Mitigating Information Imperfections:

A Market-Creation Role for Multi-Sided Platforms

Jennifer Kuan
California State University Monterey Bay

Gwendolyn Lee
University of Florida

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ABSTRACT

Multi-sided platforms (MSPs) have disrupted a wide variety of industries by creating markets where new transactions for goods, services, and information are enabled across multiple sides of a market (e.g., consumers, producers, and advertisers). While a foundational literature has described MSPs and their settings, the research has yet to systematically analyze how to identify settings where MSPs might enter and profit. In this article, we begin by noting that MSPs have been designed by firms to solve problems of information imperfections. We then develop a framework involving an information value chain, in which firms can make strategic choices about where in the value chain to enter. This framework builds upon a theory of market imperfections and analyzes information imperfections as sources of market failure, on the one hand, but also as opportunities for profits, on the other hand. Using this framework, we propose a taxonomy for analyzing when certain types of MSPs can re-configure an industry's information value chain and potentially disrupt the industry. We submit that MSPs can serve as a strategic choice for market design and an important mechanism for market creation, much as auctions and matching markets address certain informational problems to create markets.

Keywords: multi-sided platforms, market imperfections, market failure and market creation

INTRODUCTION

An extensive literature has emerged examining two-sided markets or multi-sided platforms (MSPs). In large part this attention is due to the success of digital platforms and their ability to connect different sides of the market—buyers, sellers, and advertisers—to facilitate transactions for goods, services, and information. Digital platforms have disrupted a wide variety of settings, from video games to credit cards, by helping multiple sides of the market find one another. Seeking to explain such phenomena, researchers have examined the underlying economic logic of MSPs (e.g., Rochet and Tirole 2003, 2006; Parker and Van Alstyne 2005), their trade-offs (e.g., Zhu and Iansiti 2012; Zhu and Liu 2018), and strategies (e.g., Hagiu 2014; Seamans and Zhu 2017). The cumulative research in the past two decades has provided valuable guidance in explaining what MSPs are and how they work in practice.

However, while the literature has described the rich empirical settings in which MSPs thrive, it has yet to systematically identify where MSPs might profitably enter. To answer this strategic question, we begin with the observation that successful MSPs often address information problems that can lead to market failure. Building on a theory of informational market imperfections, including buyer inability to find sellers or to trust them (Yao 1988; Oberholzer-Gee and Yao 2013, 2018), we develop a framework involving an *information value chain*. The framework analyzes information imperfections as sources of market failure, on the one hand, but also as opportunities for profits, on the other hand. Using this framework, we propose a taxonomy for analyzing when certain types of MSPs can re-configure an industry's information value chain and potentially disrupt the industry. We note that the literature typically models MSPs in theory as a single cost function, but in practice, MSPs engage in different informationally valuable activities for each side of the market. We therefore model market imperfections as an information gap separating buyers and sellers. We posit that a firm's strategic choices about where in the value chain to enter as an MSP requires an analysis of the information gap that can be decomposed and addressed by the firm. This decomposition enables us to highlight the information value chain and connect MSPs with the theory of market imperfections.

We demonstrate how our framework can be used by applying it to the market for healthcare. We explain how firms, making strategic choices to mitigate information imperfections, generate an industry configuration. An application of our framework shows that, in the healthcare industry, a variety of configurations can be discerned, reflecting the complex strategic choices that heterogeneous firms have made. Using this framework, we propose a taxonomy for analyzing when certain types of MSPs can re-configure an industry's information value chain and potentially disrupt the industry. Specifically, we identify ways through which an entrant might reconfigure and disrupt the market for healthcare.

The notion that an MSP might address market failure is not novel. As a mechanism for facilitating transactions, MSPs join auctions (Milgrom 1979, 2021; Wilson 1977, 1979) and matching markets (Roth and Sönmez 2005; Roth 2018) in implementing or improving markets. As with auctions and matching markets, MSPs address information problems within certain boundary conditions. These include two (or more) distinct sets of customers where at least one set of customers benefits from the magnitude of the other set of customers. Nevertheless, these conditions encompass a wide variety of situations, including important spot markets, in which sellers benefit the more buyers there are and vice versa (e.g., Diamond and Kuan 2018). Accordingly, we can also apply criteria for assessing the quality of markets and the incentives to increase quality, which can guide regulatory responses to residual information imperfections, an important aspect of strategy in Oberholzer-Gee and Yao's (2018) analysis.

By examining MSPs as a strategic choice for market design and for market creation, we contribute to the MSP literature by providing a conceptual framework for identifying entry opportunities. We also connect MSPs, an important new mechanism, to the information imperfections literature that has been impactful for strategy and policy. While we demonstrate our framework with an application in healthcare, which is a particularly challenging and complex market, future research—and practice—could examine other dysfunctional markets or the creation of new markets that disrupt an industry's information value chain.

LITERATURE REVIEW

The literature on market imperfections and market failure has thus far remained disconnected from a more recent literature on two-sided markets. Two-sided markets, or MSPs, are admittedly a small subset of markets overall, but they are an important subset that has attracted substantial scholarly and practical attention because of their disruptive effect on incumbent market structures. We therefore seek to bring these two literatures together to improve the identification of strategic opportunities and to assess market quality problems and solutions.

