behavioural discrimination

The ability to better discriminate may sound counter-intuitive when considering the abundance of information and options available online. How could a seller sustain behavioural discrimination when competition is only a click away? Indeed, the conventional belief is that in a structurally competitive market, persistent price discrimination is unlikely and cannot persist. This is "because other sellers of the same product have an incentive to sell the product at a competitive rate to the victims of price discrimination." 28 Therefore, if price discrimination persists, that suggests either collusion 29 or "significant monopoly power." 30

Behavioural discrimination—while not always possible—could occur more often than we expect. Furthermore, as we shift more of our activities to a controlled online ecosystem, it is likely to intensify.

Some customers, for example, are known as "sleepers," who "out of indolence or ignorance don’t shop around but instead are loyal to whichever seller they’ve been accustomed to buy from." 31 Even for more alert customers, firms can seek to reduce their incentive and ability to search for outside options. By highlighting scarcity—for example signalling only one room left at the "discounted" price which eight other people are also viewing—the seller can pressure customers to take advantage of this special offer.

Moreover, as more online retailers engage in dynamic, differential pricing, it will be harder for consumers to discover a general market price and to assess their outside options. Under the new competitive paradigm, the online experience will differ, as firms personalise how, and in what order, they present the products. The
selling platform—to reduce price transparency and increase customers’ search costs—might differentiate its products and services, perhaps through customisation. When products and services are customised to individual tastes, there is no longer a common benchmark and it can become harder for customers (and competitors) to compare products and prices. The offerings on the web page may also be tailored depending on your zip code, household wealth, gender, and age. So it will be harder to know what others see. At most, you might know what other people of similar age in your zip code see if they have similar professions and educational background, visited the same websites and have similar purchase histories.

As personalised offerings increase, search costs will also increase for consumers seeking to identify the "true" market price. The customisation and disappearance of a competitive benchmark could also make it harder for potential entrants to assess what price they should charge to convert sufficient customers for their entry to be profitable.

Moreover unlike price discrimination in a brick-and-mortar retail economy, behavioural discrimination can persist much longer even in markets that are seemingly competitive. The key to the sustainability of online behavioural discrimination is the presence of data-driven network effects. One data-driven network effect is linked to the scale achieved by trial and error, or learning by doing. Another data-driven network effect involves the scope of data on the user. As we saw in Part I, both data-driven network effects can enable sellers to optimize their pricing algorithms’ ability to discriminate. Every actual or potential consumer transaction gives the company an opportunity to study consumer behaviour, awareness to outside options, and adjust both the weight attributed to each variable and the categorization of users. The more time you spend online, the more data the firm has and the more opportunities the algorithms can "learn" from the data, the better the algorithm can more accurately segment customers into subgroups to optimise pricing and profits.

Ultimately, the significant profits from behavioural discrimination will likely entice firms with more users, more personal data, and better algorithms to discriminate. In engaging in behavioural discrimination, firms can benefit several ways: first, in improving their self-learning algorithms; second, in capturing greater value from the data (either directly or indirectly through advertising-related services or behavioural discrimination); and third, in using the profits from the discrimination to expand their online shopping platform, thereby attracting more users, more personal data, and more opportunities to experiment how to get us to buy more things at higher prices.

Of course, as we noted earlier, the power to engage in behavioural discrimination may at times be limited. It will depend on, among other things, the competitors’ incentives, including their data advantage over rivals, ability to harvest and process data, economies of scale, and network effects. The power to discriminate may be curtailed by possible pushback from consumers, including the attractiveness of outside options, their frequency in multi-homing, ability to arbitrage, and perceptions of discrimination’s unfairness. A market may emerge in which countermeasures develop for individuals to outsmart price algorithms and trigger discounts or lower prices by migrating between groups or thwarting their segmentation. But as we explore in Virtual Competition, price comparison websites may foster, rather than foil, behavioural discrimination and switching costs may be higher than one assumes, despite perceived competition being only a click away.

