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ABSTRACT

This paper evaluates current antitrust policy in light of our current understanding of how transaction costs influence the ability of firms and consumers to deal with market power. The paper shows how the failure to consider transaction costs can lead to erroneous policy decisions. Many models employed today make simplifying assumptions about transaction costs that can lead to biased results in analyzing vertical and horizontal issues. The increased ability to monitor the effect of promotional behavior should cause us to reexamine whether free riding justifications, previously accepted as justifications for various vertical restrictions, still hold. Nash bargaining and Nash-in-Nash models raise concerns about the simplified assumptions assumed in which supposedly high transaction costs restrict the choice and form of the assumed competitive alternatives. The increasing importance of two-sided markets together with an understanding of transaction costs is needed to understand antitrust conduct in those markets. The recent *Amex* case is likely to lead to confused litigation in these types of markets. Finally, the establishment of property rights for a consumer to his or her data could fail to remedy antitrust concerns that certain dominant firms are immune to competition because consumers do not own their data unless that property right is limited so that consumers cannot exclusively sell their data to one firm.

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1. Introduction

This paper evaluates current antitrust policy in light of our current understanding of how transaction costs influence the ability of firms and consumers to deal with market power. Ever since [Coase \(1937\)](#) first established the importance of transaction costs to understand the theory of the firm and especially since [Alchian and Demsetz's \(1972\)](#) and [Williamson's \(1975\)](#) work, the study of transaction costs has been central to understanding several aspects of firm and market organization. Coase's famous article (1960) on social costs explained that in the absence of transaction costs, agents with full information would always reach efficient agreements and there would be no externalities. His article then underscored the importance of property rights and transaction costs in understanding why certain externalities exist. The externality that competition authorities typically study is the one caused by the gap between price and marginal cost that arises from the existence of market power, which is typically defined as the ability to set price profitably above marginal

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cost. Demsetz (1968) observed that Coase's work implied that, in a world of no transaction costs, there are no deadweight losses from market power, with the implication that perhaps there is no need for competition policy in such a world. By transaction costs, I mean those costs of writing and enforcing contracts that arise in a world of uncertainty with asymmetric information where parties may have conflicting incentives. Of course, as Coase and Demsetz clearly recognized, transaction costs do exist and so there can be harms from the creation of market power.

Williamson (e.g., 1974, 1975, 1983) greatly expanded on Coase's and Demsetz's work and examined how a detailed understanding of transaction costs could improve then current antitrust doctrines.¹ Joskow (1991) explained the relationship of transaction cost economics to an improved understanding of certain antitrust doctrines, especially vertical practices. For example, Joskow used transaction cost savings to explain that certain non-price vertical contractual restrictions in the context of franchising should be viewed as efficiency-enhancing rather than as an interference with competition. This paper develops further the implications of transaction costs to what is now current antitrust doctrine.

Transaction costs limit the ability to use a contract to avoid inefficiencies. The transaction cost of reaching an agreement will depend on many factors including available information, the complexity of the terms, as well as the ability to monitor the terms of any agreement. Recently, we have seen an explosion in the amount of information available to firms about individuals, and perhaps to individuals about firms. We also know that many business-to-business arrangements which comprise the bulk of transactions in the economy involve long negotiations often containing many pricing and quantity terms much more complicated than just a uniform price per item. Yet it is often the case that models of uniform pricing, especially in the short run, remain the primary concern in many antitrust investigations. Even in more sophisticated models that allow for some nonlinearity in pricing, the form of the contract is often prespecified independent of whether the specification makes sense. How does an understanding of transaction costs with their effect on the form of feasible contracts alter our understanding of where antitrust authorities should reduce the aggressiveness of their enforcement and where does it suggest that they should increase the aggressiveness of their enforcement relative to competition policy today? And how does that understanding inform us about the reliability of the models that are in use today?

A summary of my conclusions is as follows:

- Analyses of horizontal mergers in industries that serve final consumers typically have focused on a uniform per unit price. While this is often a reasonable description of pricing in such markets, that may be changing and, if so, that would affect antitrust analysis in those markets, especially the evaluation of efficiencies. In industries where business-to-business dealings predominate and where transaction costs are already sufficiently low so that nonlinear pricing² is used or would be used post-merger, the benefits of certain efficiencies have likely been underestimated in evaluating horizontal mergers. In all horizontal mergers, the adverse effect on investment incentives should receive more emphasis, especially when significant rents at the margin can be transferred from buyers to sellers as a result of nonlinear pricing. The failure to address that difficult question is especially problematic in industries undergoing rapid technological change.
- Vertical mergers which are challenged because they raise rivals' costs have recently received increasing antitrust scrutiny, at least in the US.³ Although some vertical mergers can harm competition, the theory that vertical mergers can harm competition by raising rivals' costs⁴ depends on some specific assumptions regarding transaction costs, assumptions that are often never tested and likely fail in many cases. For example, a common assumption is that absent the vertical integration, contracts are too complicated to devise that would achieve either the elimination of double marginalization or the same anticompetitive result as the vertical integration.
- Vertical restrictions are typically justified as a means of overcoming some free rider problem, often involving sales effort. As a result of such justifications, the restrictions which would otherwise harm competition are allowed. Such restrictions and their justifications, especially for contracts that reference a rival's product, are at the heart of current cases involving credit cards, global distribution systems (GDS, i.e., airline reservation systems) and hotel booking sites.⁵ Free riding justifications to such vertical restrictions should be evaluated more critically than in the past especially in light of new technological abilities that lower the transaction costs of monitoring and preventing free riding.
- Negotiations involving one-on-one bargaining would seem to epitomize many agreements, especially in business. Such negotiations are often protracted despite their high transactions costs and therefore raise the issue whether the contracts reached are efficient. The use of the Nash bargaining solution and Nash-in-Nash solution has proved popular recently in these situations to analyze antitrust issues and could be one way to specify contracts other than uniform price per unit.⁶

¹ For example, Williamson (1983) explained how the practice among some multi-plant horizontal competitors to rely on each other for some deliveries to final customers (so-called "swaps") was explainable by transaction costs and not just by the then prevailing theory that such contracts are a form of conspiracy.

² I use the term "nonlinear pricing" as a shorthand throughout the paper to refer to any contracting arrangement that is more complicated than specifying a uniform price per unit.

³ See, e.g., *United States of America, Appellant v. AT&T, Inc., et al., Appellees*, 1:17-cv-02511, USCA Case 18-5214, February 26, 2019. I served as an expert on behalf of AT&T.

⁴ See, e.g., Salop and Scheffman (1983) and Salop (2018).

⁵ I have been involved in cases adverse to credit card companies and GDS systems.

⁶ See, e.g., Crawford et al. (2018), Ho and Lee (2017), and Sheu and Taragin (2017) who use these concepts to analyze vertical issues, while Gowrisanken et al. (2015) use them to analyze horizontal issues.

I raise some concerns about their use in merger analysis, especially in the context of vertical models of raising a rival's costs.

- The work of [Rochet and Tirole \(2006\)](#) explained that two-sided or multi-sided markets arise only because of the existence of transaction costs. Because different economic implications for competition policy can arise if the market is one-sided *versus* multi-sided, this means that transaction costs should be at the heart of antitrust analysis in order to discern whether the market is multi-sided or not. Certain conduct can harm competition in multi-sided but not one-sided markets. The increasing prominence of multi-sided markets will likely lead to difficult antitrust issues under vertical restraints doctrine (and perhaps tie-in sale doctrine), especially in light of the recent Supreme Court decision in *American Express* (henceforth, *Amex*).⁷
- There has been much discussion, especially in Europe, of the need to be concerned about rivals' access to data in order to compete, with some suggesting that consumers should have a property right in their data.⁸ The ultimate barrier to entry, as [Demsetz \(1968\)](#) once noted, is a property right. Coase taught us that the assignment of property rights matters to society's (and consumers') welfare in the presence of transaction costs. [Demsetz \(1967\)](#) explained that whether a property right should exist at all is itself endogenous, depending on the benefits and costs that arise from its creation and enforcement. I explain that the antitrust concerns with rivals' access to data cannot be addressed solely by giving consumers a property right in their own data. I show that assigning such a property right to consumers may fail to mitigate antitrust concerns unless limitations are placed on that property right. Specifically, no consumer should have the ability to sell an exclusive right to his or her data – that is, no one should be allowed to sell that data exclusively, as would occur with “property” if one is concerned about rivals' access to data.