MSPs

The economic logic that underpins MSPs emphasizes that MSPs can embody several externalities at once. The externalities profoundly affect the pricing of goods and services as well as the structure of an industry. MSPs serve two (or more) distinct sets of customers, where demand from one set of customers increases with the size of the other set of customers. This demand externality, which is referred to as the cross-platform externality, can work in the other direction, too, and network effects can exist for one or both sets of customers. Because of externalities, the profit-maximizing price for one side is lower than what a single-sided firm would charge, in order to make more money from the other side. And positive externalities can result in a monopoly industry structure, which can appear ill-gotten, especially when prices appear to be subsidized (Wright 2004).

Given these unique and unusual properties, the literature on MSPs has focused on explaining what MSPs are and how they work in practice (e.g., Rochet and Tirole 2003, 2006; Parker and Van Alstyne 2005). Descriptive case studies of MSPs have covered many empirical settings like credit cards (Rochet and Tirole 2003; Belleflamme and Peitz 2010), video games (Schilling 2002, 2003; Rietveld, Schilling, Bellavitis 2019; Boudreau, 2010), shopping malls (Boudreau and Hagiu, 2009) and hairdressers (Hagiu and Wright 2015a). Diamond and Kuan (2018) are the first to articulate the role MSPs have in creating a market—in this case, the stock market—despite an extensive literature using data from eBay,

an online MSP, to study basic economic theories about auctions (Tadelis and Zettelmeyer 2015; Yin et al. 2014), reputations (Tadelis 2016; Li, Tadelis and Zhou, 2020) and fraud (Gavish and Tucci 2006).

With this descriptive focus on explaining the phenomena of MSPs as a market intermediary in various settings, the literature has yet to systematically analyze how to identify settings where MSPs might enter, make profits and potentially disrupt an industry. Therefore, instead of identifying opportunities for creating new spot markets or enabling new transactions, the research in strategic management has focused on scope decisions conditional on already identifying an entry opportunity. Hagiu (2014) summarizes the strategic questions well, covering how many sides to serve (including whether to be a one- or two-sided firm) (Hagiu, 2014), how to set the price (Rochet and Tirole 2003; Parker and Van Alstyne 2005), design features (Eisenmann, Parker and Van Alstyne 2011), and governance (Kuan and Lee 2021). What remains important to explain, however, is the antecedents to the scope decisions: *whether* and *where* to enter.

Connecting MSPs to a theory of market imperfections

To explain the antecedents, we build upon a theory of market imperfections and analyze information imperfections as sources of market failure, on the one hand, but also as opportunities for profits, on the other hand. Rooted in the economic theory of market failure, the theory describes the anatomy of market failure (Bator 1958). The conditions that interfere with effective competition—market power, information imperfections, transactions costs, and externalities—are viewed negatively from the point of view of market efficiency. Recent developments advance strategy theory by emphasizing that these are the same conditions that allow firms to earn supra-normal profits (Yao 1988; Oberholzer-Gee and Yao 2013; Mahoney and Qian 2013).

For our purposes, we focus on information imperfections, which refer to buyers or sellers lacking information that is critical for efficient exchange. Problems of incomplete information occur when buyers cannot find sellers. Efficient exchanges between buyers and sellers require information for them to find alternatives. If buyers are unaware of near-equivalent products offered by rival sellers, a seller can price

above the level that would prevail under perfect competition (Chatain and Zemsky 2011). Asymmetric information is an imperfection that reduces buyers' trust toward sellers. Usually, sellers have private information about the quality of the good they are selling and buyers know that sellers have an incentive to overstate quality. The result is market failure, or a "lemons problem," as buyers consistently undervalue the seller's goods (Akerlof 1970).

Recent scholarship proposes market imperfections as opportunities for entry. Oberholzer-Gee and Yao (2018: 471) explain (1) what imperfections, if any, characterize the market, (2) how one's strategy (and the strategies of rival firms) might exploit such imperfections, and (3) how and why the market imperfections may change over time. For example, in a market characterized by information imperfections, a firm might create a strong brand to signal its quality level to consumers. Notably, government intervention is viewed as a key aspect of firm strategy that is susceptible to analysis (Oberholzer-Gee and Yao 2018). *Residual market imperfections* are imperfections that remain after a regulatory response, which can have differential effects on profit, depending on the type of regulation that gets implemented. But often, government involvement is concerned with information imperfections involving uncertain quality and this government objective is important for strategists to take into account.

THEORY DEVELOPMENT: INFORMATION VALUE CHAIN

If an information gap can be bridged profitably, firms have an entry opportunity (Fung et al 2009). The literature on market imperfections describes a variety of information gaps as well as ways to bridge them (Oberholzer-Gee and Yao 2018: 469). Building on the theory, we cast problems of information imperfections as incomplete information (i.e., the problem of finding buyers and sellers) and asymmetric information, such as the classic "lemons" problem identified by Akerlof (1970). Incomplete information results in search costs, and when buyers fail to find sellers (or vice versa), market failure occurs. Asymmetric information causes the price a buyer is willing to pay to decline. When sellers withdraw from a goods market because buyers anticipate *ex ante* misrepresentation by sellers, market failure occurs. Solving these problems requires locating buyers for sellers (and vice versa) and ensuring quality on both

sides. In our theory development, we are agnostic about whether the problem is information incompleteness or information asymmetry because both are common problems that MSPs can address. And while the literature has focused on what sellers can do to mitigate these types of imperfections, such as brands that signal quality and reduce information asymmetry, or advertising that brings buyers to sellers, an MSP can be superimposed as an information intermediary onto the information gap, which opens up additional solutions.