IV. The welfare effects of behavioural discrimination
So what is behavioural discrimination’s net effect on welfare? Behavioural discrimination amplifies many of the welfare effects associated with price discrimination. By increasing output it could increase access, choice and efficiencies, thereby increasing overall welfare. To illustrate, think about your desire to visit your local dentist. Consumers may underappreciate a product or service or simply procrastinate. Behavioural discrimination can encourage people to regularly visit a dentist, use dental floss, and brush their teeth. In doing so, it increases the individual’s and society’s welfare. One can think of other examples, where an increase in demand, even through manipulation, can benefit us.

More often, however, behavioural discrimination would likely reduce overall welfare. In gathering information about our behaviour, desires, and ability to pay, sellers can manipulate our environment to increase overall consumption, without necessarily increasing our welfare. Cigarette manufacturers, for example, exploited biases and imperfect willpower by getting people otherwise uninterested in smoking addicted. Behavioural discrimination could further increase cigarette sales. From a social welfare perspective, the increase in output is bad for smokers, their families, those harmed by the second-hand smoke, and anyone who bears the health and other costs caused by smoking.

Behavioural discrimination also raises concerns over wealth inequality. Decoy pricing may make supra-competitive priced goods appear more reasonable, or entice consumers to make purchases they otherwise would not make. This decreases the disposable income for things that would increase well-being, such as retirement, savings, donations to charities, or basic necessities. This effect is proportionately greater on those with lower incomes.*

Further, from a neoclassical economic perspective, behavioural discrimination’s overall efficiencies are likely doubtful. Economists Leeson and Sobel doubted the presence of efficiencies in price discrimination, when the costs of implementing it are taken into account. The costs in implementing behavioural discrimination generally should be significantly greater. To target one’s biases to trigger consumption, the seller must invest in tracking consumers; collecting data on their behaviour; segmenting them into groups; identifying their demand elasticities; reducing market transparency; increasing consumers’ search costs; preventing arbitrage; limiting the growth of anti-tracking technology; creating lengthy, tedious privacy statements; setting the individuals’ privacy defaults as opt-in; and lobbying against greater privacy protections. So behavioural discrimination is more likely to accompany commercial activities, where the expected profits exceed the costs. When sales increase, customers will ultimately pay for these costs. So even from a neoclassical economic perspective, behavioural discrimination would have to deliver significant benefits to actually increase total welfare. Once one accounts the consumer perspective, the social welfare perspective, and the limited likelihood of total welfare increasing, behavioural discrimination is likely a toxic combination.

Moreover, behavioural discrimination may blur into actual discrimination due to the limits and costs of refined aggregation. Pricing algorithms won’t be able in the near future to identify each customer’s reservation price across every possible situation. Instead, consumers will be lumped into groups. If you live in a certain neighbourhood, are of a certain age, went to a certain university, or are a member of a particular religion, then the pricing algorithm may place you in a particular category. The seller’s algorithm estimates that certain groups are more likely to buy the product and are less sensitive to its price than other groups. Thus, the road to perfect behavioural discrimination increases the risk that computer algorithms may categorise consumers on an unalterable trait, such as one’s skin colour.

Data brokers, as the FTC reported in 2014, are already categorising and segmenting consumers. ”While some of these segments seem innocuous,” noted the FTC, ”others rely on characteristics, such as ethnicity,
income level, and education level, which seem more sensitive and may be disconcerting." Some segments, for example,

"primarily focus on minority communities with lower incomes, such as ‘Urban Scramble’ and ‘Mobile Mixers,’ both of which include a high concentration of Latino and African-American consumers with low incomes."  

Other potentially sensitive categories

"highlight a consumer’s age such as ‘Rural Everlasting,’ which includes single men and women over the age of 66 with ‘low educational attainment and low net worths,’ while ‘Married Sophistiques’ includes thirty-something couples in the ‘upper-middle class … with no children.’"  

Businesses in the US and the EU cannot use one’s race, colour, religion, or certain other categories to make credit, insurance, or employment decisions. But the risk is that firms’ algorithms automatically develop and refine categories in which people of certain race, marital status, age, sexual orientation, or religion are lumped together.

The worrying thing is that we (and the enforcers) may not even know that we are being discriminated against. Under the old competitive paradigm, one might suspect one was discriminated against if access was inexplicably denied (e.g. restaurants for "whites only") or was charged a higher price based on this single variable. Under the new paradigm, users may not detect the small but statistically significant change in targeted advertisements (or advertised rates).

