TWO-SIDED MARKETS AND THE CHALLENGE OF TURNING ECONOMIC THEORY INTO COMPETITION POLICY

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Abstract: The theory of two-sided markets is one of the most widely discussed topics in modern industrial organization scholarship. Hundreds of academic papers have been written about it in the last ten years. The concept has also veered into antitrust policy, with applications in major jurisdictions such as the United States (“US”), China, and the European Union (“EU”). At this juncture, it seems appropriate to question whether there is such a thing as a unified theory of two-sided markets and whether the two-sided markets literature can readily be applied by antitrust agencies, regulatory authorities and courts. This paper vindicates caution. It stresses that the buzz surrounding two-sided markets might give rise to a “policy bubble” in various circles. This bubble could mask the fact that, in many cases, the policy implications of the theory are not yet clear, and that divergences among its proponents are often underplayed. In that regard, the paper notably stresses that one of the key conditions of market two-sidedness identified by Rochet and Tirole in their seminal paper of 2003 – the unavailability of Coasian bargaining between both sides of a platform – has often disappeared from subsequent scholarship. This omission threatens the coherent implementation of the theory of two-sided markets. Without this qualification, markets are often mischaracterized as two-sided, as soon as they exhibit indirect network externalities.

I. Introduction

In industrial economics, failed revolutions happen. In the early 1980s, Baumol, Panzar and Willig wrote their famous “contestable markets” theory. In his 1982 address before the American Economic Association, William Baumol characterized it as an “uprising in the theory of industry structure” (Baumol, 1982). The self-titled “theory” took a life of its own. Scholars refined it. The contestable markets theory subsequently served as a blueprint for competition reformists to push a “small” antitrust agenda. As Martin puts it, “the theory of contestable markets aspired to be all things to all people” (Martin, 2000). However, subsequent advances in economic research nuanced its relevance, stressing the restrictive postulates (Schwartz and Reynolds, 1983; Weitzmann, 1983) and extreme conditions under which it was built (Shepherd; 1984). Decades later, little of its “laissez faire” implications have made their way into antitrust practice.

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In industrial economics, “fables” are not uncommon either. Casadesus-Masanell and Spulber write that “The dismal science is enlivened occasionally by colorful fables that illustrate key points of economic theory” (2000). The acquisition of Fisher-Body by General Motors has, for instance, been romanced as a prime example of contract opportunism (Klein, Crawford and Alchian, 1978), in disregard of the underlying facts (Coase, 2000). Other fables include the failure of the Dvorak keyboard to prevail over the QWERTY standard due to network externalities (Tirole, 1988, p.405) and lock-in effects, despite alleged the alleged superiority of the former (Liebowitz and Margolis, 1999). Those fables have nurtured important policy developments, including regulatory assaults on hold-up by intellectual property owners or antitrust enforcement initiatives against de facto standards in the digital economy.

Lastly, “zombie ideas” also populate industrial economics. A zombie idea “is one that keeps on coming back, despite being killed” (Quiggin, 2010). For instance, the views that firm size denotes significant market power (Bain, 1968), that competitive firms price at marginal costs (Coase, 1946) or that a patent grants a monopoly to its holder (Kitch, 1986) have all been discredited in economic theory. This notwithstanding, those dead ideas are often kept alive by scholars and policy makers, including outside of the realm of economics.

Uprisings, fables and zombies have epistemological virtues. It often takes a long trial and error process to uncover them. And the time spent on empirical verification and formal invalidation advances the state of economic knowledge.

Against this background, this paper discusses the two-sided markets theory in an antitrust context. Its intention is not to moot the idea that the two-sided markets theory is an uprising, a fable or a zombie. But it certainly purports to cast a word of warning. In positive form, the theory of two-sided markets may give rise to a policy “bubble” (Maor, 2013) in the sense given – all other things being equal – to asset bubbles, technology bubbles or housing bubbles. Here, we tweak the concept of “bubble” to denote a trend to overvalue a theory; which leads to exaggerate interest from policy; which in turns grows bigger in theory thanks to a positive feedback loop. Bubbles have a number of causes, rational (self-interest, under expertise, etc.) and irrational (anchoring bias, herding, overconfidence, etc.).

In our opinion, one should not underestimate the risk that the two-sided markets theory may turn into a policy bubble. First, the award of the 2014 Nobel Prize in Economics to Professor Jean Tirole, a father of two-sided markets theory, will certainly fuel more research into the issue. Studies of trends of subjects in economic journals already report that industrial
organization ("IO") publications occupy a prominent place in academic publishing (Kelly and Bruestle, 2010). Senior and less senior economists eager for academic recognition are likely to “anchor” their research to Tirole’s work (and that of his co-authors). Between 2007 and 2012, Evans and Schmalensee have counted more than 200 papers on multi-sided platforms (Evans and Schmalensee, 2012).

Second, due to its proximity from policy – in particular, from competition policy – the theory of two-sided markets will likely swell in other circles. For long, the literature suggested that agencies, regulators and courts had paid little attention to the economics of two-sided markets (Wright, 2003). Perhaps, the best confirmation of this came with the 2012 judgment of a French court which found that Google was guilty of unlawful predatory pricing, simply by offering its digital maps to customers for free (Petit and Rato, 2012). But the pendulum may swing. Many, if not most, papers insist on the potential of the two-sided markets theory to inform antitrust policy and regulation.¹ In terms of scope, some scholars find the theory relevant across the board, including in relation to exclusionary conduct (Schmalensee and Evans, 2012). Others argue that two-sided markets theory will mainly grow in importance in relation to pricing issues (Rysman, 2009), such as aggressive price competition in single firm conduct cases, market definition and the SSNIP test in merger control, etc. Interestingly, the most manifest antitrust application of two-sided-markets theory often consists in providing an objective justification to what would might look like anticompetitive conduct in a “one-sided world” (Ratliff and Rubinfeld, 2014). Although there are some exceptions, only a few papers identify theories of harm specific to two-sided markets (Armstrong, 2006; Motta and Vasconcelos, 2012). With this background, antitrust agencies, courts and regulators – under the possible pressure of economic consultants, lawyers, lobbyists and governments – may well be induced to derive from it general policy guidelines and case-specific implications. Some scholars have argued that this would be premature.²

Last, and perhaps more prosaically, everything that touches the Internet generates frantic interest. In recent history, the Internet has been an abundant purveyor of bubbles. In the late nineties, the Dot-Com bubble inflicted trillions of losses on fooled investors. More recently, the current valuations of Instagram, SnapChat and the likes have fuelled fears of a great Apps bubble. A similar bubble might make its way through academic circles. After all, the

¹ Caillaud and Jullien, for instance, early considered that “the design of competition policy rules with respect to such markets should take these characteristics into account” (Caillaud and Jullien, 2003).
distinctive trait of the Internet is to feature “platformed” services,\(^3\) which constitute the core of the two-sided markets theory. There is thus a significant risk that the theory of two-sided markets might be applied too broadly when it relates to the digital economy. The Nobel Committee did just that when it stressed the importance of Tirole’s contribution to the understanding of platform\(^4\) markets, such as “search engines, and social media”.\(^5\)

II. Epistemological Assessment

This section shows that the two-sided markets “theory” should be seen as a refinement of traditional Industrial Organization (“IO”) theory, rather than an “uprising” in industrial economics, which some may believe it to be.

At its core, industrial organization studies the effects of distinct forms of industry structure on price and output levels. Monopoly theory shows that a single supplier may charge a higher price than the market demands, leading to a deadweight loss as some valuable output is not produced (allocative inefficiency). The theory of perfect competition shows that atomistic suppliers will serve at the lowest possible price, producing all the requested output (allocative efficiency). Oligopoly theory shows that when there are a few suppliers, other factors influence price levels, in several possible directions (between the monopoly and the perfect competition level).

These questions were those on the research agenda of Marshall, Cournot, Bertrand, Chamberlin, Mason and Robinson, from the end XIXth century to the mid XXth century (Corley, 1990). They were also those studied by Harvard, Chicago and Post-Chicago scholars since the second half of the XXth century, though with distinct methodologies (for instance, Harvard scholars used empirical measurements, Chicago scholars favored formal reasoning, while many Post-Chicago scholars rely on game theoretic frameworks).

Importantly, IO scholars have gone well beyond assessing the impact of industry structure (in the strict sense) on price and output levels. The scholarship focuses on the organization of industry in the large sense, including in terms of firms’ strategy, products’ characteristics, customer preferences, government interference, etc.


\(^4\) In this paper, unless otherwise stated we use platform and two-sided market interchangeably.

This is where the initial theory of two-sided markets theory cuts through. It can mainly be traced back to three papers of Caillaud and Jullien, Rochet and Tirole, and Armstrong, published between 2003 and 2006. On some markets such as video games, consoles manufacturers that compete vie to get both sides of users “on board”. Absent gamers, no developer would produce games for a console. Likewise, no gamer would buy a console, if there were no compatible games (and thus developers). According to the theory, a way to solve this “chicken and egg” problem is for the platform to “choose a price structure and not only a price level” (Rochet and Tirole, 2003). This decision is not benign in terms of output. In their 2006 paper, Rochet et Tirole find that for a given (total) price level, output can increase “by charging more to one side and less to the other relative to what the market delivers”. One side (gamers) also known as the “money side” will be called to cross-subsidize (ie pay more of the platform’s costs) the participation of the other side (developers), also referred to as the “subsidy side”. In such settings, the “decomposition or allocation” of the total price between the two sides will affect output.

From a policy perspective, this is the most important normative point. Allocative efficiency can be improved by changes to the price structure, and not only by changes to its level. But is this clearly revolutionary from a policy standpoint?

First, Rochet and Tirole themselves seem to doubt it. In their 2006 paper, they explained that the fact that the price structure affects economic efficiency is a “widespread belief” and already a “premise” for many policy interventions.