MSPs address imperfections along a value chain of information intermediaries

MSPs, by definition, serve two distinct sets of customers, making them an interesting type of information intermediary for bridging an information gap. Formal models characterize MSPs as a single cost function that simultaneously solves buyer and seller problems. For example, credit card companies are modeled as incurring a single cost for a platform that serves merchants and their customers (e.g., Rochet and Tirole 2003). However, in practice, an MSP is a chimera comprising two distinct activities and costs that firms incur to service their customers. Servicing credit card customers involves distinct activities and costs from servicing merchants. Moreover, in theory, the two distinct customer sets and their associated activities could be separated into distinct stages of the value chain.

Accordingly, we decompose the single cost function into separate functions for each side of the market. The functions are connected in a four-node value chain as shown in Figure 1. We use capitalization when referring to the nodes in the figure. *Aggregators* service *Buyers* and *Convenors* service *Sellers*. Aggregating creates value for Sellers by reducing the cost of reaching customers, while convening creates value for Buyers by making it easier to locate and purchase from trusted Sellers. Aggregators and Convenors may address incomplete information, asymmetric information, or both.

[Figure 1]

In this value chain, Buyers (B) are separated from Sellers (S) by information imperfections that must be bridged sufficiently for transactions to occur. Thus, entry opportunities can be found throughout

this value chain wherever a firm can profitably bridge an information gap. Note, also, that a firm can enter as a single-sided firm or as a two-sided firm. For example, in a market for branded goods, a single-sided goods seller invests in its brand, which gives buyers information about quality and thereby reduces information asymmetry. This branded good is sold in a department store, which is an MSP that convenes goods from many sellers and aggregates buyers by advertising and by selecting favorable store locations. Together, the seller's investment in its brand and the department store's activities bridge a large information gap.

Vertical integration along the information value chain

The question of whether to enter as an MSP or a single-sided firm can be analyzed as a question of vertical integration, as argued by Hagiu (2014). A firm can either serve two sides of a two-sided market or vertically integrate into one of those sides, yielding a one-sided firm. If the question of vertical integration –a make-or-buy question—is decided yes/no along the 4-node value chain, a simple 2x2 can represent the combinations, as illustrated in Figure 2.

[Figure 2]

The upper-left quadrant of Figure 2 is a fully de-integrated value chain, while in the upper-right quadrant, a Convenor vertically integrates backward into a Seller. In the lower-left quadrant, a Convenor vertically integrates forward into an Aggregator, and in the lower-right quadrant, all three could vertically integrate. We propose these four quadrants as a taxonomy for analyzing when certain types of MSPs can re-configure an industry's information value chain and potentially disrupt the industry.

Our taxonomy somewhat simplifies the many possible complex configurations involving MSPs that Cusumano, Gawer and Yoffie (2019) describe in the business of platforms. In our goods market example, the lower left quadrant represents a department store on a high street selling branded goods. But a shopping mall might realize a profit opportunity by improving the Aggregating function for customers. The shopping mall, an MSP that aggregates buyers and convenes department stores, would be represented

by the upper-left quadrant, the fully de-integrated value chain. But the taxonomy helps to explain why MSPs have disrupted industries: the lower-left quadrant with the integrated Aggregator-Convenor is always an MSP that brings both functions into a single firm.

AN APPLICATION OF OUR FRAMEWORK: HEALTH CARE

A dysfunctional and inefficient market with potential opportunities for entry and profit

In markets that involve multiple MSPs, the many information bridges can generate complexity that makes markets difficult to analyze. Our taxonomy, which conceptually decomposes the aggregating and convening functions, can be used to parse industry configurations and identify opportunities for entry and profit. In this section, we apply our framework to the market of healthcare, a notoriously dysfunctional and inefficient market in which firms and policymakers are both actively experimenting. We model the healthcare market as patients buying health services from doctors (an example of healthcare "sellers"). Information imperfections separate patients from doctors, whether the imperfections reside in information incompleteness, where patients cannot find (the right) doctors, or information asymmetry, where patients cannot trust doctors. A dizzying variety of configurations bridges these information gaps. Figure 3 provides four simplified configurations as exemplars, although we offer the caveat that there may be variations deviating from the stylized versions that we present in the taxonomy.