**Conclusion**

In 2015, we asked lawyers, judges, and economists about their approach to price and behavioural discrimination. We raised these issues to different groups as part of training sessions on competition law. Competition lawyers and economists dominated some groups; in others the participants had limited economic or competition law background. We asked each group for their reaction if they discovered that another online customer had purchased the same goods for a lower price through intended price discrimination.

Those without an economic background felt it was unfair, so much so that they would stop, if possible, using the seller in question. Interestingly, by contrast to the average customer viewpoint, those with an economic background were less susceptible to feelings of unfairness. They felt that this may be acceptable when one wishes to facilitate access for lower-income consumers, create positive externalities, and increase and optimise production. When faced with questions about behavioural discrimination, participants were more united in their approach. Some felt manipulated, others exposed. Many doubted the ease with which their actions may be affected by simple "tricks of the trade."

The more people shop on the online platform for different items, the more data that the firm quickly collects on them; the better it can segment them; the more opportunities it has to observe individual behaviour; the more its algorithm can learn when it predicts accurately; and the more the algorithm can refine and retest when its predict wrongly.

In such environment the platforms have increasing opportunities to engage in behavioural discrimination. As noted earlier, that power is not unlimited, but is more sustainable than one might initially predict.
Further, due to increased market power, through data-driven network effects, and ability to limit outside options and exclude competition, the market will not likely self-correct. As companies’ data collection and analytics improve, so too will their ability to discriminate. Targeted pricing may, in particular, be sustainable where a market is stable and with barriers to entry or expansion, limited outside options, heterogeneous or branded goods, imperfect information flows, or ability to distort or inhibit information exchange. It may also be sustained in markets that attract loyal customers or where companies develop and customise distinguishable products for particular purchasers.49

Even if companies can discriminate, not every firm will, at least initially. Behavioural discrimination—given its manipulation of emotions and willpower, invasion of privacy, and undoing of a fair competitive price, which everyone pays—will likely be criticised. Customer outrage is likely to limit some platforms’ incentive to discriminate. But we already saw how many forms of discrimination, involving different pricing on mobile platforms and PCs, personalised search results, personalised coupons, and price steering,50 are already appearing in the online marketplace.

The informational asymmetries favour the leading online platforms. We cannot easily distinguish a discriminatory price from a dynamic price. We also may underestimate the amount of data being collected on us, the extent to which we are being monitored, and the extent to which we are buying things we otherwise wouldn’t have, at prices higher than what others are paying.

A trend therefore may emerge. Amazon is already eliminating list prices for many products.51 Soon, as with airlines and hotels, pricing will be dynamic—as the price offered yesterday or this morning may differ from that offered today or tomorrow. With coupons added to the mix, a competitive "benchmark" price will disappear. As pricing norms change, price and behavioural discrimination eventually may be accepted as the new normal. Just as we have accepted (or become resigned to) the quality degradation of air travel, and the rise of airline fees—from luggage to printing boarding passes—our future norms may well include online segmentation and price discrimination.

The costs can be significant. The new paradigm of behavioural discrimination affects not only our pocketbook but our social environment, trust in firms and the marketplace, personal autonomy, privacy and well-being.52 The current antitrust tools may be limited in effectively deterring behavioural discrimination. In addition, the enforcers may find intervention in these instances to be overly challenging. Some enforcers may perceive the dynamics we describe as innovative and competitive. Some may fear that intervention could unintentionally chill competition and innovation. Some might refer the issue to the privacy and consumer protection agencies. Others might simply wait for the market to develop counter-measures. But given the asymmetries in information and power between the data collectors and us, countermeasures will unlikely stop the march toward near-perfect behavioural discrimination.

So as our closets become fuller and our savings account leaner, we may realise the end of competition as we knew it, and the fading promise of the emerging, virtual competition.

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Footnotes
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In one study, a hundred MIT students were offered three subscription choices for The Economist magazine: (1) Internet-only subscriptions for $59 (16 students chose this option); (2) print-only subscriptions for $125 (no students); and (3) print-and-internet subscriptions for $125 (84 students). When the "decoy" second choice (print-only subscriptions) was removed and only the first and third options were presented, the students did not react similarly. Instead, 68 students opted for an internet-only subscription for $59 (up from 16 students) and only 32 students chose print-and-internet subscriptions for $125 (down from 84 students).