After reviewing some basic insights from transaction costs and externalities in the next section, the paper then goes through the bases for each conclusion. I will base my discussion mostly on US antitrust doctrines since those are the one that I am most familiar with but the applications to competition policy generally should be straightforward.

2. Basics

In a typical antitrust analysis, one asks whether the conduct at issue creates competitive harm to society and to consumers. However, the conduct that can be examined under the U.S. antitrust laws is not any conduct that affects demanders or suppliers but only certain categories of conduct, specifically only those that harm the “process of competition”.⁹ The exact meaning of that term depends of course on the legal interpretation of the case law. But, to choose a reasonably simple and non-controversial example, that term would typically be interpreted to mean that if a firm develops a new product, then that firm is allowed to charge a monopoly price without fear that the antitrust laws will be used to constrain its prices.¹⁰ (In many jurisdictions outside the US, that would not be true.) Indeed, if that monopolist could engage in price discrimination and earn even higher profits, that too would typically be allowed even though, as a result of the price discrimination, some consumers may be worse off by having to pay a higher price.¹¹ Since in this example there is no rival involved, there cannot be a harm to the process of competition since there is no competition.¹²

In order to talk about applying the antitrust laws to “protect the process of competition”, we need to have at least two firms competing against each other where presumably one or both of them collectively have some market power. This is true for both horizontal and vertical antitrust issues. To understand the relationship of transaction costs to harms, consider the very simple case in which because of some conduct price is elevated above constant marginal cost as shown in [Fig. 1](#), where c is the constant marginal cost of production, D is demand and p is price.

The gap between price and marginal cost creates the usual inefficiency, a deadweight loss (DWL) to society, shown as the shaded area. What DWL means is that it is as if society is throwing surplus out the window, and that cannot obviously benefit society as a whole. In my experience, antitrust authorities often focus on short run harm including harm to consumers, paying insufficient attention to the effect of market power on long run harm. By that I mean that the increase in market power can alter the long run demand and marginal cost curves by adversely affecting investment decisions on both the demander and supplier side for the product in the future, including future innovations to the product. It is rare for

⁷ *Ohio v. American Express*, 138 S.Ct. 2274 (2018). See [Carlton \(2019\)](#), [Carlton and Winter \(2018\)](#), and [Katz \(2019\)](#).

⁸ See, e.g., [Furman et al. \(2019\)](#) and [Cremer et al. \(2019\)](#). See also [Stigler Center Report \(2019\)](#).

⁹ “.. for over 100 years, the antitrust laws have had the same basic objective: to protect the process of competition...”, [FTC, Guide to the Antitrust Laws](#), FTC website.

¹⁰ Of course, regulation is also a possibility, especially if an industry is a natural monopoly. I focus only on antitrust in this paper.

¹¹ [Carlton and Heyer \(2008\)](#) explain that one economically consistent interpretation of “protecting the process of competition” is to use the antitrust laws to forbid actions that enable a firm to gain market power in its own market by eliminating competition from rivals or that enable a firm to gain market power in other markets by, for example, leveraging. A monopolist that price discriminates would not therefore affect the “process of competition” because by assumption he faces none. See [Carlton and Heyer \(2008\)](#) for further discussion. Regardless of [Carlton and Heyer's \(2008\)](#) interpretation, it is my understanding that there have been no recent Supreme Court decisions to suggest that price discrimination alone violates the antitrust laws. I also ignore the moribund Robinson Patman Act which does address price discrimination but over the last 30 years has fallen into disuse.

¹² However, once one moves away from the simple example in the text, even price discrimination can harm the process of competition once one focuses on investments and future rivals. For example, suppose that as a result of price discrimination, the monopolist is able to reduce the incentive of buyers to make investments that would facilitate future entry of rivals. That could be interpreted as harming the process of competition. I am unaware of any such antitrust case.

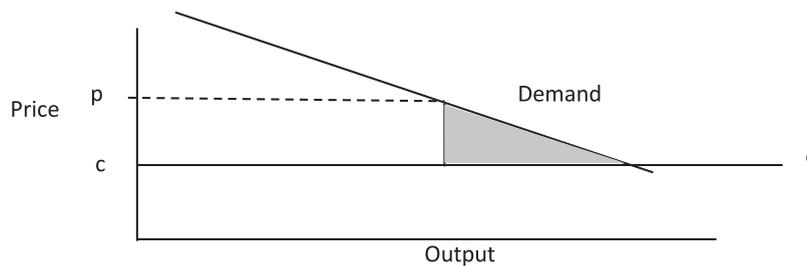


Fig. 1. Deadweight loss from price above marginal cost.

antitrust authorities to estimate the long run demand (or marginal cost) as a function of these decision variables, though admittedly this is hard.

Coase's insight is that when price deviates from marginal cost, then, in the absence of transaction costs, the consumers could pay the firms to produce the efficient amount and everyone could be made better off. Coase, of course, did not believe that such payments would necessarily occur, but if they did occur, they would eliminate the inefficiency. The implication is that whenever one sees a deadweight loss, one must ask why payments have not taken place to eliminate the harm since we know that both buyers and sellers can benefit from elimination of the inefficiency. Coase's answer is that transaction costs prevent the payments from happening. In the case of consumers, there are often just too many of them so that it would not be sensible for a firm to negotiate with each one. Moreover, there are all sorts of complications that could arise as, for example, when a consumer fails to truthfully reveal how much he is willing to pay in the hopes that he winds up paying a low price. Another complication arises if the terms of the transaction involve more than a simple uniform price per item. In that case, many terms would have to be negotiated, again raising transaction costs.

When transaction costs are large relative to the size of the deadweight loss, consumers will not even try to pay producers (or firms will not try to charge consumers) to expand output. In such a model, assuming a uniform price per consumer may be a reasonable assumption, though with the advent of more and more data accumulation by sellers, even that assumption may be weakening. For example, there have been reports of how firms with large data sets on their customers are able to offer individualized pricing to consumers depending, for example, on the consumer's characteristics (e.g., the device used to submit an order can contain information about a consumer's characteristics) or on which aisle in a physical store a consumer is walking down.¹³ If so, one must recognize that the deadweight loss to society from market power will likely be lower than what Fig. 1 shows since nonlinear pricing typically leads to less DWL, though consumer welfare may be either higher or lower than in Fig. 1 depending on how rents are transferred from buyers to the firm by the nonlinear price.

As previously mentioned, in addition to concerns about market power leading to reduced output in the short run from elevated pricing, one should also be concerned that such elevated pricing, either uniform or nonlinear, would lead to reduced investment on either the buyer or seller side. Since nonlinear prices can be especially effective at transferring rents from buyers to sellers, looking at the adverse incentives on investments in inframarginal projects is important in order to figure out long run harms from elevated market power. Those adverse effects are likely to differ depending on the form of the pricing that will be driven by transaction costs.

It is important to understand that whatever transaction costs exist that allow DWL to persist in the short run, transaction costs in the long run to avoid misallocations are likely much higher. The reason is not just that the long run is longer and therefore DWL rises linearly with duration. It is also because the long run has more uncertain contingencies than the short run so it is harder to contract. Imagine the difficulties, well explained in the literature on contracting, over investment projects with uncertain outcomes and contingencies. Importantly, even the parties in the long run that should be involved in a long run Coasian bargain may not exist in the present. Think of unborn future consumers or future firms in a growing industry. How could they bribe the dominant firm today to expand output and or to engage in efficient investments? The form of the pricing will influence the possible harm to investment from market power. Nonlinear pricing is a classic case in which rents can be shifted from buyers to sellers. One can regard such shifting *ex post* as opportunistic behavior *à la* Williamson, that allows the seller to extract quasi rents from a buyer who invests. Such behavior could deter efficient investments.¹⁴ The long run harm from creating disincentives to engage in inframarginal investments could substantially add to the long run harms from the creation or maintenance of market power and those harms will depend on the form of the pricing which itself is influenced by transaction costs. Undoubtedly, such harms may be difficult to estimate.