[Figure 3]

Fully de-integrated (the upper-left quadrant): Preferred Provider Organizations (PPOs)

In the market for healthcare, Buyers (patients using healthcare services) are on one end of the information value chain and Sellers (e.g., healthcare providers such as physicians, hospitals, etc.) are on the other. In between Buyers and Sellers are information intermediaries that bridge one or more information gaps. In the upper-left quadrant, a variety of firms that aggregate, convene and sell services collectively bridges that gap. First, insurers are two-sided platforms that convene employers on one side and Sellers (health

care providers) on the other. Insurers negotiate services and prices with specific Sellers and handle payments, on one side, and then offer these negotiated packages and payment services to employers on the other side of their platform. In industry parlance, this bundle of services is known as a preferred provider organization (PPO). Aggregating is performed by employers, who are also two-sided platforms, giving employees access to selected insurance plans on one side and providing insurers a set of employee-patients on the other side. In this quadrant involving de-integrated information intermediaries, both are MSPs.

Even within this arrangement of MSPs, additional entry opportunities remain. First, government-operated "insurance exchanges" aggregate individuals without access to healthcare through employers. The insurance exchanges fulfill the same role as employers. Second, narrow information gaps can be lucrative for intermediaries. Pharmacy benefit managers are another two-sided platform that serve pharmaceutical companies as sellers on one side and insurers on the other side. Like insurers, pharmacy benefit managers negotiate prices and handle payments for both sets of customers, pharmaceutical firms and insurers.

Convenor-Seller (the upper-right quadrant): Health Management Organizations (HMOs)

In the upper-right quadrant, Convenors and Sellers are vertically integrated into a one-sided firm rather than a two-sided platform. Sellers (e.g., healthcare providers such as physicians, hospitals, etc.) are integrated with Convenors, which is an insurer. The Convenor-Seller integrated entity sells its services to employers, which are Aggregators as in the PPO configuration. In this vertically integrated entity, known in the industry as health management organizations (HMOs) or "managed care", the insurer-provider firm negotiates the services and handles payment just like the insurer did in the de-integrated configuration, but also hires doctors, owns its own hospitals, and operates all of the seller services, as well.[1]

[1] HMOs were created as a response to the problem of incentives articulated by Fuchs (1974) who argued that a conflict of interest caused healthcare costs to grow. He argued that because doctors both prescribe and sell treatments, they are prescribing costly services, which patients feel compelled to buy. To address this, HMOs pay

Fully integrated (the lower-right quadrant): Single-payer systems

An even more integrated configuration combines Sellers, Convenors, and Aggregators into a single one-sided firm, also referred to as a "single-payer" system. In this configuration, the Convenor brings together Sellers, just as the HMO does, hiring doctors, buying and operating hospitals, etc. But the single-payer firm, unlike the HMO, does not sell to firms acting as Aggregators. Instead, the single-payer firm goes directly to patients and aggregates them.

An example of a single-payer system is the Veterans Administration (VA), which provides all US veterans with free healthcare services using facilities that it owns and medical personnel it employs. Other examples include national health systems outside the US.

Aggregator-Convenor (lower-left quadrant): Opportunities to enter as two-sided platforms

In the lower-left quadrant of the taxonomy, a single, two-sided firm is an Aggregator and a Convenor. This is a commonly-observed market structure in the MSP literature, in which these roles are modeled as integrated, often as a single cost function. MSPs that combine these roles well have successfully disrupted numerous staid industries. For instance, Uber convenes drivers and aggregates riders, Amazon convenes retailers and aggregates customers, AirBnB convenes hosts and aggregates guests. A strategy literature has emerged to advise MSPs (Hagiu 2014; Parker, Van Alstyne and Choudary 2017) and to analyze the incentives of MSPs to produce quality (Diamond and Kuan 2018; Kuan 2001).

Interestingly, in the market for healthcare, no Aggregator-Convenor as an integrated entity exists. However, we provide a framework for analyzing why a firm might enter as a two-sided platform—to bridge the informational gap—and what services the Aggregator-Convenor might incorporate into its platform. Using our framework, a firm identifies the entry opportunity and the two-sided nature of that opportunity. Therefore, the firm can leverage an existing strategy literature that guides managers in the design and operation of an MSP. For example, Hagiu (2014) lays out a succinct set of four strategic

sellers a fixed fee per patient and thereby aligns doctors' incentives, since over-prescribing unnecessary treatments would only reduce the doctor's profit from that patient.

decision categories. These include which sides of a market to serve, which features to add that could affect ease-of-use, convenience, and other dimensions of quality, how much to charge, and governance-related questions of who may access the MSP, what they may do, and how information privacy is maintained.

Our framework, which lays out a taxonomy of industry configurations and various structural arrangements of information intermediaries, provides guidance on three of these four strategic decision categories. First, regarding which sides to serve, a truly ambitious information intermediary would bridge the enormous gap between patients (Buyers) and healthcare providers (Sellers). Second, such services as billing and payment are key features of our structural analysis of existing configurations. Pricing is also informed by our analysis of existing configurations, in terms of who would pay for an MSP's services: employers are incentivized to provide healthcare for their employees. Thus, the information imperfections in the existing configurations present opportunities for firm entry as MSPs. Our analysis falls short on governance, which relates to access, rights, and privacy of information, most of which require regulatory responses and are unaddressed in our structural analysis. For this category of strategic decisions, we propose a research direction in the next section for further theorizing and implementation.