As the consulting firm McKinsey & Company reported, "many restaurants find that the second-most-expensive bottle of wine is very popular—and so is the second-cheapest. Customers who buy the former feel they are getting something special but not going over the top. Those who buy the latter feel they are getting a bargain but not being cheap."


One study sought to determine whether the introduction of a decoy software option can increase demand for the real option by exploiting consumers’ relative assessments of prices. Anshu Jalora, "Applying Consumer Psychology to Software Pricing" in Andreas Hinterhuber and Stephan Liozu (eds), Innovation in Pricing: Contemporary Theories and Best Practices (London: Routledge, 2013), pp.396–399. The study used Microsoft’s portfolio of Windows 7, which included a Windows 7 Professional bundled with a 4-GB pen drive and a decoy Windows 7 Professional option priced the same as the bundle. It found that the presence of the decoy makes the bundle option "a lucrative one and has the potential of increasing overall revenues by 15 per cent", p.397.

Executive Office of the President, Big Data and Differential Pricing (2015), p.11 (explaining "[s]teering is the practice of showing different products to customers in different demographic groups. In the online environment, steering occurs when a web site alters its search results based on information about a potential customer.").


The study examined 16 popular e-commerce sites involving general retailers and hotel and rental car booking sites, and found evidence of price steering and price discrimination on four general retailers’ websites and five travel sites. For example, the travel website Expedia was assigning users to one of three buckets, and steering users in some buckets toward more expensive hotels. Hannak et al., ss.4.2–4.5. Travelocity offered different hotel search results depending on whether users were browsing on their iPhone or iPad or browsing from "Chrome on Android, Safari on OS X, or other desktop browsers." Hannak et al., s.5.2. Travelocity gave people using their iPhones and iPads better prices on some hotels. In contrast, Home Depot was steering users on mobile browsers toward more expensive products.

Executive Office of the President, Big Data and Differential Pricing (2015), p.6 giving other examples of how firms may use complex or opaque pricing schemes to screen out less sophisticated buyers: "companies may obfuscate by bundling a low product price with costly warranties or shipping fees, using "bait and switch" techniques to attract unwary customers with low advertised prices and then upselling them on different merchandise, or burying important details in the small print of complex contracts. When these tactics work, the economic intuition that differential pricing allows firms to serve more price-sensitive customers at a lower price-point may even be overturned. If price-sensitive customers also tend to be less experienced, or less knowledgeable about potential pitfalls, they might more readily accept offers that appear fine on the surface but are actually full of hidden charges.
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Adi Ayal, "Harmful Freedom of Choice: Lessons from the Cellphone Market" (2011) 74 Law and Contemporary Problems 91, 118; "Contractual complexity thus acts to raise switching costs, which allows for raising prices to existing customers while hiding the existence of discrimination among customers paying different prices for similar consumption."

Eugenio J. Miravete, "The Doubtful Profitability of Foggy Pricing 2–3" NET Institute Working Paper No.04-07 (2004), http://ssrn.com/abstract=618465 [Accessed 3 October 2016] (finding that, as competition in US telecommunication markets increased, telecommunication providers offered more complicated, bad-value price plans); Ayal, "Harmful Freedom of Choice: Lessons from the Cellphone Market" (2011) 74 Law and Contemporary Problems 91, 121, 124; Chris M. Wilson and Catherine Waddams Price, "Do Consumers Switch to the Best Supplier?" (2011) 62 Oxford Economic Papers 98 (finding that a greater variety of price plans in UK electricity markets led more consumers to choose suboptimally, harming their welfare). Consumers may find it difficult to accurately compare the true cost of a deal by one energy provider with that of another. Indeed, the CMA in the UK noted that the fundamental characteristics of energy consumption presented two barriers to consumers’ engagement with the retail energy market: (1) the absence of a quality measurement for the differentiation of energy, which "may fundamentally reduce consumers' enthusiasm for, and interest in, engaging in the domestic retail energy markets, leading to customer inertia";
and (2) the fact that the information contained in conventional meters is not immediately accessible. Customers or the supplier generally read conventional meters infrequently, which "adds considerably to the complexity and opacity of gas and electricity bills." *Competition and Markets Authority, Energy Market Investigation: Summary of Provisional Findings Report (7 July 2015)*, para.123, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/442500/EMI_PFs_Summary.pdf [Accessed 3 October 2016]. More generally, the CMA found barriers to engagement resulted from: (i) "lack of access to the internet (or a lack of confidence in using the internet)", para.124; (ii) "customers on low income and with low levels of education" being less likely to use price comparison websites, para.125; and (iii) "the perception of the complexity and burden of the process" of searching for an alternative supplier limits successfully switching, para.126.


