

Empirical Models of Bilateral Contracting

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Abstract

This essay briefly surveys the empirical literature on bilateral contracting. The focus is on contracting between firms in vertical markets, and I discuss recent approaches to modeling their determination and the impact of contractual restrictions on competition, industry structure, and welfare. I also highlight challenges facing future research in this area.

INTRODUCTION

Perhaps the simplest market transaction is one firm selling a good to any interested party at a set price. Yet transactions between firms are often more complex, particularly if goods are specialized and the surplus generated by the transaction depends on effort or investment by the participants. There may be restrictions placed on trading with other partners, quality guarantees, or covenants on behavior; there may be bundling requirements, quantity discounts, or revenue sharing agreements; furthermore, terms of the transaction may not be fixed but rather negotiated between parties, as is often the case when the firms trading are monopolists or oligopolists in their respective markets. These agreements between firms, or bilateral contracts, govern a significant amount of inter-firm economic activity; given their prevalence, they are an active area of economic research.

Although these issues may seem specific to industrial organization and related fields examining competition and market structure, their implications are much broader. For example, if prices between firms are bargained over as opposed to unilaterally chosen by one party, the extent to which costs can be passed-through the vertical chain may be very different; this in turn affects the predicted impacts of tariffs or other supply-side interventions and shocks. Furthermore, many industries are themselves large enough to warrant specific attention. A prime example is the US healthcare sector, in which

all major players (hospitals, physician groups, insurers) bilaterally contract with one another to determine provider networks and reimbursement rates; this affects utilization, costs, and ultimately welfare in a \$2.6 T industry (over 17% of US GDP).

This essay will briefly (and by no means comprehensively) overview recent empirical literature on bilateral contracting between firms and discuss challenges likely to be faced by future work. I will focus primarily on agreements in *vertical* markets between upstream (e.g., manufacturers or wholesalers) and downstream (e.g., retailers) firms; this paradigm also includes supply chains, buyer–seller networks, and industries where consumers access the goods or services of firms through a “platform” intermediary.

FOUNDATIONAL RESEARCH

A large number of empirical papers studied the trade-off between intra-firm transactions and inter-firm market transactions, some intermediated by bilateral contracts: that is, the “make-or-buy” decision. Framed often as a test of transaction-costs (Coase, 1937; Klein, Crawford, & Alchian, 1978; Williamson, 1975) and property rights (Grossman & Hart, 2001; Hart & Moore, 1990) theories of the firm, these papers provided evidence suggesting transactions which are more costly in some regards—leading to both anticipated and realized inefficiencies due to contractual incompleteness or asset specificity—are more likely to be conducted within the firm via integration as opposed outside the firm via contracts [see Joskow (2008) and Klein (2008) for surveys].

Another substantial body of literature focused on the consequences of exclusive restraints in vertical markets. These papers generally made little distinction between exclusive contracts and integration (although in certain industries, this distinction is not an issue as integration is explicitly prohibited by law or regulation); rather, they questioned whether restraints such as minimum retail pricing, exclusive dealing, or tying can adversely affect competition or welfare. Theory on this issue delivers ambiguous predictions: papers have shown, for example, exclusive dealing can be anticompetitive by deterring entry or foreclosing rivals, or procompetitive by aligning incentives and encouraging investment (c.f. Whinston, 2006). Early work was primarily case based (e.g., Marvel, 1982) or reduced-form [i.e., empirically detailing the relationship between variables of interest; e.g., Sass (2005)], relying on cross-sectional and/or time-series variation, event studies, or natural experiments. A survey by Lafontaine and Slade (1999) found that many of these papers, across different industries, suggested voluntarily imposed restraints were welfare enhancing, whereas those imposed by government intervention appeared to have been detrimental to welfare.