DISCUSSION

Oberholzer and Gee (2018) identify government intervention as a key strategic concern that can and should be analyzed. Often at issue for regulators is the quality of the market amidst competition. That is, regulators may have concerns about market efficiency even when competition disciplines firms. In the context of MSPs, governance decisions affect quality—the quality of transactions and the efficiency of outcomes (Kuan and Lee 2021). Therefore, an MSP's strategic decisions about governance can directly affect the quality of the resulting market, and thus affect how concerned regulators might be.

While there is relatively scant strategy scholarship on MSP governance, quality and efficiency are substantially of interest to economists, who consider why a monopolistic MSP might be efficient (Wright 2004) and high quality (Diamond and Kuan 2018). Drawing upon this research, we take, as a starting

point, a two-sided market that has been studied extensively, the stock market (Diamond and Kuan 2018). We explain two insights for our analysis of information intermediaries and discuss how they might be applied practically to the market for healthcare.

Dimensions of a market's quality

The US stock market comprises two competing exchanges, the New York Stock Exchange (NYSE) and the Nasdaq. Both, historically, are nonprofit member organizations serving investors (i.e., buyers and sellers of stock) on one side and issuing firms, which list their shares on the exchange, on the other. The prior literature had omitted the issuing side of the market, focusing instead on the buying and selling of stock as the primary problem of exchanges. By contrast, Diamond and Kuan (2018) argue that a lemons problem also exists, in which low-quality issuing firms could drive out high-quality ones.

While measures of quality in the stock market might seem idiosyncratic to that setting, such dimensions as liquidity, transparency, and stability can apply to spot markets in general. Grocery stores, a retail spot market, strive for these qualities, too, including having ample inventory on-hand to meet demand, posting prices clearly, and maintaining steady prices even in the face of wholesale fluctuations. An MSP connecting patients and providers could also use these dimensions of market quality, with liquidity measured as availability of doctors and appointments, price transparency and stability measured in terms of how often prices are posted and adhered to and how often prices change.

Diamond and Kuan (2018) also address the question of *incentives* to produce high quality. They claim that the NYSE instituted governance measures to address the lemons problem because NYSE owners were underwriters who profited from efficient (high) prices in stock offerings (e.g., initial public offerings or IPOs).[2] Thus, an additional question involves ownership and incentives.

[2] In the lemons problem (Akerlof, 1972), low quality used cars cause skeptical buyers to lower their offers even to high-quality sellers because buyers cannot distinguish good from bad. Hence, prices for good cars are *lower* than the value of the car.

Dimensions of quality in the market for healthcare

Based on the dimensions of a market's quality suggested above, it is evident that the three quadrants we analyze in the preceding section fall short on one or more dimensions. Table 1 summarizes our assessments of each quadrant's dimensions of quality in the market for healthcare.

[Table 1]

In the de-integrated configuration (PPOs, as shown in the upper-left quadrant of Figure 3), Sellers and Convenors have the market power to price discriminate. They gain and maintain market power because they impose information secrecy. For example, dramatic price differences, such as $6,241 and $60,584 for the same procedure (a C-section) at the same hospital have been kept as a secret (Mathews, McGinty and Evans 2021). The secret is revealed only through a federal rule that took effect in January 2021 requiring hospitals to disclose their prices. Prices are negotiated by Convenors, in this case insurers including public insurers like Medicaid and Medicare, but Sellers and Convenors have an incentive to keep price differences a secret. This lack of price transparency affects buyers, in this case patients, who cannot observe prices. Buyers have no access to Sellers' and Convenors' private information about price differences when making decisions. Thus, Aggregators are unable to reduce costs because Buyers are unable to choose cheaper options.

In the configuration with Convenor-Seller as an integrated entity (HMOs, as shown in the upper-right quadrant of Figure 3), patients know up front what they must pay—often in the form of a fixed co-payment, so price discrimination and price transparency are not an issue. But to reduce costs, HMOs reduce access to care (or liquidity), forcing patients to wait for appointments, for example. HMOs may also use primary care physicians as gatekeepers to limit higher-cost specialty care.

In the fully-integrated configuration (single-payer system, as shown in the lower-right quadrant of Figure 3), prices are completely hidden from patients because all patient costs are covered by the VA. Rather, as with HMOs, rationing occurs through the restriction of output, where excessively long wait

times for appointments led to a Congressional action requiring the VA to pay non-VA physicians as a solution to reduce wait times.

Implementation

Herbert Simon (1996: 111, 114) famously argued that to design is to devise "courses of action aimed at changing existing situations into preferred ones". Whereas natural sciences "are concerned with how things are," design is concerned with "how things ought to be." Given the pitfalls of existing market structures in healthcare, how might a two-sided convenor-aggregator achieve high quality on all three dimensions? MSP governance involves defining who has access and what they are allowed to do (i.e., access, rights, and privacy of information). Our analysis of MSP governance as a category of strategic decisions can provide practical guidance on implementation.

To make prices stable and transparent, the MSP can implement rules requiring that sellers must post prices for services and charge only posted prices—or be removed from the MSP. Price changes could also be regulated in terms of frequency and amount, similar to the rules implemented by the NYSE. By handling billing and payment, the MSP would be in a position to improve payment terms to sellers and ensure compliance with transparency and stability rules. Finally, the MSP could also improve liquidity by promoting entry and innovation. For example, virtual doctor's visits are quicker and easier for patients and doctors, while online group therapy increases the number of patients who can be treated at once.