Economic models can get complicated quickly and the real question for policy purposes is not whether a particular assumption about the form of pricing is true, but rather whether a simplifying assumption on the form of pricing leads to flawed decision making. Let's now look at some standard situations and see whether the antitrust analysis should change from what is usually done or, alternatively, what are the limitations of current techniques.

¹³ See, e.g., Useem (2017).

¹⁴ For example, the incentive of buyers to invest in inframarginal investment projects may be eliminated if as a result of the creation of market power some rents are transferred away from the buyer.

3. Horizontal conduct

When firms produce substitute products, each firm recognizes that it would be better off if it could suppress competition with its rivals. There is a natural presumption that a restriction of competition among producers of substitute products is undesirable, all else equal. This is the standard reason why cartels are *per se* illegal and mergers to monopoly are typically illegal. Alternatively stated, the antitrust laws raise the transaction costs of creating a cartel once one considers antitrust sanctions as a transaction cost of the cartel.¹⁵ Suppose these firms sell their products to retail stores who then sell them to consumers. If instead of agreeing to engage in a cartel and charge a common wholesale price, the competing firms agreed instead to charge the same retail price as each other whenever they were in the same retail store (that retail price could differ from store to store), that too could suppress competition and could achieve a similar goal as a cartel and thereby benefit the firms to the detriment of consumers. I suspect that most antitrust scholars would find such an agreement on retail pricing as a *per se* violation of the antitrust laws. We shall soon see that some vertical contracts can have precisely this effect, and, unfortunately, they are not necessarily illegal.

Return to Fig. 1 to examine the harm that a cartel or merger to monopoly creates. Suppose that the firms merge and so the price rises from c to the monopoly price. If instead of setting a uniform price, the cartel charged a two-part tariff, then we know that the DWL could be lower. There is no need to assume that perfect price discrimination is involved – indeed such pricing is unlikely in view of its large information requirements. For my purposes, it suffices to notice that generally the two-part tariff will have a lower marginal price than the price in Fig. 1 and that this will generally lower DWL by leading to increased output relative to Fig. 1. It is also possible to show that the harm to consumer welfare can be lower than occurs in Fig. 1. I will not dwell on whether one uses a total surplus or consumer surplus standard since it does not matter to my main point.¹⁶ The point is not which standard is used but rather that no matter which standard is used, the antitrust analysis can produce large errors of harm unless one takes account of the nonlinear pricing practiced.¹⁷ That is, the predicted harms from the merger can differ a lot depending on whether one assumes a uniform or nonlinear price.

Matters become more complicated and interesting once we introduce efficiencies. For example, a horizontal merger that eliminates a rival may also lower production costs.¹⁸ The antitrust analysis becomes more complicated than, say, Fig. 1 since one has to trade off the efficiencies against any possible harm from the elimination of competition. Since we think harms are slight when there is little market power that the merged firm acquires, there is a threshold requirement regarding market power of the merged firm that must be passed before horizontal mergers trigger antitrust scrutiny. But if this threshold requirement is passed, there is a presumption under the US Horizontal Merger Guidelines that the merger harms competition absent a showing of sufficient merger-specific efficiencies.

The analysis of the effect of the efficiencies will depend importantly on the form of the pricing used pre-merger and post-merger – whether uniform or nonlinear – though this point has not been adequately appreciated. To understand this point, notice that any efficiencies that lower marginal cost will matter to society's welfare much more in a market with more output and that more output is likely in a market with nonlinear pricing. This is because the marginal price pursuant to the nonlinear pricing schedule is likely to be lower than the uniform price with the consequence that more output is consumed in the nonlinear pricing situation. That means that the magnitude of the efficiency benefit will tend to be larger when nonlinear pricing is practiced or is instituted as a result of the merger. Moreover, the welfare consequences of an efficiency will depend not just on the level of output but also on the change in output that results from the efficiency. To the extent that use of nonlinear pricing leads to a greater change in output from an efficiency than occurs when a cartel uses a uniform price, that too will affect the welfare calculations in favor of the merger. Carlton and Keating (2015) show how to modify the standard merger simulation model to allow nonlinear pricing and present examples to show how very different policy recommendations emerge about a merger depending on whether one assumes linear or nonlinear pricing.

The conclusion is that, in situations where pricing is nonlinear, one should not use a standard merger simulation model that focuses on uniform pricing per unit to estimate the elevation in price even if one takes account of efficiencies. The reason is that such a model ignores the output expanding effect of the nonlinear industry pricing and could therefore underestimate the magnitude of the efficiency savings and overestimate any harm from elevated pricing. I suspect this error of ignoring nonlinear pricing is most relevant when the merged firm sells to other firms. In those situations, it often is the case that the buyer and seller are sophisticated firms where negotiations produce complicated nonlinear pricing contracts, especially if the transactions involve lots of money. For the case where sales are made mostly to individual consumers, I suspect the likelihood of this error is less than in a business-to-business setting since nonlinear pricing is more likely to be used in a business-to-business setting. However, recently firms have been obtaining more data about their individual

¹⁵ See Brennan (2019).

¹⁶ Obviously, the exact analysis will depend on which standard is used but my point is that the form of pricing matters to the analysis no matter which standard is used. Note that the ability to practice nonlinear pricing can increase post-merger since competition can inhibit its use.

¹⁷ This observation also applies to the recent literature that uses econometric estimation of production functions to estimate market power. That work often relies on a first order condition involving the expenditure share spent on an input. That first order condition often makes sense only when the marginal and average price of the input are identical everywhere. Failure to consider pricing other than uniform pricing per unit can lead to false conclusions. See the discussion in Hall (2018).

¹⁸ A joint venture of rivals can also create efficiencies and such joint ventures could be defended on that basis. Presumably one would have to show that common price setting is needed to achieve the efficiencies in order to justify a common pricing scheme. See, e.g., Williamson (1968a, 1968b, 1969).

customers, enabling customized pricing, and this means that even in markets where consumers are the final customers, there could be an underestimate of efficiency benefits and overestimate of harm if one ignores the existence of nonlinear pricing.¹⁹

If the efficiencies are significant and if the efficiency benefit could be made much more important if output expanded, the incentives for the merged firm to move to a form of contracting that enabled the achievement of these efficiencies will be enhanced. Incurring the transaction costs of nonlinear pricing schemes that may have made such arrangements too costly pre-merger may now become profitable.²⁰ That is, even if uniform pricing were used pre-merger, as long as the efficiency benefits are large enough, one should evaluate whether the form of contracting is likely to change from uniform to nonlinear pricing as a result of the merger. After all, if the incremental benefits from such a change are large enough, then those gains could offset the transaction cost of negotiating a nonlinear pricing schedule. Once one recognizes this possibility, the possibility of overestimation of harm from a typical horizontal merger analysis increases. Nevertheless, it could be quite difficult for a policy maker to assess the likelihood of a change in the form of contracting and mere claims by parties that they will do so should not necessarily be accepted.

Many industries involved in horizontal mergers are those undergoing rapid technological change. Investments by buyers and sellers can be important to the success of such an industry. As explained in the prior section, the investment decisions can be distorted by market power. I do not only mean the obvious distortion that a firm that reduces output will build fewer facilities. I also mean that the exercise of market power, especially in the case of nonlinear pricing, can be an effective means of transferring quasi rents from buyers to sellers and of creating the possibility to engage in what Williamson called “ex post opportunism”. If the hold-up problem worsens post-merger due to a switch to nonlinear pricing, that could cause buyers to invest less. (Of course, it could create an incentive for the seller to make the investment.) Those harms to competition deserve more emphasis despite the admittedly difficulty of modeling them. For example, suppose there is a proposed horizontal merger of health insurance companies who claim that after the merger they will be able to negotiate better with hospitals and drive down hospital rates, forcing hospitals to reduce doctors’ salaries. Although in the short run it may be reasonable to assume that the number of doctors in any area (or country) may be fixed, I doubt that is a good long run assumption and a key concern from the creation of market power should be how the created market power could adversely affect investment incentives to become a doctor there and elsewhere. I do not underestimate the difficulty of this calculation but am pointing out that using merger models to predict price effects, at least for some industries, may be focusing on answering a question that we economists can answer but is not the most relevant question for policy.