23 Baymard Institute, a retailers' internet research firm, found that 68% of online shopping carts are abandoned after initial click-throughs. Consumers who abandon an online transaction may be rewarded. Indeed, it is not uncommon, when purchasing online, that a second visit to a site, following incomplete purchase, would result in a pop-up screen with a discount code. Such practices reflect the assumption that a customer who delayed purchase may be less eager, more price sensitive, or considering other purchase options. Coupon site Rather-be-shopping.com, for example, "found 17 well-known retailers (including Bed, Bath & Beyond, Macy's, and Williams-Sonoma) that offered coupons (ranging from 20% off to free shipping) to customers who left their carts." Ismat Sarah Mangla, "3 Tricks to Help You Snag the Best Deals Online", *Time*, 8 September 2014, http://time.com/money/3136612/dynamic-pricing-amazon-best-buy-walmart/ [Accessed 3 October 2016].


25 For example, after the credit card companies' no-discrimination rule was abolished, Dutch merchants could impose surcharges or offer discounts based on how the customer was going to pay. Of the consumers surveyed, 74% thought it (very) bad if a merchant asked for a surcharge for using a credit card. But when asked about a merchant offering a cash discount, only 49% thought it (very) bad, with 22% neutral and 21% percent saying it is a (very) good thing. E. Vis and J. Toth, "The Abolition of the No-Discrimination Rule," (Amsterdam: ITM Research, March 2000), pp.7–10, http://www.creditslips.org/files/netherlands-no-discrimination-rule-study.pdf [Accessed 3 October 2016].


29 Falls City Indus Inc v Vanco Beverage Inc 460 U.S. 428, 443, 103 S. Ct. 1282, 1293, 75 L. Ed. 2d 174 (1983) ("Persistent, industry-wide price discrimination within a geographic market should certainly alert a court to a substantial possibility of collusion.").

30 Coal Exporters Ass'n of US Inc v United States 745 F.2d 76, 91 (D.C. Cir. 1984) (quoting *P. Areeda and D. Turner, Antitrust Law* 342 ("[P]ersistent price discrimination *** clearly indicates *** that there is a lack of effective competition in the market where the higher net returns are made. In other words, it shows that the seller has market power.")); R. Bork, *The Antitrust Paradox* 395 (1978) (it is "essential" to "[p]ersistent or stable price discrimination in favor of specific customers" that a "seller possess[ ] *** a substantial degree of market power"
or monopoly"); R. Posner, (1976) Antitrust Law 63 ("[p]ersistent discrimination is very good evidence of monopoly because it is inconsistent with a competitive market"); L. Sullivan, Handbook of the Law of Antitrust (1977), p.89 ("A firm will not discriminate unless it has market power.").


33 Direct network effects arise when a consumer’s utility from a product increases as others use the product. Competition authorities are familiar with traditional network effects, which are observable in social network platforms, such as Facebook. See: Marina Lao, "Networks, Access, and ‘Essential Facilities’: From Terminal Railroad to Microsoft" (2009) 62 Southern Methodist University Law Review 557, 560–561; United States v Microsoft Corp 84 F. Supp. 2d 9, 20 (D.D.C. 1999) (discussing the "positive network effect" of Windows); Microsoft Corp v Commission of the European Communities (T-201/04) [2007] E.C.R. II-3601; [2007] 5 C.M.L.R. 11 (discussing the indirect network effects of streaming media players).