The issue of incentives raises the question of who might wish to create an MSP that generates efficient outcomes. Might a profit-maximizing MSP make the governance choices we outline? We speculate on the possibility, suggested by the stock exchange setting, that a member nonprofit consisting of local employers might have the right incentives to produce high quality. Employers already pay health insurance for their employees; those funds could be pooled to create a single MSP, especially if the employers were not competitors, as was the case with a 2018 joint venture by Amazon, Berkshire

Hathaway, and JP Morgan Chase (NY Times, 2018).[3] Moreover, a geographical region like Seattle that seeks to upgrade its workforce and human capital in the labor pool might be uniquely positioned for the creation of an MSP because the employees of the diverse large firms—Amazon, Boeing, Costco, Starbucks, and Microsoft—would attract sellers to the MSP.

CONCLUSION

The analysis of industry configuration and market structure has long defined the field of strategy (Porter 1980). Structural features such as barriers to entry and the intensity of rivalry have been the central focus in analyzing the attractiveness of an entry opportunity and the long-term profit of an industry. But MSPs, which have disrupted many industries, may also be a feature of market structure that disrupts how managers and researchers conceptualize entry and profit; at the very least, MSPs have much to contribute. In situations where MSPs disrupt an industry, they do so by bridging information gaps more effectively than incumbents. This places information imperfections at the center of disruptive opportunities, and moves them from the realm of market failure into the core of strategy. To be sure, structure is still a key concept; in our analysis, a value chain connecting buyer and seller is decomposed to distinguish aggregators of buyers from convenors of sellers. But in our model, *information* defines the opportunity space. MSPs disrupt an industry by changing the configuration of information value chain.

In viewing MSPs as intermediaries that bridge information gaps, we also identify a role for MSPs as a *mechanism for creating markets*. The MSP literature has lately viewed MSPs as a source of data to test or build theory, but we submit that MSPs belong to a class of mechanisms that mitigate problems of imperfections. These mechanisms include warranties and other contracts to mitigate the "lemons" problem (Akerlof 1972), auctions to address private information in valuation (Milgrom 1979, 2021; Wilson 1977, 1979), and matching markets to coordinate preferences (Roth and Sönmez 2005; Roth 2018). MSPs are a market-design mechanism that can be implemented by firms to bridge large

[3] https://www.nytimes.com/2018/01/30/upshot/can-amazon-and-friends-handle-health-care-theres-reason-for-doubt.html

informational gulfs and reduce market inefficiencies. As an example of implementation, firms design digital markets by defying knowledge constraints with crowds and marketplaces (e.g., Tajedin et al 2019). Accordingly, MSPs also present an opportunity to unpack a dichotomy, proposed by Williamson (2010), between a spot market and hierarchy. In the application of our framework to the market of healthcare, MSPs are the hierarchy of a spot market.

Future research could further explore disruptions by MSPs. We discuss several instances in which MSPs choose to bridge narrow informational gaps, whether as a shopping mall or pharmacy benefit manager, neither of which disrupts the respective industry. By contrast, our proposed MSP in the lower-left quadrant as shown in Figure 3 seeks to disrupt an existing healthcare market by reconfiguring the information value chain. More research is needed to identify the elements of disruption, and whether a reconfiguration is needed for an MSP to disrupt an industry.

REFERENCES

Acemoglu D, Verdier T (2000) The choice between market failures and corruption. *American Economic Review 90*(1):194–211.

Bator FM (1958) The anatomy of market failure. *Quart. J. Econom.* 72(3):351–379.

Baumol WJ, Panzar JC, Willig RW (1982) *Contestable Markets and the Theory of Industry* Structure (Harcourt Brace Jovanovich, New York, NY).

Boudreau K (2010) Open platform strategies and innovation: Granting access vs. devolving control. *Management Science* 56(10): 1849-1872.

Boudreau K, Hagiu A (2009) Platform rules: multi-sided platforms as regulators. In *Platforms, Markets and Innovation*, Annabelle Gawer (ed). (Elgar, Cheltenham, UK).

Belleflamme P, Peitz M (2010) *Industrial Organization: Markets and Strategies* (1st ed.). (Cambridge University Press, Cambridge, UK).

Chatain O, Zemsky P (2011) Value creation and value capture with frictions. *Strategic Management J.* 32(11):1206–1231.

Cusumano MA, Gawer A, Yoffie DB (2019) *The Business of Platforms: Strategy in the Age of Digital Competition, Innovation, and Power*. (Harper Business, New York, NY).

Dellarocas C (2003) The digitization of word of mouth: promise and challenges of online feedback mechanisms, *Management Science* 49(10):1407–1424.

Diamond SF, Kuan J (2018) Are the stock markets rigged? An empirical analysis of regulatory change, *International Review of Law and Economics* 55:33–40.

Elfenbein DW, Fisman R, McManus B (2015) Market structure, reputation, and the value of quality certification. *American Economic Journal: Microeconomics* 7(4):83–108.

Eisenmann T, Parker G, Van Alstyne M (2011) Platform envelopment. *Strat Mgmt J* 32: 1270-1285.