Second, in their papers, Rochet and Tirole did not attempt to present a “welfarian” analysis of two-sided markets. Rather as Stigler once wrote, they sought “to explain economic life” in continuance of the tradition of IO scholarship (Stigler, 1992). In this context, their seminal paper (Rochet and Tirole, 2003) had a mostly descriptive (or positive) ambition. It explored how platforms in distinct environments allocate prices between the two sides of the market (Rochet and Tirole, 2003). Their 2006 paper went one step further; it attempted to provide a stylized definition of two-sided markets, and of the necessary conditions for their existence (Rochet and Tirole, 2006). For instance, it has now become clear that there must be indirect network externalities (or cross-platform externalities) to have a two-sided market: users’ participation on one side increases the participation of users on the other side (and vice versa).

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6 Spulber talks of a “circular conundrum” (2010).
7 REFER TO paper where they contest idea of Cross-subs.
8 Subsequent literature questions for instance which will be the subsidy side, and which will be the payment side.
In addition, users must be prevented from negotiating away a platform’s price allocation through Coasian bargaining or thanks to monopoly power (Rochet and Tirole, 2006). In other words, the price structure must be “non neutral”. As will be seen below, this last limb of the definition is the one that is often left out of the picture by policy makers.

Importantly, most of the IO literature that sought to build on Rochet and Tirole’s seminal research followed a similar positive approach. For instance, the oft-quoted 2006 Armstrong paper finds three main factors that determine the price structure: the relative size of cross-group externalities, fixed fees or royalties, and presence of single or multi-homing (Armstrong, 2006). Armstrong further explains which side pays more and less in terms of externalities (the side that brings the biggest positive externalities to the other pays less).

Third, the idea that the overall “price level” is not the sole determinant of output is an old economic idea. Price discrimination, for instance, is a well-known source of efficiency (Baumol and Bradford, 1970). Much like price allocation in two-sided markets, structuring distinct prices for end-users can increase output. Third-degree price discrimination by movie theaters is a case in point (Orbach and Einav, 2007). It is indeed well-settled that movie theaters increase output when they charge different prices to parents and children. Price discrimination too seeks to “get all users on board”. Such a view is not universally accepted. Parker and Van Alstyne, for example, argue that third degree price discrimination only leads to a transfer of surplus. It is thus deficient to explain the output effect that appears on two-sided markets (Parker and Van Alstyne, 2005). Their argument runs counter to prior economic literature on price discrimination in monopoly (Schmalensee, 1981; Varian, 1989) and other settings (Armstrong and Vickers, 2001), which shows that output can increase under third-degree price discrimination. Another objection to the analogy might be that in a typical price discrimination setting, there are (at least) two prices. In contrast, in a typical two-sided markets scenario, there is just one price: the money side pays, and the subsidy side pays nothing (ie, Google’s users). However, this is a formalistic counter-argument. In two-sided markets where there is a free service on the subsidy side, users often pay a hidden, non-monetary price. For instance, users of Google’s search engine incur a tacit price by reading adverts and giving away personal data to the other side of the platform. Moreover, in many two-sided markets, the subsidy side pays a price to the platform, even if it bears less of the

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9 In other words, there must be transaction costs preventing “the bilateral setting of prices between buyer and seller”.
platform’s costs than the money side (for instance, ladies in night clubs are often charged a discounted entrance fee).

More generally, economists have long known that cost allocation can influence output. Regulatory economics shows that, in industries with common costs, Ramsey pricing expands output. Under Ramsey pricing, the service provider structures prices so that they are inversely proportional to user’s price elasticity (Laffont and Tirole, 2000).

Similarly, in welfare economics, Rawls’ “maximin” principle tolerates differences in price allocation, provided they are to the advantage of all (the pie increases) and that the welfare of the worst off is a large as feasible (the share of the pie) (Phelps, 1973)\(^\text{10}\). In other words, that firms accept to pay more than others in exchange for additional utility/output is mundane welfarian economics.

Important parallels can also be drawn between the theory of two-sided markets and that of network externalities (Katz and Shapiro, 1985 and 1986). The theory of network externalities shows that the number of agents consuming a good can affect the good’s value to these users. The canonical example is that of phone networks where increases to the number of users exponentially multiply the number of connections that can be made on the network. This can ultimately increase the value of the network for its users. Seen in this context, the theory of two-sided markets may simply be a refinement of traditional network externalities theory, but with the twist that two distinct user groups are present on opposite sides of a platform. Moreover, although the theory of two-sided markets was the first to model these cross-platform externalities, authorities had intuitively identified and understood them before the emergence of formal economic models (Ordover, 2007).\(^\text{11}\)

*Last*, the theory of two-sided markets is firmly rooted in literature economic surrounding the Coase theorem. This theorem affirms that if property rights are well defined and there are no transaction costs, parties can negotiate an efficient solution to an externality (Coase, 1960). Most papers explain that two-sided markets arise when Coasian bargaining amongst users cannot take place (Parker and Van Alstyne, 2005). In so doing, the theory allegedly refines our understanding of how markets react to externalities short of possibilities of Coasian bargaining. Not unlike traditional solutions such as vertical integration and regulation, the

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\(^{10}\) Though Rawls was not speaking, strictly, of pricing structures but rather of the distribution of income and wealth in society.

\(^{11}\) In that respect, the US Microsoft case contains a particularly prescient quote. See notable fn. 73.
appearance of a two-sided market might be a remedy to a transaction cost problem. Schmalensee and Evans say just this when they contend that two-sided markets create value by “solving a coordination – and transaction cost – problem between the groups of customers” (Schmalensee and Evans, 2012).

But even under this twist, economists remain divided. In an undeservedly less famous paper, Spulber argues that the “decentralized coordination” that occurs between each group of users through the platform relates to “Ronald Coase’s description of private bargaining as a means of resolving the problem of social cost” (Spulber, 2010).

Interestingly, the Coasian-epistemological relevance (or irrelevance) of the two-sided markets theory may hinge on a viewpoint dispute. For Rochet and Tirole, two-sided markets do not belong to the world of Coasian bargaining because some factors prevent users from reengineering or evading the effects of the price structure decided by a platform (as with tax incidence). In Spulbers’ view, two-sided markets belong to the world of Coasian bargaining, because there is an accumulation of bilateral transactions between seller and intermediary, and between intermediary and buyer. Both views might not be mutually exclusive. Two-sided markets exist because of costs that would otherwise prevent parties from concluding transactions. In turn, such markets give rise to another problem: users on both sides cannot reallocate the costs of the platform among themselves. There are thus two distinct transaction cost problems. Platforms are the solution to one, but the cause of the other.

III. Conceptual Proliferation

At its core, the theory of two-sided markets had a mostly descriptive ambition. But it was also quite limited in scope. Rochet and Tirole (as well as previous work), had carefully stressed the specificities of their analysis, and the “necessity to circumscribe the scope of a two-sided markets theory” (Rochet and Tirole, 2006).

In subsequent scholarship, this initial ambition may have been stretched, possibly beyond the intentions of the theory’s founding fathers. A symptom of this is the proliferation of labels that have been given to two-sided markets. Scholars have rivaled in imagination to tag new names on what has until now been referred to as the “theory of two-sided markets”: “multi-sided platforms” (Evans and Schmalensee, 2012), “two-sided networks” (Eisemann, Parket

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12 In contrast, when the Coase theorem applies the market is not two-sided (Rochet and Tirole, 2006).
13 Rochet and Tirole go even further. In their view, the mere fact that the Coase theorem fails is necessary, but not sufficient to have a two-sided market, even if an intermediary is present (Rochet and Tirole, 2006).
and Van Alstyne, 2006; Parker and Van Alstyne, 2005), “informational intermediation” (Caillaud and Jullien, 2003), “two-sided strategies” (Rysman, 2009); “two-sided markets” (Rochet and Tirole, 2003; Wright, 2003; Weyl, 2006; Rysman, 2009).

More importantly, there has been a proliferation of concepts relating to the theory of two-sided markets. In this section, we give evidence of this variance with regards to the definition of two-sided markets (a) and the use of other concepts (b). We offer illustrations that show that these divergences go beyond semantics (c) and warn that this may be symptomatic of a policy bubble which could undermine its transposition into policy (d).

a) Definitions
A number of papers in the multi-sidedness literature purport to elucidate a basic definitional issue: what distinguishes a two-sided market from a one-sided market? Three types of definitions are generally advanced. The first, and the narrowest, is the one of Rochet and Tirole: a “market is two-sided if the platform can affect the volume of transactions by charging more to one side of the market and reducing the price paid by the other in an equal amount; in other words, the price structure matters, and platforms must design it so as to bring both sides on board” (Rochet and Tirole, 2006). Its focuses on the price structure. Interestingly, Rochet and Tirole also offer a definition of one-sided markets: “The market is one-sided if the end-users negotiate away the actual allocation of the burden (i.e., the Coase theorem applies); it is also one-sided in the presence of asymmetric information between buyer and seller, if the transaction between buyer and seller involves a price determined through bargaining or monopoly price-setting, provided that there are no membership externalities”.

A second, “less formal” definition is proposed by Evans and Schmalensee: “a multi-sided platform” has “two or more groups of consumers”; “who need each other”; “who cannot capture the value of their mutual attraction”; and “rely on a catalyst to facilitate” their interaction (Evans and Schmalensee, 2007). This definition has a managerial savor. It insists on the transactional solution generated by the platform.

A third definition finds that there is a two-sided market when there is “some kind [emphasis added] of interdependence or externality between groups of agents that are served by an intermediary” (Rysman, 2009). This strand of the literature mostly pays attention to the existence of an “indirect network externality” across a platform (Parker and Van Alstyne,

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14 A notable exception to this is Rysman (2009, p.127), who explains that this question may not be so important.
In our view, it is the loosest definition that can be encountered in the two-sided markets scholarship.