More recently, there have been several papers employing structural empirical methods to evaluate the impact of various contractual restrictions. Leveraging theoretical models of consumer and firm behavior tailored to particular institutional environments, these papers have been able to recover unobserved parameters of interest, such as supplier costs (Asker, 2005; Villas-Boas, 2007). Furthermore, by estimating what are meant to be policy invariant parameters—that is, parameters detailing consumer and firm behavior that are not specific only to the context being studied—governing supply and demand, structural models have also been used to evaluate what-if counterfactual scenarios: instead of requiring explicit variation across markets or time, these models simulate what *would* happen under hypothetical changes to the contracting environment. Papers in this vein have examined the elimination of revenue sharing contracts and bundling requirements in video rental markets (Ho, Ho, & Mortimer, 2012; Mortimer, 2008), the relaxing of exclusive arrangements in the smartphone (Sinkinson, 2011) and the movie exhibition industry (Wozniak, 2013), liberalizing selective and exclusive distribution systems in the European car market (Brenkers & Verboven, 2006), the interaction of resale-price-maintenance on the propagation of cost shocks (Bonnet, Dubois, Villas-Boas, & Klapper, 2013), and the impact of hospital mergers on reimbursement rates (Capps, Dranove & Satterthwaite, 2003; Ho, 2009).

CUTTING-EDGE RESEARCH

There are two important features that more recent structural papers have explicitly introduced in their empirical analysis of bilateral contracts. The first is motivated by the fact that prices and terms of agreement are not necessarily set solely by one-side of the market; as many contracts are signed between oligopolistic or monopolistic firms, neither side is necessarily a price-taker or setter. Indeed, empirical evidence has shown prices are often negotiated [e.g., between wholesalers and supermarket retailers as in Draganska, Klapper, & Villas-Boas (2010) and Meza and Sudhir (2010)], and that firm size interacted with a measure of competitive conditions can explain variation in pricing discounts among firms (e.g., Ellison & Snyder, 2010; Sorensen, 2003). Bargaining in the presence of externalities among multiple parties is a difficult theoretical problem in general. However, recent empirical work has commonly used a simple extension of the Nash bargaining model (Nash, 1950) to accommodate several firms (Horn & Wolinsky, 1988) by assuming each pair of firms simultaneously and bilaterally bargain; topics analyzed include the impact of a la carte pricing in cable markets (Crawford & Yurukoglu, 2012), and hospital negotiations with insurers (Gowrisankaran, Nevo, & Town, 2013; Ho & Lee, 2013) and medical

device suppliers (Grennan, 2013). The generality and applicability of this bargaining concept in applied work is still being explored (Collard-Wexler, Gowrisankaran, & Lee, 2014), and there is clearly potential for alternative approaches.

The second feature that has recently been incorporated into new empirical work is the recontracting between new partners when evaluating a counterfactual regime. Although it is reasonable in certain circumstances to assume the set of firms who come to an agreement does not change, in others environments it is less so. For example, when examining the consequences of banning integration and exclusive deals in the videogame industry, Lee (2013) uses a simple model of how software titles choose to develop for hardware platforms in order to predict the counterfactual decisions of previously exclusive titles. In general, a tractable model of recontracting for applied work remains to be developed, and likely will rely on insights from both the bargaining (c.f. Muthoo, 1999) and strategic network formation (c.f. Jackson, 2008) literatures [see also Lee and Fong (2013)].

KEY ISSUES FOR FUTURE RESEARCH

Unquestionably, the primary obstacle facing current and future empirical research on bilateral contracting between firms is the inaccessibility and incomplete observability of these contracts. Insofar the precise terms of such contracts are of significant strategic importance, they are often proprietary or confidential (with disclosure occasionally subject to legal action). It is thus not surprising that competitors, let alone academic researchers, are not privy to them. Although there are exceptions (e.g., Dafny, 2010; Grennan, 2013; Lafontaine & Slade, 2008), most researchers do not observe negotiated prices, and instead attempt to infer them by leveraging theoretical assumptions. However, these assumptions may be difficult to test or evaluate, which in turn potentially limits the scope of the analysis or believability of results.