Fuchs VR (1974) *Who Shall Live?: Health, Economics and Social Choice* (Basic Books, New York, NY).

Fung A, Graham M, Weil D (2009) *Full Disclosure*: *The Perils and Promise of Transparency* (Cambridge University Press, Cambridge, UK).

Gavish B, Tucci C (2006) Fraudulent auctions on the Internet. *Electron Commerce Research* 6:127–140.

Hagiu A (2014) Strategic decisions for multisided platforms. *Sloan Management Rev*. 55(2): 71–80.

Hagiu A, Wright J (2013) Do you really want to be an eBay? *Harv. Bus. Rev.*, 91(3):102–108

Hagiu A, Wright J (2015a) Multi-sided platforms. *Internat. J. Indust. Organ*. 43:162–174.

Hagiu A, Wright J (2015b) Marketplace or reseller? *Manag. Sci.* 61(1):184-203.

Kuan J (2001) The phantom profits of the opera: Ownership in the arts as a make-buy decision. *Journal of Law, Economics & Organization* 17(2): 507 – 520.

Kuan J, Lee GK (2021) Governance strategy for digital platforms: Differentiation through information privacy. *Strategic Management Review*. http://leeds-faculty.colorado.edu/jere1232/smr.html Forthcoming.

Li L, Tadelis S, Zhou X (2020) Buying reputation as a signal of quality: Evidence from an online marketplace. *The RAND Journal of Economics 51*(4):965–988.

Mathews AW, McGinty T, Evans M (2021) How much does a C-Section cost? $6241. Or $60,584. *Wall Street Journal*, February 12, A1.

Oberholzer-Gee F, Yao DA (2013) Market imperfections and sustainable competitive advantage. Thomas C, Shughart II W, eds. *Oxford Handbook of Managerial Economics* (Oxford University Press, Oxford, UK), 262–277.

Oberholzer-Gee F, Yao DA (2018) Integrated strategy: Residual market and exchange imperfections as the foundation of sustainable competitive advantage. *Strategy Science 3*(2): 463-480.

Mahoney JT, Qian L. 2013. Market frictions as building blocks of an organizational economics approach to strategic management. *Strategic Management J.* 34(9):1019–1041.

Milgrom, PR (1979) A convergence theorem for competitive bidding with differential information. *Econometrica* 47(3):679–88.

Milgrom, PR (2021) Auction research evolving: Theorems and market Designs. *American Economic Review* 111.5:1383–1405.
Parker GG, Van Alstyne MW (2005) Two-sided network effects: A theory of information product design. *Management Sci*. 51(10):1494–1504.
Parker GG, Van Alstyne MW, Choudary, SP (2017) *Platform Revolution: How Networked Markets Are Transforming the Economy—and How to Make Them Work for You*. (W.W. Norton).
Porter M (1980) *Competitive strategy: techniques for analyzing industries and competitors* Free Press, New York.
Rapping L (1965) Learning and World War II production functions. *Rev. Econom. Statist.* 47(1):81–86.
Rietveld, J., Seamans, R., & Meggiorin, K. (2021). Market orchestrators: The effects of certification on platforms and their complementors. *Strategy Science* 6(3):244-264.
Rietveld J, Schilling MA, Bellavitis C (2019) Platform strategy: Managing ecosystem value through selective promotion of complements. *Organization Science* 30(6):1232–1251.
Rochet J-C, Tirole J (2003) Platform competition in two-sided markets. *J. Eur. Econom. Assoc*. 1(4):990–1029.
Roth AE (2018) Marketplaces, markets, and market design. *American Economic Review* 108(7):1609–58.
Roth AE, Sönmez T (2005) A kidney exchange clearinghouse in New England. *American Economic Review* 95(2):376–380.
Schilling MA (2002) Technology success and failure in winner-take-all markets: The impact of learning orientation and network externalities. *Academy of Management Journal* 45(2): 387–398.
Schilling MA (2003). Technological leapfrogging: Lessons from the US video game console industry. *California management review*, *45*(3), 6-32.
Seamans R, Zhu F (2017) Repositioning and cost-cutting: The impact of competition on platform strategies. *Strategy Science* 2(2):83–99.
Simon HA (1996) *The Sciences of the Artificial* (3rd ed.). (MIT Press, Cambridge, MA).
Stiglitz JE (1989) Markets, market failures, and development. *American Economic Review 79*(2):197–203.
Tadelis S (2016) Reputation and feedback systems in online platform markets. *Annual Review of Economics* 8:321–40.
Tadelis S, Zettelmeyer F (2015) Information disclosure as a matching mechanism: Theory and evidence from a field experiment. *American Economic Review* 105(2):886–905.
Tajedin H, Madhok A, Keyhani M (2019) A theory of digital firm-designed markets: Defying knowledge constraints with crowds and marketplaces. *Strategy Science* 4(4):323–342.
Tirole J (1994) The internal organization of government. *Oxford Econom. Papers* 46(1):1–29.
Williamson OE (2010) Transaction cost economics: The natural progression. *American Economic Review 100*(3):673–90.
Wilson R (1977) A bidding model of perfect competition." *Review of Economic Studies* 44(3):511–18.
Wilson R (1979) Auctions of shares. *Quarterly Journal of Economics* 93(4):675–89.
Wright J (2004) One-sided logic in two-sided markets. *Review of Network Economics* 3(1):44–64.
Yao DA (1988) Beyond the reach of the invisible hand: Impediments to economic activity, market failures, and profitability. *Strategic Management J.* 9:59–70.
Yin PL, Davis JP, Muzyrya Y (2014) Entrepreneurial innovation: Killer apps in the iPhone ecosystem. *AER: Papers & Proceedings* 104(5): 255-259.
Zhu F, Iansiti M (2012) Entry into platform- based markets. *Strategic Management Journal* 33(1):88–106.
Zhu F, Liu Q (2018) Competing with complementors: An empirical look at Amazon. com. *Strategic Management Journal* 39(10):2618–2642.