Finally, one must be careful as to what one labels as an efficiency. If one were to imagine an explicit coordination among all buyers of a product solely in order to obtain a lower price (e.g., monopsony) with no efficiencies, I suspect most antitrust scholars would say that this is a *per se* violation of the antitrust laws.²¹ A cartel of buyers is no different than a cartel of sellers in the sense that both harm competition and create deadweight loss in the presence of transaction costs. Suppose the buyers defend by saying that their market power will lead to an expansion of output. This could happen because, for example, the cartel’s market power could offset the market power on the selling side of the market and lead to lower prices.²² Notice that a cartel of sellers could also make similar claims if it faces market power on the buying side of the market. These are basically arguments that the competitive process does not work well with the existing market structure and would work better if the non-concentrated side of the market were altered so that those firms acted collectively to counteract market power on the other side of the market. I expect and hope that such arguments would receive careful scrutiny by courts and antitrust authorities.²³ Such arguments raise questions about the efficient level of output, transfers among market participants, and long run incentives to invest. Although it is theoretically correct that a cartel can expand output and thereby can increase consumers’ and society’s welfare, I fear a slippery slope in which one merger that creates market power is allowed in order to offset the market power on the other side of the market, and then a few years later, that other side of the market merges to acquire market power to offset the market power that has previously been created.²⁴ Such a process could easily lead to bilateral monopoly. Moreover, one must recognize that a “firm” can be nothing more than an agent for all its customers. So a firm that is nothing more than a buying consortium of its members is in effect a buyers’ cartel. Therefore, it is unclear to me whether the “buying efficiencies” that merging firms often claim should be applauded or condemned under the antitrust laws. One should at the very least look at what will happen to output, investments, and, depending on one’s views of the objective of antitrust, the welfare of consumers.

¹⁹ Although I think overestimation of harm is the likely error, the reverse could also happen. This just means that one must pay attention to the form of pricing, otherwise errors will occur.

²⁰ The standard example is Alcoa, whose vertical integration allowed it to deviate from uniform pricing and practice third-degree price discrimination. See Ch. 9, Carlton and Perloff (2004). For a more recent example, the vertical merger of Live Nation and Ticketmaster enabled the better utilization of information on fans to set prices to fill concert halls. See Brooks (2018). I served as a consultant for Ticketmaster.

²¹ It is commonly thought that if the buying group comprises less than 35% of purchases, then that share by itself will not trigger scrutiny. See Lindsay (2009).

²² See Carlton and Israel (2011).

²³ See, e.g., *United States v. Anthem, Inc.* 236 F. Supp. 3d 171 (D.D.C. 2017).

²⁴ A firm that innovates and legitimately achieves market power will be deprived of the fruits of that innovation if antitrust authorities allow market power to arise on the other side of the market to offset the innovator’s power.

4. Vertical conduct

4.1. Vertical mergers

A vertical merger, unlike a horizontal merger, does not eliminate a competitor. There is instead a combination of complementary assets. Since the combination of complementary assets can bring efficiencies from the elimination of transaction costs, à la Coase (1937), Alchian and Demsetz (1972), and Williamson (1975), we expect them to occur.²⁵ Perhaps for this reason, there is or appears to be a general presumption that vertical mergers are desirable. Indeed, even though there are some exceptions, the overwhelming bulk of the evidence (see, e.g., LaFontaine and Slade (2007)) suggests that vertical mergers benefit consumers.²⁶ This does not mean that there never can be a harmful vertical merger but the burden of showing that this will be true in a particular case is typically thought to rest on the party complaining about the merger.

There has been an increase in antitrust concerns with mergers that are vertical.²⁷ Recently, the Department of Justice unsuccessfully challenged in court its first vertical merger in 40 years, ATT's acquisition of Time Warner.²⁸ The concern in vertical mergers is that the merged entity will use the market power of the input supplier that it is acquiring to harm its downstream rivals by raising their input price or by otherwise partially or completely foreclosing them. (Complete foreclosure occurs when the input price is so high that the rival chooses not to buy.)

To use a simplified model, suppose that upstream Firm U is a monopolist of an input and charges a uniform price to Firms 1, 2, ..., N who are rivals that compete downstream and use the input in fixed proportions. Even though Firms 1, 2, ..., N compete downstream, suppose that their competition does not drive their profits down to the competitive level. There are two key points to note about a raising rivals' cost challenge to a vertical merger between Firm U and Firm 1. First, the downstream rivals have market power in the sense that they set prices that exceed marginal cost. (For simplicity, assume that there are constant returns to scale.) Second, the upstream market power of Firm U is not fully exploited pre-merger in the sense that the downstream rivals continue to earn rents above the normal competitive return even though those rivals face Firm U, an input monopolist. In these circumstances, it *can be* the case that post-merger, the merged firm can profitably raise its rival's costs, and thereby harm consumers or society. But, it can also be the case that the merger benefits consumers when, as is likely (and is either explicit or implicit in most vertical merger models), the vertical merger creates some efficiencies.

Let us continue to use the simplified model to examine a bit more closely what happens in a typical model of a vertical merger that raises rivals' costs. First, the merged firm will eliminate the inefficiency from double marginalization. Pre-merger, the entire industry bears the efficiency costs of double marginalization. Post-merger, the merged firm eliminates the double marginalization since it will have a profit incentive to transfer its upstream product to its downstream division at marginal cost. All else equal, this creates an unambiguous gain to its consumers whose downstream price falls. The complication as to the overall welfare effect of the merger turns on what happens to the downstream rivals and the substitutability of those rivals' products with that of the merged firm. If the downstream rivals produce products that are highly substitutable with that of the merged firm but despite this there is still a gap pre-merger between price and marginal cost downstream because of, say, oligopolistic interdependence, then there is always an unambiguous gain to society from the vertical integration. The reason is that the rivals add nothing special to the consumer that the merged firm cannot produce in terms of product characteristics, and that any notion that a downstream rival is "competing" with the merged firm is illusory since the merged firm controls the rival's input price.

However, if the downstream rivals' products differ from that of the merged firm, as occurs when those rivals continue to earn rents at the post-merger input price even in competition with the merged firm, then it means that those rivals are adding some value to consumers that the merged firm cannot duplicate. Moreover, transaction costs can limit the merged firm's ability to fully extract that value from its rivals when it sells them the scarce input. If that were not the case, then Firm U would prefer that method of increasing its profits to any other.²⁹ In such a situation where transaction costs limit Firm U's ability to extract surplus, the merged firm will find it profitable to increase its input price to its rivals who will then reflect that cost increase through a higher downstream price. The increased input price not only affects the merged firm's profits from sale of the input (those profits generally decrease because of reduced sales to the rival), but generate increased profits to the merged firm by relaxing the competitive constraint on the downstream pricing of its downstream product by shifting demand from rivals' downstream products to that of the merged firm in response to the increase in the rivals' price induced by the increase in the rivals' costs.

²⁵ In models with uniform pricing, a horizontal merger allows coordinated pricing of substitutes, leading to higher prices. A vertical merger allows the coordinated pricing of complements, leading to lower prices, absent incentives to harm rivals, a topic we discuss in depth below.

²⁶ See Salop (2018) for a different view.

²⁷ See, e.g., Salop (2018).

²⁸ Opinion by Judge Rogers, *United States of America, Appellant v. AT&T, Inc., et al., Appellees*, 1:17-cv-02511, USCA Case 18-5214, February 26, 2019. See Carlton et al. (2019). I served as ATT's main economic expert in that case.

²⁹ This insight has a relation to the work of Calzolari and Denicolo (2013, 2015, 2018). In their work, the conduct they examine – various restrictive contracts – is a way to extract some of the surplus that, absent transaction costs, could have been more efficiently extracted directly. I am explaining that that property applies to much conduct that is regarded as harmful to competition.

Let $q_i(p_1, p_2, \dots)$ be the demand curve of downstream product i that depends on prices, p_i , of downstream products 1, 2, etc., where the merged firm produces product 1. If dq_i/dp_i were 0 for all i other than 1, that is, if there were no competition between the “rivals” and the merged firm downstream, then the incentive that I just described to raise a rival’s costs in order to switch consumers to product 1 would no longer exist because the downstream firms are not rivals to the merged firm. Instead, the situation would be described as vertical integration that can enable price discrimination among non-competing buyers. The merged firm charges itself marginal cost but may raise the price of its input to other buyers of its input. This is simply the standard Alcoa example – vertical integration in order to prevent arbitrage in input pricing and thereby increase profits through price discrimination.