Disagreements around the definition of two-sided markets are not merely a matter of semantics. Rochet and Tirole rightly worried that “you know it when you see it”-type definitions would be over inclusive. For example, if two-sided markets only exist in situations where Coasian bargaining between both sides of a platform is impossible, then parameters that are not readily observable play a critical role in identifying a two-sided market. A platform’s governance structure, contractual arrangements and legal rules will notably have an important impact on the availability of Coasian bargaining between users, and in turn, on the two-sidedness of a market. Take payment cards. If a platform’s rules forbid surcharging, then it is the platform that controls which side will bear most of the platform’s costs and both sides cannot bargain away this allocation. Instead, if surcharging is free, the party with the most bargaining power can shift part or all of the costs to the other party, thus overturning the price allocation decided by the platform. As a result, the platform’s price structure should no longer affect output (this is analogous to traditional tax incidence; with surcharging the platform’s costs are no different to VAT, Rochet and Tirole, 2006). Rules that govern users’ payments are thus no trivial matter, and affect the one or two-sidedness of the market. This might be a strong reason to favor Rochet and Tirole’s definition over others, which do not pay attention to this issue.

Going a step further, one might question if this definitional divergence could give rise to something of an academic “bubble”, where old ideas are rebranded as novel exotic concepts. A paper by Spulber discretely conveys this argument, recalling that two types of markets exist in textbook economics (Spulber, 2010). Decentralized markets, where buyers and sellers interact over the counter. And centralized markets, where firms act as intermediaries between buyers and sellers. According to Spulber, the term “two-sided market describes both decentralized markets and centralized markets in which intermediary firms help to coordinate the participation of buyers and sellers”. Nineteenth and early twentieth century economists like Cournot or Edgeworth already talked of two-sided markets in this sense. However,
Spulber observes that scholars like Rochet and Tirole failed to recognize prior art, and in particular, “the large body of earlier work on intermediated markets or matching markets”.\(^\text{17}\)

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**b) Concepts**

The formation of a bubble may also appear at a more granular level. In the literature, there is a tendency to substitute classic IO concepts with modern notions that seem to originate in the tech world. As will be seen below, the issue again is not merely rhetorical, but has critical consequences.

**i) Markets**

In the early papers, reference was generally made to “two-sided markets” (Rochet and Tirole, 2003; Armstrong, 2006), at least at title level. In subsequent papers, the “market” concept has sometimes been phased out or qualified. Evans and Schmalensee prefer to talk of multi-sided “platform businesses”. Parker and Van Alstyne use the concept of “two-sided networks”. Evans mentions “multi-sided platform markets”.

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\(^{17}\) In a footnote, Spulber seems to regret that the literature has poured old wine in new bottles. Indeed, the argument goes that, in essence, the 2000s literature simply explores centralized (or intermediaries) markets, with network effects.
Most of those papers seem intent on stressing the importance of the platform. The new wording may also seek to address the critique that the notion of a two-sided market is self-evident, for all markets are two-sided as long as there is a buyer and seller (Ordover, 2007).

The best wording is unclear in our view, and there are good arguments in support of platform-type semantics (we actually use platform abundantly in this paper). However, three lines of arguments militate in favor of the traditional IO wording.

First, the concept of “platform” invites the automatic inference that some sectors/businesses are intrinsically multi-sided.\(^{18}\) From an economic perspective, however this is not always true (and it suggests that “platform”-wording is misleading), for a platform is not necessarily multi-sided. For instance, it is customary to view payment card systems as platforms. However, although many payment systems – notably Visa, MasterCard and American Express – are set up as two-sided markets, this is not always the case. Indeed, many supermarket chains provide their customers with an in-house payment card system.\(^{19}\) At first blush, such card systems are not two-sided markets, because the platform owner does not sit between two separate user groups (Evans and Schmalensee, 2012). In addition, when supermarkets own their in-house platform, they have the ability to charge (or reward) shoppers for their use of the store’s payment system. In other words, the supermarket internalizes the effects of its card system’s pricing.

Second, from a policy perspective, the random, side-by-side combination of business journals’ semantics with technical economics terminology may send the counterproductive signal that the theory is not mature.

Thirdly, and even more importantly, if the theory is ever to be embedded in antitrust and regulation, it is probably advisable to frame it in terms that fit readily with accepted terminology in those fields.

Finally, as Hadfield and Weingast explain, the “rule of law” requires the existence of unique and clear classifications. In other words, rules of liability and penalty should strive for a certain degree of terminological unity and accuracy.

\(\text{ii) Buyer/seller}\)

\(^{18}\) In plain language, a platform is “a raised level surface”, with several sides: an above and a below.

\(^{19}\) Target, for example, offers an in-house payment card that can only be used in its stores. See http://www.target.com/redcard/main#next
The literature on two-sided markets is replete with references to “users” or to “groups of users” in relation to the platform. On close read, those users refer to the well-known IO concepts of “buyers” and “sellers”. In their papers, Rochet and Tirole as well as others, often alternate between those two notions (2003).

Several reasons may explain why authors indistinctly use both the IO “buyer-seller” couple and the “users” concept. This may be due to the fact that in some two-sided markets, users on one side are bartering with the platform (for instance, in search engines) so that there is no monetary transfer. Or that in other two-sided markets, some groups of users pay a price to the platform whereas others do not, so they cannot be considered as buyers (for instance, media player users).

On principled grounds, however, the distinction seems unproblematic, and therefore irrelevant. Caillaud and Julien explain that all users can a priori be considered buyers and/or sellers. The user that pays no price in dealing with the platform (or that barter with it), is a buyer that receives a “negative price” (a subsidy or a “freebie”) as compared to other buyers on other sides who are charged a “positive price”.

The relevance of the “buyer-seller” v “user” dichotomy can be explained with a thought experiment. If one thinks of the economy as a world of “platforms and users”, then a football club looks like a two-sided business because it helps bring both sides of users “on board”. On the one hand, “marquee” players will drive fan base and viewership up (Eisenmann, Parker and Van Alstyne, 2006). On the other hand, a large fan base and viewership will boost the attractiveness, in both financial and reputational terms, of clubs to players. Instead, if one thinks of the economy as a world of “firms with buyers and sellers”, then a football club does not look like a two-sided platform. It is a vertically structured organization that transforms inputs (players) into products (games and entertainment sold in various forms). This could mislead authorities when the theory is implemented.

c) Illustrations

This divergence amongst the proponents of various two-sided markets theories goes beyond semantics. Crucially, such a divergence affects the markets that will ultimately be deemed to be two-sided. Although most authors agree on the two-sidedness of some markets (i), for others there are clear divergences (ii).

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20 Talking, besides buyers and sellers of “distinct group of users” or “two distinct sides” (Tirole and Rochet, 2003).
The core: payment systems, video games, matching markets and newspapers

In the early literature, the illustrations given of two-sided markets were quite contained. Rochet and Tirole mentioned software (video games), portals and media (newspapers), payment systems, among others (Rochet and Tirole, 2003). Other papers also put an important emphasis on matching markets, such as night clubs, social gatherings, etc. (Caillaud and Jullien, 2003). At the time though, most papers anticipated an expansion of the business models that would later be categorized as two-sided markets.

And its indefinite periphery?

In subsequent publications, disagreements have become more frequent in relation to the categorization of two-sided markets. For instance, Armstrong argues that supermarkets are two-sided (Armstrong, 2006), whilst Rysman disagrees (Rysman, 2006). Similarly, Eisemann et al. consider that retail electricity markets are evolving in two-sided markets paper (Eisemann et al, 2006), whilst Rochet and Tirole seem to disagree (Rochet and Tirole, 2006).

Further papers give more examples of two-sided markets, though often without discussing them. Those include expos and trade fairs, standardized tests, real estate agencies, airports, stock exchanges, credit rating services, academic publishing, ranking websites, conferences, pools and industrial standards, etc.21 Rysman also mentions the original example of franchising. In his view, the “franchisor operates a two-sided market in the sense that it attracts consumers to its brand and franchisees to operate outlets” (Rysman, 2009).

Assessment

Given the burgeoning list of examples of two-sided markets, we have attempted to draw a list of possible two-sided markets and to apply to them the three different definitions of two-sided markets discussed previously (Rochet and Tirole, 2006; Evans and Schmalensee, 2012; and Eisenmann, Parker and Van Alstyne, 2006). The objective of our comparison is not to decide once and for all whether given markets are two-sided, but to show that different definitions of the term have a substantial impact on what one might or might not consider a two-sided market. Although this is a prima facie assessment, we expect that even with a full analysis, there will be divergences due to the differing definitions.

21 For a list, see Wright, 2003.
Cells are salmon-colored when the assessment relating to a market’s two-sidedness is made in an authored paper. In non-salmon cells we apply the authors’ definition of two-sided markets, though there is no reference to these markets in their paper. These assessments should be read with caution. As Rochet and Tirole argue, whether or not a market is two-sided depends on a number of fact specific questions. For a more detailed explanation of our assessments, see Appendix I to this paper.

### d) Bubble?

The definitional, conceptual and illustrational expansion of the two-sided markets literature is a normal evolution. It takes root in the testing process inherent in economic research (modification in specifications and settings). It is also influenced by the proclivity of academics to distinguish their research from prior art. The lack of semantic homogeneity in economic discourse may also be an explanatory factor. Other possible explanations include group-think, fashion and trends in academic research, etc.

This evolution has a number of paradoxical consequences. On the one hand, as economists keep classifying new types of markets (and re-classifying old ones) as two-sided businesses,
the early literature retrospectively gets celebrated as a general “theory”.\footnote{Although, the term “theory” might only be used as a shorthand, it is present in a number of papers. See Evans and Schmalensee 2012, Wright, 2003, Rochet and Tirole, 2003 and 2006.} According to the Oxford dictionary, a theory is: “a supposition or a system of ideas intended to explain something, especially one based on general principles independent of the thing to be explained”. However, when looking at the wider implications of the two-sided market theory, it is apparent that they cannot be generalized and that they are often not independent from the thing to be explained. On the other hand, as it embraces an ever open-ended scope, the theory loses relevancy. When reduced to the notions of markets with indirect network externalities and intermediaries, the theory encompasses a vast number of markets including football clubs, MBA or LL.M programs, gasoline powered engines, and franchising. This might be misguided.