FIGURES & TABLES

Buyers (B) –Aggregators (A) –Convenors (C) – Sellers (S)

Figure 1: A value chain of information intermediaries addressing exchange imperfections

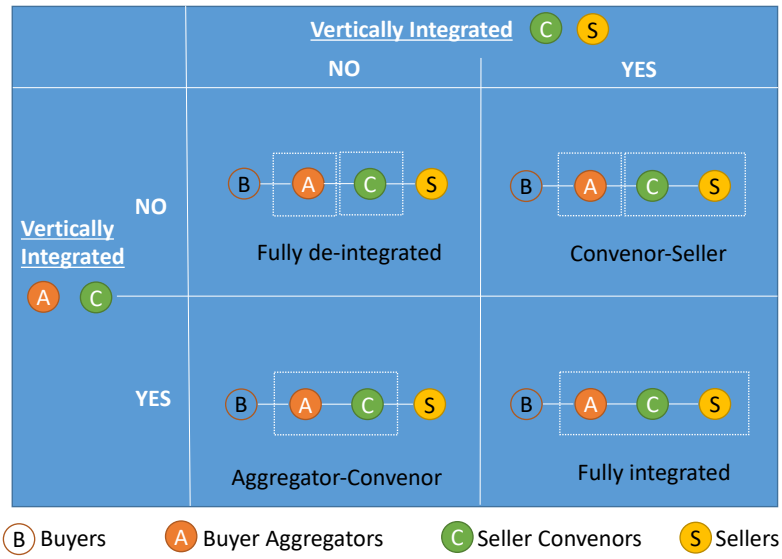

Figure 2: A taxonomy of vertical integration options along the information value chain

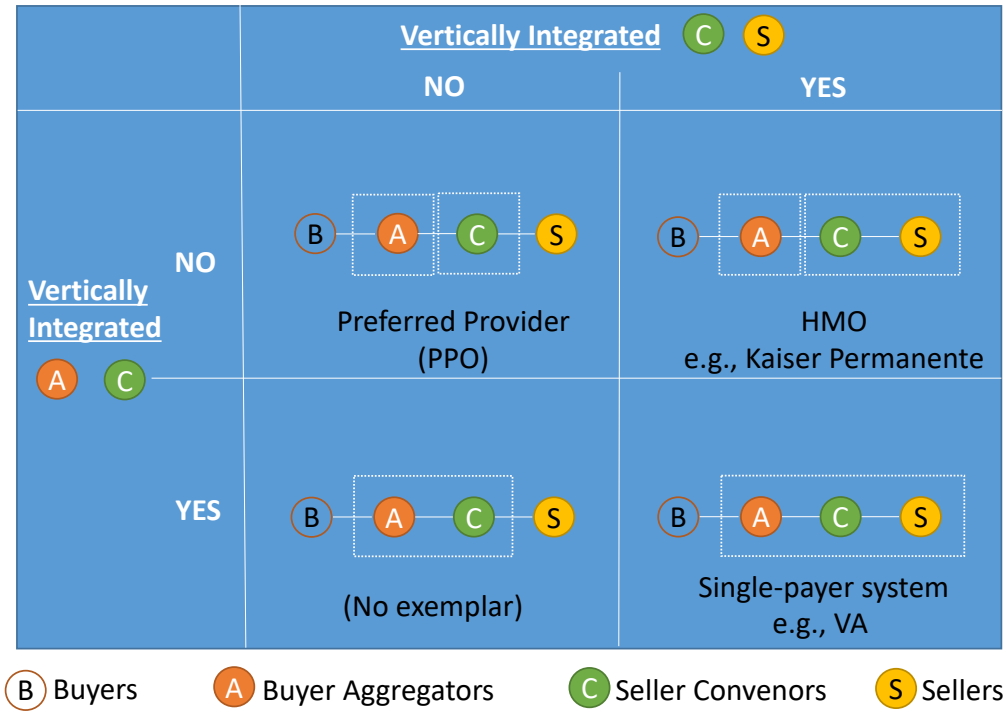

Figure 3: A taxonomy and exemplars in the market for healthcare

Table 1: Dimensions of a market's quality in each quadrant of our framework applied to healthcare

	Liquidity	Transparency	Stability
PPO (the upper-left quadrant)	+	-	+
HMO (the upper-right quadrant)	-	+	+
Single-payer system (the lower-right quadrant)	-	+	-