Let me explain the analogy to the Alcoa example in more detail. In a simplified version of the Alcoa³⁰ case, Alcoa is the monopolist of ingot that has two uses, making aluminum wire and making aluminum airplane wings. The demand curve for aluminum wire is elastic compared to that for aluminum airplane wings. If Alcoa is not vertically integrated and sells ingot, it has to charge one price because arbitrage (transaction costs) prevent it from practicing price discrimination. But after vertical integration into wire production, Alcoa can effectively charge (itself) the marginal cost of ingot, sell aluminum wire at a low price (reflecting the marginal cost of ingot and high price elasticity of the demand for aluminum wire) and then sell aluminum ingot at a high price to demanders who make aluminum airplane wings, effectively price discriminating between the two types of users. As Section II explained, from at least one economic viewpoint, such vertical integration should not violate the antitrust laws, presumably because nowhere is the “process of competition” affected, even though we know that some consumers are harmed and overall consumer welfare may go up or down as a result of price discrimination. In the Alcoa example, there is no upstream or downstream competition between any firms. However, once dq_i/dp_i is positive so that downstream products are substitutes then an increase in the input price will adversely affect the process of competition in the downstream market. Presumably, because of that, raising rivals’ costs can be an antitrust violation, from an economic viewpoint.

Notice I said “can be”. To show (from an economic viewpoint) an antitrust violation, it would be absolutely incorrect to rely solely on the fact that input prices rise to rivals, and ignore the fact that the effective input price falls to customers of the merged firm. These are two offsetting price effects and they can produce either an overall gain or loss to consumers of all products. The overall result is theoretically ambiguous. If the downstream products are highly substitutable, there will be a gain for reasons explained earlier. If the downstream products do not compete, then, from an economic viewpoint, the increased ability to price discriminate should not be subject to the antitrust laws since there is no effect on the “process of competition”. It is only in an intermediate case, combined with other assumptions, that there can possibly be an overall harm from an economic viewpoint. For this reason, I expect that models that show overall harm may be sensitive to reasonable changes in assumptions,³¹ and that the harmful result will depend on the specific facts and assumptions.³² In particular, assumptions about the type of feasible contracts pre- and post-merger, as well as firms’ expectations about subsequent contracts will matter. The danger is that a welfare increasing vertical merger will be stopped because the rivals object that their costs will go up even though those cost increases are more than offset by the effect of the decrease in the merged firm’s prices. Since we know that models of raising rivals’ costs are likely to depend on lots of assumptions, the best way to establish the reliability of such a model’s predictions is to show that the model would have correctly predicted a raising rivals’ cost strategy that has happened under similar circumstances in the past and that has harmed competition.

There are two insights regarding raising rivals’ costs that are importantly related to transaction costs. First, if there were no transaction costs to prevent the input monopolist from extracting the full rents from the upstream firms, there could be no raising rivals’ cost strategy. It would not be as profitable for the input monopolist to extract rents from downstream rivals through an increase in the input price compared to the more efficient extraction that occurs if the input monopolist can directly and fully extract rents from its rivals.³³ It is inefficient to extract rents from the pre-merger customers of Firm 2 by inducing them to become customers of the merged firm even if some of them switch to Firm 1 post-merger. The switchers preferred Firm 2 pre-merger and therefore any profit the merged firm gets from them is lower than what the input monopolist could have gotten if it could have fully extracted the higher consumer surplus from consumption of product 2 through some nonlinear pricing pre-merger.

Second, even if transaction costs exist to prevent full rent extraction, one could ask why the merging firms had not entered pre-merger into the following contract: Firm U agrees with firm 1 to charge firm 1 a low input price and the rival firms 2, 3, ... a high price. Firm U receives a lump sum payment from firm 1 which firm 1 can afford to pay because its profits increase since its sales rise as a result of its rivals’ increased prices (that result from the high input price to these

³⁰ *U.S. v. Aluminum Company of America*, 148 F.2d 416 (1945).

³¹ The other assumptions include, for example, whether the game played is Cournot or Bertrand, whether a firm can make binding commitments, and whether the model accounts for the fact that the remaining independent suppliers could have market power against the unintegrated firm. For papers with these other assumptions, see, e.g., Salinger (1988), Ordovery et al. (1990), and Hart and Tirole (1990). In my discussions in the text, I have generally assumed Bertrand competition and that binding commitments can be made.

³² Joskow (1991) writes “...anticompetitive “foreclosure” is theoretically possible under certain circumstances (contrary to the Chicago view), but the assumptions embedded in these models do not fit real markets very well.” That caveat should continue to act as a warning today when one uses current vertical models showing anticompetitive harm, especially those that use the Nash bargaining concept and a Nash-in Nash equilibrium, topics discussed below.

³³ See, for example, Mathewson and Winter (1984). The insight of that article is that the input monopolist can use non-linear contracts to internalize the competition externality of the downstream firms.

rivals). If such contracts are possible, then there is no merger-specific harm from the merger.³⁴ Of course, an immediate response to this last point is that such a contract would be illegal. That may be so but proving that under the rule of reason would likely be difficult. Contracts often treat different horizontal suppliers differently and one would have to show that this different treatment had the effect of harming competition as distinct from other explanations. If one wanted to achieve an anticompetitive effect, one would likely have a higher probability of success by doing it through contract than by engaging in a high profile vertical merger that will come under close scrutiny. Therefore, the absence of such pre-merger contracts could be considered a possible indication that there is not much gain from raising rivals' costs, especially if contract terms for some contracts in the industry are complicated and include most-favored-nations' clauses.³⁵ I now turn to a closer examination of vertical contracts.

4.2. Vertical contracts

The procompetitive justifications for vertical restrictions as a means of overcoming various transaction costs are well-known. The vertical restriction may harm competition but that effect can be more than offset by the procompetitive effect of, for example, encouraging sales effort. One standard example is that by, say, using resale price maintenance a manufacturer can encourage retail stores to promote its product and not fear that other retailers will free-ride off such efforts and deprive the promoting firm of the benefit of all its promotional efforts. By encouraging promotion of its product, each manufacturer heightens competition with other manufacturers producing rival products, so even though there is a restriction on competition, the end result is that consumers gain.

The need for such restrictions arises because transaction costs prevent separate compensation for promotion and sale. The retailer makes money only if the promotion leads to a sale. One could imagine the manufacturer paying for the promotion directly, in which case the free-riding problem is solved. But that does not often occur, as discussed in the literature, because the retailer knows better than the manufacturer how to promote. That is, the entire free rider problem is arising because of the high transaction costs of decentralizing and monitoring the effectiveness of promotion. But techniques of monitoring have now greatly improved. For example, consider the rise of digital advertising. It is possible to determine whether a person is shown an ad, how long the person views the ad, whether the person buys as a result of the ad soon thereafter, etc. This means that some reasons that previously justified vertical restrictions on competition as a way to prevent free-riding may no longer be justifiable based on transaction costs of monitoring promotional effort and its success. In that case, the usual analysis trading off the restriction on competition against the benefit generated by increased promotion should swing in the direction of reducing the desirability of allowing the restriction on competition.

Let me give an example loosely based on a case I was recently involved in, *American Airlines v. Sabre*.³⁶ Let me simplify a bit for expositional purposes. Many airlines sell tickets through travel agents who use what is called a global distribution system (GDS), which is basically software that contains a listing of airline flights and fares plus a mechanism to book a ticket. If I call a travel agent and ask what flights go between say Washington and Chicago on the days and times I wish to travel, the agent checks his or her GDS and gives me some flight options and associated fares. I then decide what to do and, based on that, the travel agent books my ticket. The travel agent may charge me a fee for his or her service in addition to the ticket price. The travel agent may have to pay a fee to (or receive a fee from) the GDS and the airline will pay a fee to the GDS. If an airline has no contract with the GDS then that airline does not appear in the GDS and I am unable to book a seat on that airline through my travel agent. We now come to the interesting vertical restriction.