The early literature insisted on the satisfaction of several restrictive conditions (in particular the absence of Coasian bargaining and the inability to transact away the price allocation through side payments between end users). Scholars should not lose sight of this, on pain of weakening the theory’s relevance. As Tirole himself wrote in his famous IO textbook (Tirole,1988, p.3): “At first sight, even a theorist should regret the very high ratio of theory to evidence in a field which is often lacking in generality and in which practical implications are so crucial”…

\section*{IV. Competition Policy Implications}

The combination of academic enthusiasm and uncertainty surrounding the theory of two-sided markets might give rise to a number of challenges and pitfalls for antitrust agencies, regulatory authorities and courts.

In this section, we seek to illustrate this phenomenon by analyzing a sample of US and EU competition cases where two-sided markets might have been at play. The cases are selected on the basis of the broad definition given by Eisenmann, Parker and Van Alstyne (2006). All of the cases exhibit the basic trait of market two-sidedness, \textit{i.e.} cross platform externalities, though – on the basis of publicly available information – we cannot definitely conclude that they were genuine two-sided markets.

In this rough sample, we distinguish between two types of cases. Section (a) covers cases where the theory of two-sided markets was taken into (some) consideration, whilst section (b) covers cases where the theory was not clearly or explicitly taken into account. The latter
section covers either cases where the authorities were familiar the theory of two-sided markets but deliberately decided to leave it aside; cases where the authorities ignored the existence and relevance of the theory for the matter to decide; or cases where the authorities applied the theory, but did not say so expressly.

With this section, our ambition is twofold. In cases where the theory was applied, we question whether authorities drew the right (or wrong) implications from it. In cases where the theory was not applied, we question whether two-sided markets were actually at stake and whether a two-sided analysis would have brought added value to the cases’ outcome. This analysis brings forward two main conclusions.

First, “applied” theory is no easy science, and decisional errors cannot be excluded. In some cases, authorities might see two-sided markets where there are none. For example, as soon as they see cross-platform externalities, authorities might be tempted to jump to the conclusion that there is a two-sided market. In turn, they may infer that anticompetitive conduct on one side of a market yields efficiencies on the other side, because it helps the platform get “all users on board”. Conversely, outside of the most common textbook examples of two-sided markets, authorities might not realize that a more thorough multi-sided analysis is warranted. For instance, subsidies, rebates and other forms of aggressive pricing (and even State aid) may be identified as unlawful predatory conduct if the authority fails to see that there is a money side that cross-subsidizes such expenses. This simplification could lead to both type I and II decisional errors.

Second, the hype surrounding the literature might underestimate the costs and benefits brought by its application to real-world problems. That is not to say that the theory could not have an impact on the outcome of some cases. But, at this stage, no significant reflection has been devoted to the enforcement costs of the theory of two-sided markets. This issue is of contemporary importance, in light of the growing tendency of antitrust agencies in Europe and elsewhere to repudiate more costly economic analysis (to the exception of merger control), in particular in single firm conduct cases.

a) Cases where the theory was taken into (some) account

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24 Often, the theory will give rise to a number of very fact specific questions which require substantial investigation to be answered. Moreover, there are situations where the theory will offer little explanatory value compared to existing theories such as that on network externalities.
The difficulties faced by authorities when applying the theory of two-sided markets can be seen at play in the First Data Corporation case in the US (i) and the recent Groupement des cartes bancaires and MasterCard cases in the EU (ii).

i) First Data Corporation

One area which has drawn much attention from scholars is that of market definition in two-sided markets. On both sides of the Atlantic, a priori to measuring market power consists in defining relevant markets. A relevant market comprises all the products (or services) that compete as substitutes. The conventional method for the definition of relevant markets is to apply the “SSNIP” test (sometimes referred to as the “hypothetical monopolist” test).\(^{25}\)

Technically speaking, the SSNIP test gauges the cross-price elasticity of demand. In mundane words, it tells if demand will switch to other products (or services) when a Small but Significant Non-transitory Increase in Price – typically in the range of 5 to 10% – is applied to the product under consideration. To take a classic example, if demand for Coca-Cola deflects to Pepsi when Coke’s price increases by 10%, then there is a relevant market for cola drinks that comprises both Coca-Cola and Pepsi. The undergirding theoretical question is whether the price rise is profitable despite the loss in demand. If it is profitable, then alternative sources of supply do not constrain the “hypothetical monopolist” and the candidate group of products constitutes a relevant market of its own. If it is unprofitable, the products to which demand switches must be deemed to constrain the supplier, and to form part of the relevant market.

A number of authors (notably, Emch and Thompson, 2006; Hesse and Soven, 2006; Evans and Noel, 2008; and Filistrucchi et al., 2013) have argued that in two-sided markets the SSNIP test might require significant tweaking. In a nutshell, they suspect that the SSNIP test does not correctly capture cross-platform externalities. Losing demand of one side of the market has an impact on the number of users on the other side, making the platform less profitable. Those indirect network externalities should be brought into the picture when the SSNIP test is applied on two-sided markets. Such externalities may turn a profitable SSNIP on a single side into an unprofitable SSNIP when both sides are taken into account.

The application of the SSNIP test in two-sided markets was one of the issues raised by the DoJ and the parties in the United States v. First Data Corp District Court case.\(^{26}\) The case concerned a merger between First Data Corporation and Concord, the owners of two of the

\(^{25}\) The use of the SSNIP test is mentioned in both US and European merger guidelines.

three biggest PIN debit networks in the United States. PIN debit is an electronic payment method that entitles shoppers to pay merchants with cards, upon entry of a personal identification number that authorizes the issuing bank to debit funds from the cardholder’s bank account. Like credit cards, these networks are a typical example of a two-sided market. Shoppers value PIN debit cards that give them access to more merchants, while merchants value PIN debit brands that give them access to more customers.28

*United States v. First Data Corp* provides a good illustration of the practical intricacies faced by authorities when implementing the SSNIP test in two-sided markets. Three of them are particularly noteworthy.

First, should a single SSNIP test be applied to both sides of the market, or should a separate test be applied to each side?29 In the *First Data* case, the DoJ looked at both sides of PIN networks separately and only applied the SSNIP test to the merchant side, where PIN debit networks charge merchant banks for the distribution of PIN debit terminals with merchants (it is on this side that anticompetitive effects were most likely). Whether this was the right decision is debatable. Some economists argue that a single “*platform*” market should be defined when there are tangible underlying transactions between both sides of a platform, which is the case of most card networks (notably Emch and Thompson, 2006; Evans and Noel, 2008; and Filistrucchi et al., 2013). This is because every transaction made through such platforms requires a user from both sides of the market.30 Loosing users on one side will thus affect the other side. Other economists argue that both sides of a platform should be looked at individually (notably Hesse and Soven, 2006). They contend that a dominant card network might decide to exercise its market power by raising prices on a single side of the platform. It would thus be preferable to apply the SSNIP test separately, in order to identify the competitive constraints that are present on each side.

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28 That being said, PIN debit networks with fewer merchants can attract financial institutions through various other means, such as more competitive fees, network reliability and speed. In addition, potential cross-network externalities are mitigated by the fact that most financial institutions conclude deals with the main card networks and issue cards that are compatible with multiple networks. On the merchant side, the most important parameter of competition is not a PIN network’s size, but the level of its fees. This suggests that network externalities might not be particularly significant, especially from the merchant’s point of view.

29 In practice, this distinction implies that authorities will either define a single platform market or two relevant markets on both sides of the platform. This issue is akin to that of “relevant submarkets”, which was notably addressed in the *Brown Shoe* case, as early as 1962. See *Brown Shoe Co., Inc. v. United States*, 370 U.S. 294 (1962).

30 Evans and Noel (2008) notably refer to services that are sold in fixed proportions on both sides of the platform.
Choosing one method or the other is not without consequences. Defining a single platform market will normally imply a larger price increase. Imagine a platform which charges 20€ per transaction, split equally between users on both sides (10/10). A 10% platform SSNIP would look at consumer switching when the platform charges a total of 22€ per transaction. In contrast, a single side SSNIP would look at consumer switching when a 10% increase is applied to one side. The total price would thus be 21€. The policy consequences to derive from this price differential increases remain unclear. And the literature provides no clear guidance on this.

Moreover, if they go down the platform SSNIP variant, authorities will have to decide how to allocate the price increase among different groups of users. This is no easy choice. Returning to our example, the 10% increase can be allocated in a range of different ways (for instance, 12/10; 11/11; 10/12). Authorities might assume that because the platform was previously charging 10€ to both sides, the increase should be spread equally (11/11). On the other hand, they may also decide to change the price allocation. A hypothetical monopolist platform might thus charge 12€ to one side and 10€ to the other. The pros and cons of each option remain unclear in the literature, and economists disagree on the appropriate method. Some posit that the hypothetical monopolist should be allowed to adjust the price structure (Emch and Thompson, 2006; and Filistrucchi et al., 2013), while others argue it should not (Evans and Noel, 2008). In the First Data case the DoJ argued that a hypothetical monopolist would raise prices by 5-10% on the acquiring banks side (and hence to merchants), and held the price to issuing banks fixed.31

Market definition is also complicated when one side receives the platform’s services free of charge. Adjusting our example slightly, a platform may charge the entire 20€ transaction fee on one side of the market only. How then should the price increase be applied to subsidized users? 10% of zero is still zero. A symbolic fee might have to be set, but this could have dramatic effects. Imagine if Google was ever to charge users 1cent per search; users would surely flee in droves. Should authorities assume that in such circumstances the hypothetical monopolist faces sufficient competitive constraints? Maybe not.