34 For example, an increase in the number of searches attempted on a search engine increases the search engine’s likelihood of identifying relevant results. In other words, the more consumers who use the search engine and the more searches they run, the more trials the search engine has in predicting consumer preferences, the more feedback the search engine receives (seeing which links the user identifies as relevant), and the quicker the search engine can respond by recalibrating its offerings. Naturally, the quality improvement attracts additional consumers to that search engine compared to competitor sites. In effect, the more users, the larger (and more heterogeneous) the sample size, and the better the search engine can identify relevant responses for both popular and less frequent queries ("tail" queries). For more on data-driven network effects, see Maurice E. Stucke and Allen P. Grunes, Big Data and Competition Policy (Oxford: Oxford University Press 2016).

35 Search results, for example, can improve from the variety of personal data on users. If people use other services offered by the search engine company (such as email, web-browser, texting, mapping, purchasing, etc.), the company, in collecting the variety of personal data, can develop user profiles to better predict individual users’ tastes and interests, and better target users with more relevant organic and sponsored search results. This feedback loop adds another dimension: it is now no longer trial and error, learning by doing from earlier searches, but also learning of users’ tastes and preferences from the variety of personal data it collects across its platform, which enables the personalization of search results and the targeting of users with specific sponsored ads that they will likely click.

36 Executive Office of the President, Big Data and Differential Pricing (2015); noting that "even small improvements can have a large impact on profitability, particularly for companies with a large customer base." The report references a 2014 study, which provides, as an illustrative example, the profit potential if Netflix were to use behavioural data for personalized pricing. According to the study, "differential pricing based on demographics (whereby Netflix would adjust prices based on a customer’s race, age, income, geographic location, and family size) could increase profit by 0.8%, while using 5,000 web browsing variables (such as the amount of time a user typically spends online or whether she has recently visited Wikipedia or IMDB) could increase profits by as much as 12.2 percent."

37 As more consumers rely (and trust) an intermediary to deliver the best results (whether relevant results to a search query or array of goods and services), the less interested they become in multi-homing—that is, from checking the availability of products and prices elsewhere. As fewer consumers multi-home by running the same search on multiple
The rise of behavioural discrimination, E.C.L.R. 2016, 37(12), 485-492

price comparison websites, the more power the platform has to engage in behavioural discrimination, which can persist.

Illustrative is the behaviour of many users who indicated that when a search result is fails to meet their expectations they will "try to change the search query—not the search engine."


Bach, "Tobacco Company Marketing to Kids", Campaign for Tobacco-Free Kids, 4 June 2015 (finding that "retail cigarette advertising increased the likelihood that youth would initiate smoking; pricing strategies contributed to increases all along the smoking continuum, from initiation and experimentation to regular smoking; and cigarette promotions increased the likelihood that youth will move from experimentation to regular smoking").

P.T. Leeson and R. Sobel, "Costly Price Discrimination" (2008) 99(1) Economics Letters 206, http://www.peterleeson.com/Costly_Price_Discrimination.pdf [Accessed 3 October 2016]; "We show this occurs [perfect price discrimination is often socially inefficient] because firms face costs of enacting price discrimination. These costs, which include segmenting consumers, identifying elasticities, and preventing resale, are significant in all industries. This, of course, is the reason not all firms enact this pricing strategy. The omission of these transactions costs from existing theories of price discrimination is important because, as [Hal] Varian has pointed out: 'A full welfare analysis of attempts to engage in [perfect] price discrimination cannot neglect the transactions costs involved in the negotiation itself.'"

Executive Office of the President, Big Data and Differential Pricing (2015) (noting how Big Data "may facilitate discrimination against protected groups, and when prices are not transparent, differential pricing could be conducive to fraud or scams that take advantage of unwary consumers").


Data brokers also categorise us into health-related topics or conditions, such as "Expectant Parent," "Diabetes Interest," and "Cholesterol Focus".


Mattioli, "On Orbitz, Mac Users Steered to Pricier Hotels"("Orbitz Worldwide Inc. has found that people who use Apple Inc’s Mac computers spend as much as 30% more a night on
hotels, so the online travel agency is starting to show them different, and sometimes costlier, travel options than Windows visitors see."). The article referred to in Frederik Zuiderveen Borgesius, "Online Price Discrimination and Data Protection Law," Amsterdam Law School Research Paper No.2015-32 (28 August 2015), http://ssrn.com/abstract=2652665 [Accessed 3 October 2016].