The GDS has a rule that says to airline 1 that airline 1 cannot sell, on its own, an equivalent seat that it is selling on the GDS for any lower fare. Specifically, if a customer goes to the airline's internet site to book his ticket, he cannot be offered a fare lower than the one the airline shows in the GDS system, all else equal. One airline, Southwest, for many years chose not to agree to these restrictions and was able to offer lower fares to travelers, but those travelers had to book directly with Southwest. One possible justification for the GDS policy is that it is costly to create and maintain a GDS system and that if a customer could call a travel agent to use the GDS to look for a convenient flight, then the customer (or the travel agent) could use that information to then book direct with the airline and the GDS would receive no payment. But with today's technology, it could be possible to monitor whether a travel agent only "looks" or "looks and books" a ticket. If it is possible to monitor, then the travel agent could be charged for only "looking". There could be a separate charge for "looking and booking". Such pricing could greatly mitigate any free-riding problem and remove the justification to restrict fare setting for the sale of airline flights. The recognition that free-riding defenses depend on an imperfect solution to a

³⁴ There is a symmetry between an evaluation of the harms and benefits of vertical integration. Each must be merger-specific to matter in an evaluation of the merger's effects. A benefit of vertical integration is a more efficient production process including the elimination of double marginalization, assuming that those efficiencies could not be achieved equivalently by contract. That is, the efficiencies must be merger-specific. The harm from vertical integration in this theory is that rivals' costs are raised, leading to an overall consumer harm, assuming those harms could not be otherwise achieved by contract. That is, the harm from vertical integration should also be merger-specific. If transaction costs are low, then vertical integration creates neither benefits nor harms, since everything can be achieved by contract. If transaction costs exist to prevent the achievement of a benefit but not a harm (or vice-versa), then that must be accounted for in a calculation of the overall effect of a vertical merger.

³⁵ Contracts that make one firm's price contingent upon what another pays can be difficult to enforce. That is why the presence of most-favored-nations' clauses in some pre-merger contracts is mentioned above in order to show that the industry has likely overcome such contracting costs.

³⁶ *US Airways, Inc., for American Airlines, Inc. as Successor and Real Party in Interest v. Sabre Holdings Corporation et al.*, Southern District of New York, 1:11-cv-02725-LGS.2011. I have served as an expert in cases adverse to GDSs.

principal-agent problem, combined with the recognition that monitoring technologies have improved (i.e., the transaction costs of monitoring have declined), should mean that traditional free-riding defenses that justified vertical restrictions should be examined for their current relevance. There may now exist alternatives to the restrictions on competition that eliminate the free-rider problem, allow the sales promotion to occur, but mitigate the adverse competitive effect of the restriction on competition.

The type of restriction on GDS sites that I have just discussed is a “price parity” restriction. These types of restrictions are common on platforms where consumers can purchase. The form of the restriction is often something like “the seller will sell on no other site at a price below the price posted on my site”. Again, just as in the case of GDS, to the extent there is a competitive justification for such restrictions to prevent free-riding, one should make sure that such free-riding defenses continue to make sense in today’s digital environment where monitoring of the internet sites that someone has visited is increasingly easy, thus lowering the transaction costs of preventing free-riding.³⁷

5. Nash bargaining and Nash-in-Nash solutions

Some recent progress has been made in modeling transactions in which the bargaining is one-on-one and the outcome varies by individual transaction. The benefit of this modeling is that it can allow for outcomes other than a uniform price per unit to each buyer. It sounds like but, as I explain below, is not an attempt to model transaction costs. This modeling strategy uses the concept of Nash bargaining and a Nash-in-Nash equilibrium. These approaches have appeared in the recent economic literature and in a recent prominent litigation.³⁸ I note, though I know most readers know this, that Nash bargaining is not the same as a Nash equilibrium, which unlike Nash bargaining arises in a non-cooperative game. Nash (1950) introduced the concept of Nash bargaining to deal with the problem that arises when two agents each have the ability to influence the terms of a transaction. Neither agent is a price taker. It is a difficult problem to figure out what will emerge from such one-on-one bargaining. It used to be commonplace to say that in such a situation there is bilateral monopoly, and so no one knows what will happen, other than to say that the area of possible agreement that is Pareto-improving could be large.

Nash (1950) proposed an axiomatic solution, one that does not involve individual profit or utility maximization. Instead, Nash put forward some axioms that he thought a reasonable equilibrium should possess and figured out what the equilibrium would have to be in order to satisfy those axioms. If absent agreement, agent 1 would earn A and agent 2 would earn B but with agreement the two could produce collective profits of Y, then the Nash bargaining solution is to split equally the gains from trade, which equal Y-A-B. Therefore, agent A earns $.5(Y-A-B) + A$ and agent B earns $.5(Y-A-B) + B$. The modeling difficulties increase if there are multiple agents involved, as occurs when one party may have several contracts to negotiate. In such a circumstance, it is typical to hold all other contracts fixed when analyzing one particular contract, and to analyze each contract separately.³⁹ Such an assumption is called Nash-in-Nash because it is similar to what one assumes when one uses the usual Nash equilibrium concept. There is debate as to how good an assumption Nash-in-Nash behavior is since it is mixing a non-cooperative game concept with a cooperative one.⁴⁰ Of course, a demonstration of past successful predictions in a particular industry would give one some confidence in its use. There are several caveats worth noting about the use of Nash bargaining solutions related to transaction cost considerations especially when used to evaluate mergers in a vertical setting.

First, it would be incorrect to label the Nash bargaining solution as a model of transaction costs. It is not. There is a distinction between modeling individual transactions and being cognizant of transaction costs. Transaction costs are the costs involved with reaching agreement and monitoring the agreement. The Nash bargaining solution does not model transaction costs but does model a transaction. The Nash bargaining solution is what emerges when one *assumes* that the transaction takes a particular form (e.g., uniform or nonlinear pricing) and that the resulting equilibrium comports with certain axioms. Because it can accommodate individualized pricing, it represents an advancement over assumptions of uniform per unit pricing to all but it would be incorrect to say it models transaction costs.

³⁷ A practice related to “price parity” restrictions is one that Ralph Winter and I have labeled vertical most-favored-nations (vMFN) clauses. In this type of restriction, one firm tells a retailer “you can sell my product at retail at whatever price you choose as long as the price is the same as the retail price of my rivals”. Especially in an industry where each retail store finds it efficient to sell multiple rivals’ products, this type of vertical restriction can harm competition. This practice can allow firms to achieve the equivalent of a horizontal cartel. The most salient example of a vertical most-favored-nations clause arises in the industry involving credit cards, which often have a restriction on how a merchant can charge consumers for the use of various cards. See Carlton (2019) and Carlton and Winter (2018). I have frequently served as an expert adverse to credit card firms in various US and foreign jurisdictions.

³⁸ See, e.g., Horn and Wolinsky (1988), Binmore et al. (1986), Ho and Lee (2017), and Crawford et al. (2018). Although my discussion will focus on vertical mergers, the same concept of Nash-in-Nash has been used in some horizontal mergers. See Gowrisanken et al. (2015). See Shapiro’s (2018a,2018b) expert testimony on behalf of the United States in *U.S. v. ATT* (2018). I appeared as an expert for ATT.

³⁹ This assumption can be particularly inappropriate in industries where the use of most-favored-nations clauses guarantees that a change in one contract will alter others.

⁴⁰ Rubinstein (1982) and Collard-Wexler et al. (2019) have provided circumstances under which the Nash bargaining solution can be attained in a non-cooperative game with maximizing agents. Nevertheless, given the complexity of the modeling, my view is that some empirical verification of the validity of the Nash-in-Nash modeling in the particular industry being analyzed is desirable if it is to be used to analyze an actual event. One could make the same observation about the use of other more well-known antitrust tools such as static merger simulation. See, e.g., Peters (2006), Budzinski and Ruhmer (2010), Weinberg and Hoskins (2013), and US Department of Justice and Federal Trade Commission submission to OECD’s Competition Committee (2011) for a discussion of the mixed success of such models (DOJ & FTC, 2011).