Of course, a possible solution to this conundrum is to consider that Google charges an implicit price on users, which consists in extracting personal data from them. But it is unclear how to operationally simulate the effects on demand of a “small but significant increase in data

extraction”. Similarly, one may consider that Google, as a hypothetical monopolist, will instead degrade the quality of the content offered to its users. But applying a “small but significant decrease in content quality” test would certainly prove a daunting task.

Once those prices issues have been resolved, a second vexing question is how to capture the complex demand effects of SSNIP increases on the various sides of the platform? A price increase will directly decrease demand on the side of the platform where it is applied. However, in two-sided markets, due to indirect network externalities, this price increase will also decrease demand on the other side of the platform. In turn, this reduction can indirectly affect the users’ group to whom the price was initially applied. The idea that authorities should take these externalities into account is relatively uncontroversial. In United States v. First Data Corp, the DoJ appears to have taken those externalities into some account (see Hesse and Soven, 2006). But due to a lack of publicly available information, it is unclear how this was concretely done. And beyond the model of Evans and Noel (2008), the research on this issue remains embryonic.

A third and final question concerns the baseline upon which the SSNIP test is calculated. When possible, the SSNIP test should be based on a supplier’s (i.e. the platform, in two-sided markets) contribution to the final price. For example, in the case of firms that transport gas through pipelines, the SSNIP should be based on the price paid for transport, rather than the total price paid to the pipeline (which includes gas). In two-sided markets, it is often difficult to identify this baseline. In the First Data case, merchant banks paid two separate transaction fees to the card network: a switch fee and an interchange fee. The parties to the merger argued that only the switch fee should be increased because the interchange fee did not stay in the PIN debit platform pockets, but was ultimately given to financial institutions. They thus contended that a PIN debit monopolist would use its market power by increasing the switch fee, not the interchange fee. The DoJ countered that the total fee paid by merchant banks was the relevant benchmark because merchant demand depended on the sum of these two fees (Hesse and Soven, 2006). Again, choosing one option or the other can have an important impact on the results of a SSNIP. Notably, the interchange fee was much larger than the switch fee. As a result, the DoJ’s proposed approach led to a much larger price increase than a 5% to 10% increase in the total switch fees.

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32 See US merger guidelines, Example 8.
33 Pretrial brief, Section II.
To summarize, most economists agree that the SSNIP test should be adapted when applied in multi-sided environments. There is however little consensus on how this should be done.\textsuperscript{34} In the \textit{First Data} case, there was a reasonable alternative to almost every decision made by the DoJ on the SSNIP test. There is thus some way to go before the SSNIP test can be applied to two-sided markets with any consistency.

\textit{ii) EU cases: Groupement des Cartes bancaires and MasterCard}

Although \textit{Groupement des Cartes bancaires} and \textit{MasterCard} present factual differences, both concern credit card systems. In such systems,\textsuperscript{35} cardholder banks (the issuing segment) interact with merchants’ banks (the acquiring segment) through payment platforms such as Visa and MasterCard. The ultimate function of the platform is to perform payment transactions between issuing and acquiring banks. Importantly, the allocation of the platform’s costs among issuing and acquiring banks can drive cards’ adoption up or down. In this respect, a commonplace finding of two-sided markets theory is that it is often rational to allocate more of the platform’s costs on acquiring banks (and in turn merchants) in order to sponsor issuing banks (an in turn cardholders). Those allocation choices may, however, give rise to opportunistic behavior by members of the system and, as a result, credit card organizations usually establish internal rules to allocate costs, prevent free-riding and avoid hold-up. In turn, those internal rules may be looked upon with suspicion by antitrust authorities. Whilst there is broad agreement between payment systems and antitrust agencies, regulatory authorities and courts on the intrinsic necessity of such rules, they often disagree on their actual design and scope.

\textit{Groupement des cartes bancaires}

The \textit{Groupement des cartes bancaires} case concerned various measures introduced by a trade association of French banks in charge of the payment cards infrastructure. The trade association was seeking to achieve a certain balance between the members’ cards acquisition and cards issuance activities. In particular, the association was attempting to prevent some banks from free-riding on other banks in the system by only operating in the issuing segment, which was more lucrative and less costly than the acquisition segment. The association thus

\textsuperscript{34} Some economists have, however, optimistically referred to \textit{“principles of market definition in two-sided platform”}. \textit{See James D. Ratliff and Daniel L. Rubinfeld, “Is There a Market for Organic Search Engine Results and Can Their Manipulation Give Rise to Antitrust Liability?”}, \textit{Journal of Competition Law and Economics}, pp. 1-25, May 2014.

\textsuperscript{35} Both cases concern multi-bank settings. In multi-bank setting the issuing and acquiring activities of the platform can be operated by different banks. For example, this is, broadly, not the case with American Express which operates both the acquiring and issuing segments of its platform.
imposed a complex system of fees penalizing banks that were that were heavy issuers or that did not develop significant acquiring activities.\textsuperscript{36}

The European Commission and the General Court ("GC", which reviews Commission decisions in first instance) sought to determine whether these measures constituted anticompetitive coordination and whether the alleged multi-sidedness of the card system had any bearing on this question.

When addressing this issue, both the Commission and the GC acknowledged that there were externalities between the acquiring and issuing sides of the card system. However, they then considered that the “issuing side” of the platform was the only relevant market in which competition was to be scrutinized.\textsuperscript{37} Having followed this path, both the Commission and the General Court were drawn to the inevitable conclusion that the card system’s measures were presumably anticompetitive and could thus be dealt with under a quasi \textit{Per Se} prohibition rule. This is not surprising. Looking only at the issuing side of the market, the Card association’s measures look like garden variety naked restraints.

On further appeal, the Court of Justice opted for a more holistic approach.\textsuperscript{38} It found that the General Court had insufficiently taken into account of the economic context of the impugned fees. Instead, the General Court should have looked at both sides of the payment system.\textsuperscript{39} Had it done so, it would have found that the measures at stake sought to achieve a balance between the acquiring and issuing activities of the association, and that they were not “\textit{by their very nature}” harmful to competition.\textsuperscript{40} In turn, the Court hinted that a “rule of reason” approach might have been more appropriate.\textsuperscript{41}

The Court judgment in \textit{Groupement des cartes bancaires} was celebrated in the antitrust community. Some antitrust scholars and practitioners read in it a blueprint for the introduction of two-sided markets theory in European competition law. Any such hopes have

\textsuperscript{36} Three measures were a stake: first, a fee (called the MERFA) levied on banks that were heavy issuers and destined to finance the acquisition activities of the system; second, a membership fee and fees linked to the issuance of new credit cards; finally, a fee per card issued imposed upon members that had not been active during a given time period (in effect, this fee prevented banks from rapidly entering the issuing segment of the system).

\textsuperscript{37} The Commission recognized the existence of three separate markets: the issuing market, the acquiring market and the market for payment systems. See Case COMP/D1/38606, \textit{Groupement des cartes bancaires “CB”}, 17 October 2007, notably §180.

\textsuperscript{38} The EU’s equivalent to the Supreme Court.

\textsuperscript{39} See Case C-67/13 P, Fn. \textit{Erreur ! Signet non défini.}, §76, 77, 78 & 79.

\textsuperscript{40} See Case C-67/13 P, Fn. \textit{Erreur ! Signet non défini.}, §78.

\textsuperscript{41} In other words, restrictions of competition on one side of a two-sided market could not be folded in the “object” box, if there was a \textit{prima facie} justification for them pertaining to the other side of the market. However, this did not mean that they are immune of prosecution under the “effects” analysis
however been diminished by the concomitant ruling in *MasterCard*, which was handed down the same day (and by the same judges).

*MasterCard*

The *MasterCard* case confronted the Court with the next, alternative question: how to apply a “rule of reason” type analysis in two-sided markets? In the European context, competition agencies and courts that apply the rule of reason must first review anticompetitive effects under article 101(1) TFEU and then consider redeeming pro-competitive justifications under article 101(3) TFEU. On both counts, the Court’s approach strays from *Groupement des cartes bancaires*.

The case concerned interchange fees levied by banks that were members of the MasterCard card association. To summarize, once a card payment is processed in a merchant’s store, the MasterCard system requires the acquiring bank (the merchant’s bank) to pay a fee (normally smaller than the transaction fee) to the issuing banks. This is called an interchange fee. As previously explained, this allows issuing banks to subsidize the use of cards by consumers. It is these fees that were at stake in *MasterCard*. MasterCard – which operated as a trade association – was accused of “fixing” these multilateral interchange fees (hereafter, “MIFs”). Both the Commission and the General Court’s concern was that those multilateral fees subsequently served as a basis for the coordinated calculation of the charges imposed by acquiring banks on merchants (hereafter, “MSCs”), in turn inflating merchants’ costs.

On final appeal, the Court of Justice reviewed the theory of anticompetitive effects advanced in support of the case. It found that the Commission and the General Court had clearly characterized the potential anticompetitive effects of the MIFs. Like the General Court, the upper Court’s concern seemed to lie with the distributional effect of the MIFs. In the Court’s view, the MIFs were restrictive because they reduced “the possibility of prices [for merchants] dropping below a certain threshold”. By imposing a fee on the acquiring bank, the MIF inflated the base for the calculation of the MSC subsequently charged by acquiring banks to

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merchants.\textsuperscript{45} With this, the mechanism placed a lower limit on the MSC that in turn led to a transfer of surplus from merchants to acquiring banks.\textsuperscript{46}

In contrast, the Court made short shrift of the MIFs’ potential output effects. Nowhere did the judgment find it necessary to scrutinize whether the MIFs led to a deadweight loss. Similarly, the judgment does not envisage that switching costs from one side of the market to the other can increase output on all sides of the market (see notably Rochet and Tirole 2006; Weyl 2006, etc.).