Although contractual terms (price, restrictions, duration) are often extremely difficult to observe, it may be possible to obtain information on the contracting space—that is, the restrictions on the types of contracts which are employed in certain industries—more easily. Occasionally redacted or censored contracts can be obtained in financial filings or court records, or specific details can be obtained directly from conversations with industry participants. This information, although limited, would still provide guidance toward tailoring analysis and justifying certain modeling assumptions. Theoretical work on bilateral contracting, particularly in the presence of externalities, is complex (Segal & Whinston, 2003), and results are sensitive to set of contracts that can be offered. Thus, knowing certain institutional tendencies or practices—for example, only linear fees as opposed to two-part

tariffs are commonly used; royalty rates are flat, or have quantity discounts which are activated at certain thresholds; or agreements are always of a certain duration—can significantly narrow the scope of potential outcomes.

Such information would also enable researchers to expand their analysis to address “non-price” elements of bilateral contracts. Similar to how papers in finance utilize detailed information on lending contracts to examine the impact of debt covenants (Bradley & Roberts, 2004; Matvos, 2013; Roberts & Sufi, 2009), the availability of additional information could allow for the empirical analysis of less often explored contractual features (e.g., most-favored-nation agreements which limit discrimination across contracting providers, evergreen clauses which stipulate automatic renewal provisions, etc.). The sheer richness of true complexity of most contracts may prove daunting if the objective is to engage with only “clean” tractable environments; however, there is a danger in abstracting away features that may prove to be as important in their own right.

Another piece of missing information is often, surprisingly, whether or not two firms even have an existing contract or agreement in the first place. Observing the start and end dates of contracts, or breakdowns during negotiation, would allow models to begin incorporating dynamic concerns and more sophisticated recontracting and bargaining features. In many markets, there is constant renegotiation—for example, health provider–insurer networks change over time as hospital and medical groups join and leave networks—and if firms anticipate future changes to the network when contracting and bargaining, the contracting process and ultimately the division of surplus would be affected (Lee & Fong, 2013). Observing the length of any particular bilateral relationship (across potentially multiple contracts) might also enrich research on relational contracting between firms (c.f. Malcolmson, 2012), and also inform whether or not there are frictions and switching costs when adjusting trading partners. Furthermore, there may be state dependencies: for example, contract terms in the present may be significantly influenced (and constrained) by what they were in the past.

This lack of easily accessible data poses a challenge to a researcher accustomed to readily cleaned or packaged sources; however, this also presents a huge opportunity for academics willing to embark on creative and ambitious data collection projects. For instance, indirect means of gathering price information can be as simple as recording content fees paid by distributors to content providers from newspaper articles, or scraping negotiated prices between hospitals and insurers from patient claims and billing data. Much value will likely also be realized through more direct means: for example, by researchers who are willing to become more closely engaged with industry participants, and learn firsthand not only what occurs at the contracting table but also the objectives and concerns of those whose livelihood is at stake.

In this regard, insights from other academic disciplines, including but not limited to psychology and sociology, can play a role in enhancing our understanding of the contracting process.

Finally, although it is important to capture the important and relevant institutional details of any market being analyzed, there is a concern that insights gleaned from any study may only be specific to that particular industry. Research on bilateral contracting is not necessary exempt from criticisms regarding external validity; however, there is a sense in which our understanding of these contracts is still nascent. Indeed, once there are a greater number of detailed studies on contracting in different industries, it will become easier to identify themes that are generalizable across markets.

CONCLUDING COMMENTS

How firms bargain and contract with one another is a key input for many economic questions of interest. The set of promising empirical projects on bilateral contracting has grown significantly over the past several years; more detailed data on the underlying contracts between firms would drastically expand the scope and sophistication of the questions being addressed. Although early empirical work primarily tested theoretical predictions, recent papers have shown the value of merging theoretical insights and models with institutional detail and real world data; it is likely that successful future research will continue in this manner, blending together new insights from both theory and empirics.

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Robin S. Lee is an Assistant Professor of Economics at Harvard University. Robin's primary research fields are industrial organization and applied microeconomic theory. His research focuses on bilateral oligopoly in networked industries and contracting and bargaining between firms with market power. His recent work concentrates on platform intermediated markets—with applications in hardware–software industries, content distribution, and the healthcare sector—and examines the implications of exclusive or selective contracting and vertical integration on industry structure, competition and welfare. Robin received his AB and AM in Economics and his PhD in Business Economics from Harvard University.

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