Second, in the typical economic model, the gain from trade, $Y-A-B$, is not fixed but dependent on the exact agreement reached and the assumed form of the pricing. So for example, if agent 1 sets price to agent 2 above marginal cost, then the usual deadweight loss from agent 2 facing a price above marginal cost can arise. That is, the Nash bargaining model, as it has been typically used recently in merger analysis, assumes that transaction costs prevent the attainment of the efficient contract (unlike in Nash's original article) even though the negotiation is one-on-one and may in the real world be highly complex, lengthy, and lead to contract terms much more complicated than the simple ones postulated in the model.⁴¹ That, of course, can be a plausible outcome since certain contracts can be too costly to write but it also means that the larger the inefficiency involved, the greater is the incentive to write an efficient contract. So, if the inefficiencies are really high, then we expect the likelihood that an inefficient contract is used will decline. Presumably, the efficient form of contract can be used in the modeling, though so far most attention has been on simple contracts that, unlike Nash's original paper, do not achieve the efficient outcome. However, even if a nonlinear contract would lead to an efficient outcome in the short run, the contract could transfer large gains to a newly merged firm and, as I explained earlier, in light of the high transaction costs of long term contracts, that could result in a diminution of investment incentives on the part of buyers, leading to a large deadweight loss in the long run.⁴² As already discussed, that could cause a more severe harm than the short run harm and, at least currently, it is rare to see that harm being the focus of an antitrust inquiry.

Third, as long as there are any gains from trade (using the inefficient contractual form usually posited), then a deal will be reached, and assuming the underlying Nash conditions are met, it will be the Nash bargaining solution. If one were to model a proposed merger using the concept of Nash bargaining, one would have to somehow estimate A and B , the no-agreement points. But if those points are never observed, how can one do that? The answer is that it can be hard to do. One can make assumptions as to what each agent might do absent agreement but note that it is likely that A and B are very far from what is ever observed. They are never observed because they are so much worse than a consummated transaction. What should one assume are the transaction costs and form of contract used in those very extreme situations that are, as a matter of the model's theory, never observed? Why is it reasonable to assume, as Nash-in-Nash models typically do, that transaction costs are such that the alternatives must be based only on the set of existing contracts in the observed world. If indeed there were a failure to reach agreement, I assume that the parties would go to extensive efforts and be willing to incur substantial transaction costs to find alternatives, not restricting themselves to those currently available under existing contracts.⁴³ This suggests that whatever one does to estimate A and B , there is likely to be a range of uncertainty in the estimates.

More generally, what one assumes firms will do in the no-agreement state can matter a lot to the final predictions. The more realistic one makes the no-agreement point, the more complicated the modeling becomes. This is especially true when multiple firms are bargaining with each other over time. If firm 1 and firm 2 fail to reach agreement, what alternatives should firm 1 be allowed to consider to firm 2? Should firm 1 take into account that its failure to reach agreement with firm 2 could affect the terms on which firm 1 reaches agreement with other firms in the future? The bottom line is that if we do use a modeling approach that requires us to assume something about the no-agreement point, we should be up front about the uncertainty in our assumptions and the simplifications regarding transaction costs that we are making. That is why an empirical validation of the model confirming that the model has desirable properties that square with reality is especially important.

Fourth, the equal split of gains is often assumed, not estimated. But that can be easily changed. The hard part is to justify the assumed bargaining split and to understand whether whatever conduct (e.g., merger) that is being investigated would alter the bargaining split.⁴⁴ What determines the bargaining split – is it the underlying economics including transaction costs or is it the personalities of the bargaining agents? If the latter, should that be considered in an antitrust evaluation? For example, suppose an agent has a reputation as an excellent negotiator – the agent gets 90% of the gains from trade. If so, if that agent buys a firm in an unrelated business, then the customers of the acquired firm may be harmed. Should that be an antitrust violation? If so, haven't we made the identity of a buyer of a firm the focal point of investigation even if that agent is not a rival to the firm it is buying? I would say that in such a case there should be no antitrust violation, otherwise antitrust authorities would have too much discretion to intervene in transactions that do not even involve rivals. How could such transactions be labeled a harm to "the process of competition"?

Finally, there have been several examples of Nash bargaining involving multiple parties embedded in a vertical model.⁴⁵ In constructing such models, one typically assumes that there is one-on-one bargaining between the vertically integrated firm and its rivals in the upstream market, and then Bertrand competition in the downstream market. These models get complicated and often for simplicity abstract from certain feedbacks. In the Nash bargaining part of the model, one might for example assume for simplicity that the output prices are fixed when the input prices are being negotiated, presumably because it is too costly for the parties to keep track of the output price effect. Yet, one of the insights of Salop and Scheffman's (1983) work on vertical mergers is precisely that raising an input price to a rival who passes the increase on to its downstream customers will be a mechanism of harm to competition and that mechanism creates an incentive to raise rivals'

⁴¹ See, e.g., the discussion in [Sheu and Taragin \(2017\)](#).

⁴² It could also lead to an increase in the incentives of the merged firm to invest.

⁴³ I thank a referee for emphasizing this point.

⁴⁴ [Rubinstein \(1982\)](#) and [Binmore et al. \(1986\)](#) show how the split can be related to factors such as the parties' relative rate of time discounting.

⁴⁵ See, e.g., [Horn and Wolinsky \(1988\)](#), [Binmore et al. \(1986\)](#), [Ho and Lee \(2017\)](#) and [Crawford et al. \(2018\)](#).

costs. However, that incentive to raise rivals' costs disappears if one assumes, for transaction cost reasons, that output prices are fixed in the Nash bargaining part of the model.⁴⁶

The limitations of Nash bargaining and Nash-in-Nash models may not always be appreciated in litigation, though some courts have refused to admit testimony based on a Nash bargaining model when there have been no validity tests of the model.⁴⁷ Overcoming these limitations represent areas for future research.

6. Two-sided markets

With the growth of digital platforms on which to transact, there has been an upsurge in the interest and in the prevalence of so-called two-sided markets.⁴⁸ These are markets in which each side of the market gains from having the others "on board". A standard example is a credit card in which consumers are benefitted when there are more stores that accept the card and in which merchants are benefitted when there are more customers who carry the card. Although appealing as a rough description, that definition lacks precision in that all markets need two sides. A more precise and rigorous definition for transaction platforms is given by [Rochet and Tirole \(2006\)](#) who define a two-sided, or more generally a multi-sided market, as being one in which the quantities sold depend on the individual prices charged to each side of the market and not just on their sum. If there were no transaction costs, then the split of any given sum of prices between, say, two sides could be worked out by a member of one side paying a member of the other side, but if transaction costs prevent that exchange, we have a two-sided market. Returning to the credit card example, the market is two-sided as long as a fee charged by the card company to the merchant does not costlessly go back into the pocket of the customer (as a reward) with the merchant raising the retail price by the amount of the fee. If that did happen, then there is no reason to separately charge a fee to the merchant and give the fee as a reward to the card holder. In such a case, it is sufficient to analyze a market in which there is no reward and only a fee charged to the merchant. Hence, "two-sidedness" depends on the existence of transaction costs.

The antitrust issues surrounding two-sided markets have raised lots of controversy and likely will continue to do so. Assuming that the firms under analysis have market power, one key antitrust issue is whether it is sufficient for the Plaintiff to show that there is an interference with the setting of price on one side of the market in order for the court to allow the case to go forward to be judged under a full reason of reason in which the procompetitive justifications and overall effects of the restrictions are analyzed, or alternatively, whether it is necessary for the Plaintiff at the outset to show that overall the restrictions harm competition. The reason this "burden shifting" matters so much is because in the typical vertical restriction case in a one-sided market, the justifications for restrictions usually fall on defendants (who presumably understand the justification for the restrictions), as in for example a resale price maintenance case. Placing the burden on plaintiffs will likely make it more difficult for plaintiffs to bring cases under [Section 2](#). In a controversial decision, the Supreme Court in *Amex* ruled that in a two-sided market the plaintiff must show an overall harmful effect in order to go forward, even though in a one-sided market it suffices to show an adverse effect on only one side. I do not want to delve into the details of that controversy here,⁴⁹ but instead want to focus on one simple point to emphasize the connection between one-sided and two-sided markets and thereby illustrate the economic errors underlying some important antitrust cases in both one-sided and two-sided markets.