The output effect of MIFs can be best understood with a short numerical example. Let us imagine two different states of the world: one where merchant fees are inflated by MIFs, and another where there are no MIFs. We could further imagine that in a world with MIFs merchants pay MSCs of 2€ per transaction and consumers nothing, whereas in a world without MIFs both merchants and consumers pay 1€ per transaction. If consumer’s demand is highly elastic they might use their cards far less often when they are charged 1€. One could thus imagine a situation where 500 consumers are willing to use their card for 0€ and where 100 consumers are willing to use their cards for 1€. At the other end of the platform, merchant’s demand for card transactions is less elastic: 500 merchants are willing to conclude transactions at 2€ per transaction and only 600 merchants might be willing to conclude transactions at 1€. Assuming that both merchants and consumers only conclude a single transaction, the two states of the world give the following results. In a world with shared fees (no MIFs), 600 merchants would like to conclude card transactions, but only 100 have that possibility. In short, merchants are rationed: in this world there are simply not enough consumers to satisfy the merchants (and cover their investments into cards systems). Only 100 card transactions are made. In the second world, 600 merchants are willing to conclude card transactions, as are 500 consumers. As a result, there are 500 card transactions. Compared to the first state of the world, it is true that 100 merchants have each lost 1€ in consumer surplus. But on the other hand, 400 extra merchants and 400 extra consumers can now conclude card transactions.

\textsuperscript{45} See Case C-382/12 P, Fn. 42, § 193 and 195
\textsuperscript{46} Up to the point where the MSC is so high that merchants refuse to pay (their reserve price). This point is nicely illustrated in §158 of the General Court’s judgment. Which in more convoluted terms essentially argues that the with the MIF there is both a lower bound to the fee that banks can charge – they do not want to operate at a loss – and an upper bound because they cannot charge too many merchants more than their reserve without losing profits.
In this hypothetical example, merchants are better off paying more because they are no longer rationed. Increased MIFs can thus lead to Pareto improvements. Of course, this is not always the case.

For a start, higher MIFs don’t necessarily increase a card system’s output. For example, the extra sums paid by merchants might be absorbed by the card payment platform. Moreover, consumers’ elasticity might not be as high as in our example. Even if it is passed on to consumers, the increase to the MIF might not increase output if consumer demand is less elastic than merchants’. Finally, platforms can also charge merchants well beyond the point where consumers’ adoption of the platform is increased (Bourguignon, Gomes and Tirole, 2014; Bedre-Defolie and Calvano, 2013.). In addition, some empirical research suggests that interchange fees and their suppression have little effect on consumer welfare (Carlton, 2009).

More importantly, regardless of output effects, MIFs impose negative externalities on cash shoppers (Baxter, 1983). This occurs due to the combination of merchant fees and no-surcharge rules (merchants must charge the same price to all customers regardless of their payment method). In this setting, merchants can pass on the cost of the merchant fee to all shoppers indistinctly (through increased retail prices). Both card and cash shoppers will thus bear the costs generated by card payments. Moreover, the MIFs generate an even higher adverse distributional effect on cash shoppers, because cardholders are often subsidized by the issuing bank. The latter thus may bear less of the card system’s costs than cash shoppers, though the magnitude of this effect remains ambiguous (Baxter, 1983; and Evans, 2014).

Interestingly, the Court did not wade into this intricate discussion. It concluded that the MIFs exerted anticompetitive effects on microscopic distributional grounds, by finding that merchants were harmed through inflated costs. Possibly, the Court preferred to abstain from undertaking complex comparisons across diverse groups of users, and this is understandable. After all, why favor some economic agents on one side – cardholders – at the expense of economic agents on the other side – merchants? But this fails to capture that the positive effects of MIFs might ultimately trickle back to the same group of users that was allegedly harmed, ie merchants, through an increase in the overall number of cards transactions, and in turn an expansion of total economic output (it has indeed been suggested that the use of payment cards can have a positive impact on overall spending47). However, the Court failed to come full circle, and grasp that MIFs might potentially be used to subsidize card adoption.

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In turn, this could translate into more card transactions for merchants and shoppers alike. Although this virtuous effect is far from certain, one might regret that is was not more central to the Court’s reasoning.

The Court also reviewed pro-competitive justifications put forward by the parties. In that respect, agreements found to restrict competition can benefit from an exemption from the prohibition if they fulfill the four conditions set out at Article 101(3) TFEU, the first of which is to contribute “to improving the production or distribution of goods or to promoting technical or economic progress”. The parties thus argued that the MIFs benefited cardholders and that this had not been taken into account by the Commission and the General Court. The Court took a different tack. It held that when customers on both sides of a two-sided market are not substantially the same, at least some of an agreement’s potential benefits need to accrue to those within the relevant market. Accordingly, because the relevant market was the acquiring side of the platform, some of the MIFs’ benefits needed to fall upon merchants and not just upon cardholders. The Court in turn observed that the parties had not contested the General Court’s conclusion that merchants did not benefit. This was therefore the end of the story. As has already been mentioned, it simply does not follow that higher prices necessarily harm merchants. One can only wonder what might have happened if the parties had argued that merchants benefited from the MIFs through increased output.

Lessons from Groupement des cartes bancaires and MasterCard

A number of points can be taken away from the Groupement des cartes bancaires and MasterCard rulings.

For a start, that the problems encountered in Groupement des cartes bancaires are not unique to two-sided markets. The gist of the problem was that some banks were free riding on others. Such dynamics are not particular to payment cards and can be encountered in standard distribution networks where opportunistic retailers often try to free ride on before and after-sales investments made by others. In that regard, applying the theory of two-sided markets might simply have been pouring old wine into a new bottle. This is not to say that the trade

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48 See Article 101(3) TFEU and Case C-382/12 P, Fn.42, §230 and 234.
49 See Case C-382/12 P, Fn. 42, §228 & 243
50 Ibid., § 242.
51 See Case C-382/12 P, Fn. 42, § 243.
52 Finally, it ought to be noted that merchants might benefit from MIFs because they grow the cardholders base on the other side of the market. This is, in particular, true if installing card terminals and concluding agreements with acquiring banks involves heavy fixed costs. In such cases, merchants might be better off, despite the higher fees, because the increased number of cardholders allows them to achieve scale economies. The Court ruling does not address this issue.
association was not ultimately seeking to balance its activities on both sides of the card platform. However, in doing so it faced the age-old problem of free-riding (or cream skimming): most banks only wanted to enter the lucrative segment of the market (card issuing), even though the system also required acquiring activities in order to provide a functioning product. For this reason, the theory of two-sided markets might not have been necessary to understand or resolve the case.

Second, the CJEU was faced with numerous tradeoffs between consumer surplus and platform output, yet a clear trend does not emerge from the cases. In *Groupement des cartes bancaires*, the Court appears to have favored platform output. Indeed, as the Court itself accepted in *Groupement des Cartes bancaires*, the fee system undoubtedly reduced the surplus of some members of the grouping on the issuing side of the market.\(^{53}\) Despite this adverse distributional effect, the *Groupement des Cartes bancaires* Court insisted that the measures at stake aimed to foster activities on the acquisition market. In contrast, in *MasterCard*, by concluding that a price increase on one side of a platform was sufficient to prove anticompetitive effects,\(^{54}\) the Court only took one side of the platform into account. In doing so, the Court did not require any proof that the MIFs restricted platform output. This schism is unfortunate. As many economists have noted, in two-sided markets there are at least two components to look at: the system’s total output and the surplus that accrues to parties on both sides of the platform (Weyl, 2006; and Evans and Schmalensee, 2012). At the very least, economists agree that in two-sided markets a price rise on one side can, for a given price level, have opposite effects on consumer surplus and output.\(^{55}\) The upshot is that authorities will often have to choose between these objectives. By favoring different objectives in *Groupement des cartes bancaires* and *MasterCard*, the Court might be sending mixed signals to companies that operate in multi-sided markets.

In addition, the narrow version of the consumer surplus standard applied in *MasterCard* (which focuses solely on the immediate price effect on merchants) significantly reduces the applicability of the theory of two-sided markets to competition law. If a price increase on one side of a platform is systematically found to have anticompetitive effects, then the theory of two-sided markets becomes nearly irrelevant for competition law purposes.


\(^{54}\) See Case C-382/12 P, Fn. 42 §193.

\(^{55}\) There is no agreement on how common or uncommon such a result might be. Weyl (2006, p.35) suggests that these objectives often contradict themselves. Rochet and Tirole’s model (2003, p.1005) yields different results. They conclude that often the profits of all parties to a platform are proportional to the total volume of transactions that take place.
To summarize, the Cartes bancaires and MasterCard cases show that the theory of two-sided markets has been formally recognized by European case law, however there is still a long way to go before its complex implications are entirely understood.

b) Cases where the theory was not (clearly) taken into account
Two-sided markets were probably present well before economists discovered and theorized them. If this is the case, the literature suggests that, without the benefit of theories of two-sided markets, authorities and courts may have committed decisional errors in the course of enforcing the competition rules.

In what follows, we focus on two iconic cases of US and EU antitrust law in the areas of coordinated and single firm conduct. We find that the theory of two-sided markets would probably not have affected the general outcome of these cases and that authorities and courts often used proxies or rules of thumb that approximated what is today known as the theory of two-sided markets.

i) Single firm conduct: Microsoft in the US and the EU
The Microsoft case is one of the most high profile cases in US and European antitrust history. In the US, the case notably focused on Microsoft’s maintenance of its Windows operating system (“OS”) monopoly through the exclusion of middleware developers such as Netscape. The Court of Appeals found that Microsoft had sought to protect its OS monopoly from the platform threat posed by middleware providers. This was achieved through a variety of tactics, such as contractually preventing OEMs from pre-installing rival browsers, integrating Internet Explorer and Windows (notably by removing Internet Explorer Add/Remove utility), attempting to exclude Java, etc. Ultimately, the Court of Appeals upheld large parts of the District Court’s ruling which found that Microsoft had unlawfully drawn developers away from rival platforms that might otherwise have challenged Microsoft’s OS monopoly.

In Europe, Microsoft was found guilty of excluding rivals from the media player market, through the tying of “Windows Media Player” (hereafter: “WMP”) with its dominant OS Windows. The Commission and the General Court’s theory of abusive tying was that with pre-installation of WMP on Windows, Microsoft had made its media player ubiquitous.

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57 Our analysis focuses on internet browsers, even though other types of middleware (such as Java) were also at stake.
59 See Case T-201/04, Microsoft v. Commission, 17 September 2007, ECR 2007 II-03601, § 979 and §, 1037 to 1040. The Court notably found that rival media players could not achieve similar market penetration either by
Content providers and software developers were induced to use WMP-compatible language.\textsuperscript{60} In turn, this made WMP more attractive to users, creating a "positive feedback loop"\textsuperscript{61} which foreclosed rival media players.\textsuperscript{62}

Given that software markets are often mentioned in two-sided markets theory, it is worth looking first into the issue of whether the American and European Microsoft cases features two-sided markets, and second whether the application of two-sided markets theory in those cases could have substantially changed their outcome.

\textit{Did the US and EU cases concern two-sided markets?}

At first blush, OSs, media players and internet browsers exhibit the basic features of two-sided markets. The three products sit between end-users and content providers and there are strong indications that the pricing structure of these types of platforms can, for a given price level, have a strong impact on output.\textsuperscript{63}

However, not all three products are genuine two sided markets. On the one hand, OSs and media players certainly are. OSs match program and application designers with end-users. And Media players connect users and content providers.\textsuperscript{64} On both platforms, users on one side are likely to attach some value to the size and quality of the group that is present at the other end of the platform.\textsuperscript{65}

On the other hand, for web browsers the analysis is not as straightforward. Web browsers sit between a number of different groups, most notably: end users, web developers, and client side codes.\textsuperscript{66} The existence of cross-platform externalities, typical of two sided platforms, is less clear in the case of web browsers. The magnitude of a browser’s user base is indifferent for web developers and vice versa for a number of reasons. First, most mainstream browsers offering their players free for download (§1050 to 1052) or by concluding deals with OEMs who preinstall Windows (and WMP with it) on the PCs they sell (§ 1043 to 1048).

\textsuperscript{60} \textit{Ibid.}, §983, § 1060.
\textsuperscript{61} \textit{Ibid.}, § 1061 to 1077
\textsuperscript{62} \textit{Ibid.}, § 988 and § 1078 to 1087.
\textsuperscript{63} See notably Economides and Katsamakas, 2006.
\textsuperscript{64} Users are likely to value players that allow them to access as much relevant content as possible, while content providers might prefer players that attract the most users, especially if porting content from one player to another involves heavy costs. If porting were timeless and free, content providers could simply choose to develop content for all media players.
\textsuperscript{65} One should not, however, overgeneralize. Although it is probably the case that Microsoft’s users value extra applications, this is not automatically the case for all OSs. Similarly, content providers might not value the number of users on the other side of the platform if porting was timeless and free.
\textsuperscript{66} I.e. the language which websites use to interact with clients as opposed to servers).
are compatible with all mainstream client side codes; users can thus access any website with any browser. Second, websites do not need to be optimized in order to run on specific browsers. As a result, web developers do not have to commit themselves to a particular browser in order to reach users. That said, the theory of two-sided markets may become relevant when companies use browsers as a gateway to other services where cross-platform externalities might reappear (for example, Google offers its Chrome browser for free as a way to encourage consumers to use Google’s other services, including search; Mozilla earns money by integrating Google’s search engine as the default search engine) or as a rudimentary OS (this was ultimately the goal of Netscape, and was initially how Chrome OS was meant to function). In such settings, the two-sidedness of browsers, or at least of the tying product, is much clearer.

Technicalities aside, the OSs and the Media Player markets at play in the Microsoft cases thus seem to possess many of the characteristics of two-sided markets, in contrast with the web browser market. Accordingly, one might ask how the US Court of Appeals and the EU General Court’s analysis withstand examination under the theory of two-sided markets.

Could the theory of two-sided have affected the outcome of the cases?

Both the US and European Microsoft cases predate the emergence of the seminal models of two sided markets. Despite this, the US and EU decisions are broadly in line with the main insights of the theory, even though they relied on a plain vanilla theory of network effects. They understand that tying-down users on one side of a platform can increase adoption by users on the other side. In other words, the decisions correctly identify the existence of cross-

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67 See notably, http://en.wikipedia.org/wiki/Comparison_of_web_browsers. For example, HTML5 is for all practical purposes, supported by all mainstream browsers, as are most mainstream image formats. Indeed, most of these codes are given away for free, this is for example the case of HTML5. Most of the owners of patents used in HTML5 have committed to royalty-free licensing. See notably: http://www.w3.org/2004/01/impl/40318/showCommitments and http://www.w3.org/2014/10/html5-rec.html.en.


69 Ibid.


71 Indeed, the Commission objected to Microsoft’s tying as early as 2001, even though the seminal paper on two-sided markets (Rochet and Tirole, 2003) was only published two years later. See notably, http://europa.eu/rapid/press-release_IP-01-1232_en.htm?locale=en; The same can be said for the US District Court and Court of Appeals cases which were decided in 2000 and 2001, respectively.
group externalities. On this later aspect, the analysis of the US Court of Appeals is particularly prescient.\textsuperscript{73}

Given this, the added value that a two-sided analysis might have brought in those cases is uneasy to gauge. Of course, the two sided markets literature could have provided stylized wording to improve the authorities’ reasoning, in particular in relation to the theory that Microsoft was seeking to become a gatekeeper on the multimedia content side of the market. Such a theory might however have been undermined on the facts. At the time of the EU ruling in particular, iTunes and Youtube were exploding onto the scene, competing aggressively with Microsoft for content providers and developers.\textsuperscript{74} Even though they might not have been substitutes from a users’ standpoint, both Youtube and iTunes competed with Windows Media Player on one side of the market (ie the developer’s side of the market).

Similarly, the theory could have given ammunition to Microsoft in support of its defense that the tie was objectively justified. Many economic papers suggest that tying in two-sided markets might be more efficient even if it leads to foreclosure (Choi, 2010, and Evans and Schmalensee, 2012). Surely such a finding would probably not have influenced the ability of the Court of Appeals and of the Commission to reach a finding of infringement. On both sides of the Atlantic, objective justifications and efficiency defenses are rarely successful in single firm conduct cases. However, such arguments may have made the task of the authorities more difficult.

On the whole, applying the theory of two-sided markets in those cases might only have been marginally useful and would possibly have raised decisional costs. Not only did authorities intuitively grasp much of the contribution that this new economic literature had to offer but, in areas where they didn’t, it is not clear whether the theory of two-sided markets would have led to a different outcome.

\textit{ii) Coordinated conduct: eBooks in the US and EU}

\textsuperscript{73} Ibid., p.18: “Browser usage share is important because, as we explained in Section II.A above, a browser (or any middleware product, for that matter) must have a critical mass of users in order to attract software developers to write applications relying upon the APIs it exposes, and away from the APIs exposed by Windows. Applications written to a particular browser’s APIs, however, would run on any computer with that browser, regardless of the underlying operating system. “The overwhelming majority of consumers will only use a PC operating system for which there already exists a large and varied set of ... applications, and for which it seems relatively certain that new types of applications and new versions of existing applications will continue to be marketed....”

The eBooks sector has also been scrutinized by antitrust authorities on both sides of the Atlantic. Cases were successfully brought against Apple and a number of eBook publishers by both the American⁷⁵ and European⁷⁶ authorities. In brief, e-book publishers were suspected of colluding with Apple so as to undermine Amazon’s aggressive pricing strategy. From 2007 onwards, Amazon had maintained a $9.99 pricing policy for a number of eBooks sold on its platform. Believing this policy would ultimately depress their margins, eBook publishers sought to convert Amazon from a wholesale model – where Amazon could freely set the retail price – to an agency model – where publishers set the retail price themselves. Faced with Amazon’s refusal, the eBooks publishers turned to the new entrant, Apple, and concluded agency agreements containing an MFN (most favored nation) clause which threatened to disrupt Amazon’s supplies. Should Amazon continue to sell its eBooks at a loss for $9.99, all eBooks sold on Apple’s platform would have to retail at the same price, even though Apple would retain a 30% commission. Under this contractual arrangement, an eBook bought by Amazon for $12.99 and sold for $9.99 would, in effect, have to be “sold” to Apple for $6.99. This would have proved untenable for eBook publishers. Facing catastrophic losses if they failed to switch other buyers to an agency model, the eBook publishers found a new momentum to bring Amazon back to the negotiation table and, ultimately, bury the wholesale model for good. Amazon was left with no other choice but to give in to the publisher’s demands or risk being denied access to their eBooks.

Although a cursory glance suggests that eBook platforms have many of the characteristics of two-sided markets,⁷⁷ both cases were decided on the basis of a single-sided market analysis. This might come across as surprising. As observed by Jeff Bezos,⁷⁸ Amazon’s core business consists in bringing together book publishers (in digital format) and readers.⁷⁹ Moreover, the ability to access a large variety of works is of utmost importance to readers, especially if they must pay for their reading device, which is systematically the case. On the other side of the Amazon platform, it is unclear how much publishers value the number of users. Indeed,

⁷⁷ In that respect, a quote from the Amazon’s CEO seems particularly relevant: “Ultimately we’re an information broker. On the left side we have lots of products; on the right side we have lots of customers. We’re in the middle making the connections. The consequence is that we have two sets of customers: consumers looking for books and publishers looking for consumers. Readers find books or books find readers”. See Caillaud and Julien, 2003.
⁷⁸ In doing so, they reduce searching and transport costs for consumers, and they allow publishers to enjoy enhanced benefits stemming from the long tailed distribution of revenues (publishers no longer need to decide how many books should be printed and no longer need to store books before they are sold). In that respect, having as wide a library as possible is crucial for platforms to maximize revenues. See notably http://archive.wired.com/wired/archive/12.10/tail.html?pg=1&topic=tail&topic_set.
multi-homing might be a particularly attractive option for publishers due to the presumably low cost of porting a book from one medium to another. Finally, it is conceivable that an eBook platform’s pricing structure can, for a given price level, affect output. In that respect, recent data offered by Amazon suggests that consumer demand is highly elastic in the eBook sector, very slight changes to the price of eBooks might thus have vastly boosted demand for them.