In a two-sided market, there can be many prices that influence the output of each firm. Imagine a demand curve for firm 1 (and another for firm 2) of the form $q(p_1, p_2, \dots; p^*_1, p^*_2, \dots)$ in which p_i is the price to side i of the market for one firm and p^*_i is the corresponding price for its rival in an industry with only two firms. Notice that such a function could also describe a one-sided market in which p_i represents the various fees associated with a product.⁵⁰ For example, p_1 could be the base price, and p_2 could be freight. Now ask the following question: When will interference with the setting of, say, p_1 and p^*_1 alter the equilibrium outputs and full prices ($p_1 + p_2, p^*_1 + p^*_2$). For example, in a two-sided market, such as credit cards, would a cartel setting the fee that merchants pay to card companies lead to an equilibrium different from the output and full price that would prevail absent the restrictions? Or, in a one-sided market, would a cartel on freight alter the equilibrium from the unrestricted one?⁵¹

The question is quite similar to the one posed by [Stigler \(1968\)](#) when he asked whether a cartel on price alone, but not quality, would raise profits. The answer to our question depends on the marginal rate of substitution between, say, p_1 and p_2 in the function q . If the rate of substitution is linear, then fixing price on only one component cannot help. In a

⁴⁶ See, e.g., [Sheu and Taragin \(2017\)](#).

⁴⁷ See, e.g., *Oracle America v. Google*, 798 F.Supp.2d 1111 (N.D. Cal., 2011), *Robocast v. Microsoft* (D.Del., 2014), and *Virnetx v. Cisco Systems*, 767 F.3d 1308 (2014).

⁴⁸ "Two-sided platform" is a more precise term but "two-sided market" is often used in the economics literature. The use of the term "market" in the economics literature does not necessarily imply an "antitrust" market. Moreover, platforms can have many different participants (sides) so "multi-sided platform" is often more accurate than "two-sided platform". I will use "two-sided market", following the literature.

⁴⁹ I refer the reader to the growing literature analyzing this decision to learn about the details of the controversy. See, e.g., [Carlton \(2019\)](#), [Carlton and Winter \(2018\)](#), [Hovenkamp \(2019\)](#), and [Katz \(2019\)](#).

⁵⁰ The fact that certain aspects of two-sided markets can be analyzed with tools used to analyze one-sided markets in no way diminishes the fact that the analysis of two-sided markets has been an important intellectual advance. See [Carlton and Winter \(2018\)](#).

⁵¹ There have been several such antitrust cases involving cartels on only one component of price in one-sided markets. See, e.g., *FTC v. Cement Institute*, 68 S.Ct. 793 which concerned use of basing points and *Catalano, Inc. v. Target Sales, Inc.*, 446 U.S. 643 (1980) which concerned credit terms.

one-sided market, for example, if firms are bidding for Dennis's business and each firm quotes to Dennis a base price plus a delivery charge, then agreement on the delivery charge cannot raise the full price to Dennis, if there is competition on the base price.⁵² The insight – and this is the important point – is that the rate of substitution is never linear in a two-sided market. If it were, then it would, by definition, be a one-sided market and we get the result that all that matters is $p_1 + p_2$, just as [Rochet and Tirole \(2006\)](#) explain. Interference with just p_1 would not enable the elevation of the sum of prices. But if the market is two-sided, then interference with p_1 will alter the equilibrium since it will alter the relative prices of p_1 and p_2 and that matters in a two-sided market. The upshot is that the courts may not have to worry as much as they do in a one-sided market about, for example, a standard freight charge being used in the industry if there is no interference with competition on the base price. But courts should worry more than they have so far when in a two-sided market, such as credit cards, there is interference in the setting of, say, the fees that merchants pay card companies. The Supreme Court's recent decision in *Amex* in which it indicated that interference on only one side of a two-sided market may not matter because only the sum of prices matters in a two-sided market is wrong and fails to understand this point.⁵³

I predict that two-sided markets will be increasingly involved in antitrust proceedings and that the *Amex* decision will lead to confusion as to how to apply the economics of vertical restraints (and perhaps tie-in sale doctrine) to antitrust cases since there are now different standards depending on whether the market is one-sided or two-sided, yet there is only a vague judicial definition as to what a two-sided market is.⁵⁴

7. Property rights and data

Coase taught us that property rights need to be established in the presence of transaction costs in order to reach an efficient solution. [Demsetz \(1967\)](#) explained that property rights emerge endogenously when their establishment generates more benefits than the transaction costs of enforcing them. Recently, data and its ownership has been a focus of attention not just for privacy concerns (which I will not discuss) but for antitrust concerns. The antitrust issue is that some dominant firms have data bases that they claim to own. Since data on consumers are often important for rival platforms, the ability of the dominant firm to deny a rival data can impede entry and harm competition. Some have suggested, presumably following Coasian logic, that letting individuals own their data and requiring firms to pay for it, could solve the antitrust problem.⁵⁵ But that solution can fail to solve the problem unless some limitations are placed on the property rights that one has in one's own data.⁵⁶ As [Demsetz \(1968\)](#) taught, the greatest barrier to entry is created by a property right. Property usually carries with it the ability to sell the property exclusively and prevent its use by others. Since a monopolized industry always has higher profits than an industry with competition, it is well understood that a monopolist can always outbid entrants for a scarce essential resource.⁵⁷ Giving individuals property rights in their own data would have no effect on mitigating the antitrust concern if consumers would wind up selling it exclusively to the dominant firm. For the solution to have a better chance of mitigating the antitrust problem, no consumer should have the right to exclusively sell his or her data to another firm. Any firm should be able to pay the consumer for the consumer's data but no firm should be able to prevent the consumer from selling it to other firms if one is concerned about rivals' access to data.⁵⁸

8. Conclusion

Since the Introduction summarized my conclusions in detail, I will not repeat them here. The simple point of this paper is to emphasize that failure to consider transaction costs can lead to erroneous policy decisions. Many models employed today make simplifying assumptions about transaction costs that can lead to biased results in analyzing vertical and horizontal issues. The increased ability to monitor the effect of promotional behavior should cause us to reexamine whether free riding justifications, previously accepted as justifications for various vertical restrictions, still hold. Nash bargaining and Nash-in-Nash models raise concerns about the simplified assumptions assumed in which supposedly high transaction costs restrict the choice and form of the assumed competitive alternatives. The increasing importance of two-sided markets together with an understanding of transaction costs is needed to understand antitrust conduct in those markets. The recent *Amex* case is likely to lead to lots of litigation in these types of markets. Finally, the establishment of property rights for a consumer

⁵² The conditions under which setting freight (or other components of price) can raise the full price are more complicated once asymmetric information is introduced. See, e.g., [Carlton \(1983\)](#).

⁵³ See [Carlton \(2019\)](#), [Carlton and Winter \(2018\)](#) and [Katz \(2019\)](#).

⁵⁴ Two-sided markets are also likely to raise difficult issues under tie-in sale doctrine since the monetization of a platform often occurs through the pricing of many products on the platform. For my views on tie-in sale doctrine, see [Carlton and Waldman \(2002, 2005\)](#) and [Carlton and Heyer \(2008\)](#).

⁵⁵ Of course, one would have to define what it means to have access to one's own data. Surely, a firm that has spent lots of money refining and keeping a database should not be required to make it available for free.

⁵⁶ Even with the limitations I discuss, the remedy's effectiveness would likely differ depending on the particular market.

⁵⁷ The analogy to harms from exclusive distribution should be obvious. Note that I ignore the mitigating factor that some consumers might not agree to allow their data to be sold exclusively since the consumers may benefit by allowing each merchant to learn their preferences.

⁵⁸ If consumers do obtain the right to sell their data, the price that they can sell it for will depend on the marginal value of that data. In cases where there are large scale economies, the equilibrium price could be 0, applying similar logic as appears in the literature on exclusive dealing. See, e.g., [Rasmusen et al. \(1991\)](#) and [Segal and Whinston \(2000\)](#). These articles explain that the exclusivity winds up hurting firms collectively even though it is individually rational for each firm to agree to the exclusivity. A similar logic applies here to individuals willing to sell their data exclusively.

to his or her data could fail to remedy antitrust concerns that certain dominant firms are immune to competition because consumers do not own their data unless that property right is limited so that consumers cannot exclusively sell their data to one firm.

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