The eBooks cases illustrate how difficult it is to go from theory to practice. From a theoretical perspective, the agency agreements concluded by the eBooks publishers with Apple and Amazon had the effect of turning a two-sided market into a one-sided market. But the theory says little of the welfare implications of this. Armstrong’s “competitive bottlenecks” model suggests that in situations such as the eBooks market (Armstrong, 2006) the multi-homing side – in this case the publishers – will face monopsony prices to reach the exclusive users of each competing platform – in this case the readers. According to this model, eBook platforms would not capture any surplus and the benefits of their monopsony power over publishers should be transferred to readers. A two-sided market setting should thus be particularly favorable for consumers. Authorities might have inferred that moving towards a one sided market under the agency model would harm consumers and warrant antitrust intervention. This analysis is however incomplete. As of yet, the welfare consequences of multi-sidedness vs. one-sidedness remain poorly understood. Moreover, the fact that two-sided “competitive bottlenecks” might yield significant welfare benefits, does not imply by necessity that one sided markets cannot bring equal welfare improvements.

V. Conclusion
In his famous treatise titled “A theory of industrial organization”, Jean Tirole – who won the 2014 Nobel Prize in Economic Sciences – stressed that “[I] do not want to overemphasize the practical contributions of the theory [in this case, industrial organization]… it has done little to help practitioners distinguish between competing theories. But it definitely has practical content”. The same can be said about the theory of two-sided markets.

80 See notably the following statement published by Amazon: http://www.readersunited.com/
81 See Fn. Erreur ! Signet non défini. Alternatively, one could speculate that Amazon was trying to change the price that customers were willing to pay for an eBook and ultimately force publishers to adapt their prices. It is also plausible that part of the loss that Amazon made on some eBooks was in part compensated by revenue from other, more profitable, eBook sales or by advertising revenue, see notably http://services.amazon.com/content/product-ads-on-amazon.htm/ref=footer_pads?Id=A2P4DSFooter
Although in many cases the theory has a strong explanatory value, it is far from unified and risks being applied inconsistently,\textsuperscript{82} causing unwarranted confusion or illegitimate distinctions. Ultimately, policy makers risk falsely diagnosing or missing two-sided markets, in turn committing type I and II errors.

If, as many economists advocate, the theory of two-sided markets is to be further implemented by competition authorities, a necessary prerequisite is that it be sufficiently circumscribed. Further research is therefore needed in order to better turn theory into policy.

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\textsuperscript{82} Lawyers accustomed to the “one word-one meaning” principle may occasionally be led to draw flawed distinctions amongst the above concepts. Lawyers are used to a strong – and at times obsessive – degree of lexical discipline. Therefore, they often take for granted that different words conceal distinct meanings.
References:


Appendix I: Comparison of potentially two-sided markets

a) Payment systems

- Rochet and Tirole: Page 648. Yes, if three conditions are met: no surcharging; if platform’s MIF is passed through to cardholders and merchants; and if dual-pricing system doesn’t lead to transaction costs.

- Evans and Schmalensee: Implicit in paper that payment systems are two-sided markets; many references to them as examples; no mention that they might not be two-sided markets in some circumstances.

- Eisenmann, Parker Van Alstyne: Page 2. Yes.

b) Video Games

- Rochet and Tirole: Page 645. Yes. Presumably with similar caveats as in the case of payment systems. For example, under an agency model rather than a retail model, video game consoles might not be true two-sided markets.


- Eisenmann, Parker Van Alstyne: Page 4. Yes

c) Operating systems

- Rochet and Tirole: Page 646. Yes. Usual caveats apply.

- Evans and Schmalensee: Pages 17 and 32, notably. Yes.

- Eisenmann, Parker Van Alstyne: Page 2. Yes

d) Online recruitment

- Rochet and Tirole: Not mentioned in paper. Probably not two-sided; users on both sides of the platform might be able to reallocate the platform’s costs among themselves.

e) Shopping malls
   - Rochet and Tirole: Not mentioned in paper. Maybe not two-sided. Shoppers and retailers are free to reallocate the costs of the platform.
   - Evans and Schmalensee: Pages 14 and 15. Yes.

f) Academic journals (authors and readers)
   - Rochet and Tirole: Not mentioned in paper. Probably yes. Academic journals must choose a pricing structure which, presumably, has a strong impact on output. There do not seem to be any obvious ways for parties to bargain around a journal’s price structure.
   - Eisenmann, Parker Van Alstyne: Not mentioned in paper. Yes. Readers value journals with quality publications, while authors value journals with many readers.

g) Industrial standards
   - Rochet and Tirole: Page 645. Yes, with usual caveats.
   - Evans and Schmalensee: Not mentioned in paper. Probably, standards solve transaction cost problems between producers and patent holders. Both would like to interact, but might not always be able to do so absent standards.
   - Eisenmann, Parker Van Alstyne: Not mentioned in paper. Unclear. Buyers value standards which contain the best patents. Patent holders might value standards which contain other strong patents (because they are valuable to consumers).

h) Automobile engines
   - Rochet and Tirole:
Not mentioned in paper. Probably not two-sided markets. Auto owners and refueling stations can reallocate a technology’s pricing structure.

- **Evans and Schmalensee:**
  Not mentioned in paper. People do not buy engines because they want to interact with refueling stations. This example might be closer to traditional complementary goods situations, where the cost of running an engine influences auto owners’ initial investment decisions.

- **Eisenmann, Parker Van Alstyne:**
  Yes, p.4. Cars owners value means of propulsion that offer many refueling/recharging options. Fuelling and recharging stations value technologies that have many users.

i) **Airports**

- **Rochet and Tirole:**
  Not mentioned in paper. Probably not two-sided. Airlines can and do charge different prices depending on the airports of departure and arrival. This suggests that flyers and airlines often reallocate the platform’s costs among themselves.

- **Evans and Schmalensee:**
  Not mentioned in paper. Probably yes. Flyers and airlines could not interact without airports.

- **Eisenmann, Parker Van Alstyne:**
  Not mentioned in paper. Probably yes. Flyers might value airports that give them access to more connecting flights, while airlines might value airports that give them access to more flyers.

j) **Supermarkets**

- **Rochet and Tirole:**
  Not mentioned in paper. Maybe yes. Suppliers and shoppers might not be able to negotiate away the platform’s price allocation (if the supermarket controls the retail price). Non-neutrality might be highlighted by the fact that, often, some suppliers pay for shelf placement while others, which are more valuable to consumers, do not.

- **Evans and Schmalensee:**
  Not mentioned in paper. Yes. Shoppers and suppliers need each other; shoppers want to buy goods, suppliers want to sell them. Although these transactions could theoretically take place directly, outside of shops, such a system might be prohibitively expensive (shops significantly reduce transaction costs).

- **Eisenmann, Parker Van Alstyne:**
Not mentioned in paper. Yes. To some extent, shoppers value supermarkets that carry more products and marquee brands, while suppliers might value supermarkets that give them access to more shoppers.

**k) Conferences**

- **Rochet and Tirole:**
  Not mentioned in paper. Probably yes. A conference’s pricing structure might well affect output. Parties cannot readily bargain around the platform’s pricing structure.

- **Evans and Schmalensee:**
  Not mentioned in paper. Yes. Conference attendees and speakers want to interact but need a venue to do so effectively.

- **Eisenmann, Parker Van Alstyne:**
  Not mentioned in paper. Yes. Conference attendees value quality speakers, while speakers probably value high profile conferences with many attendees.

**l) Franchising (absent RPM)**

- **Rochet and Tirole:**
  Not mentioned in paper. Whether or not a franchise’s price structure affects output might depend on whether it controls the prices charged by franchisees. Without RPM, franchisees and customers should be able to bargain away the platform’s price structure.

- **Evans and Schmalensee:**
  Not mentioned in paper. Unclear. Franchisees and customers would like to interact by selling and consuming goods, respectively. It is unclear to what extent they need franchises in order to do so.

- **Eisenmann, Parker Van Alstyne:**
  Not mentioned in paper. Yes. Franchisees value franchises with many customers, while customers might attach some value to franchises that are present in many locations.

**m) Collecting societies**

- **Rochet and Tirole:**
  Not mentioned in paper. Probably yes. In many instances, artists and consumers cannot reallocate the collecting society’s price structure (especially if exclusive licenses are concluded). The price structure chosen by the collecting society might well affect output (parallel with industrial standards and pools).

- **Evans and Schmalensee:**
Not mentioned in paper. Clients and artists need each other, but could probably not strike deals without collecting societies (due to prohibitive transaction costs).

- **Eisenmann, Parker Van Alstyne:**
  Not mentioned in paper.

  **n) Highways**
  - **Rochet and Tirole:**
    Not mentioned in paper. Probably not two-sided. Although highways must make price structure decisions (charge vehicles or fuel stations), motorists and fuel stations might be able to bargain around these price decisions.
  
  - **Evans and Schmalensee:**
    Not mentioned in paper. Probably not two-sided. Motorists need petrol stations and fuelling stations need motorists. They do not need highways in order to interact, even it is convenient for motorists to have petrol stations on the highway.

  - **Eisenmann, Parker Van Alstyne:**
    Not mentioned in paper. Maybe yes. Motorists might, to some extent, value highways that have more/better petrol stations. Petrol stations value highways that have more traffic.