

Multi-sided platforms[☆]Andrei Hagiu^a, Julian Wright^b^a Harvard Business School, Boston, MA 02163, United States^b Department of Economics, National University of Singapore, Singapore 117570, Singapore

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ABSTRACT

We study the economic tradeoffs that drive organizations to position themselves closer to or further away from a multi-sided platform (MSP) business model, relative to three traditional alternatives: vertically integrated firms, resellers or input suppliers. These tradeoffs lead to a comprehensive discussion of the defining features of MSPs. The formal model we develop focuses on the MSP versus vertical integration choice, which we interpret in the context of professional services. A key tradeoff emerges between the need to coordinate decisions that generate spillovers across professionals (best achieved by a vertical integrated firm) and the need to both motivate unobservable effort by professionals and ensure professionals adapt their decisions to their private information (best achieved by a MSP). We show how this baseline tradeoff is impacted by the nature of contracts available to the vertically integrated firm and the MSP, and by the possibility of professionals holding pessimistic expectations when deciding whether or not to join the vertically integrated firm or MSP.

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1. Introduction

There is growing interest in the economics of multi-sided platforms (MSPs), which get two or more sides on board and enable interactions between them (e.g., Airbnb, eBay, Uber, and Xbox). The pioneering models of MSPs introduced by Armstrong (2006), Caillaud and Julien (2003), Parker and Van Alstyne (2005), and Rochet and Tirole (2003), as well as a large number of more recent contributions, all treat “multi-sidedness” as a given characteristic of the relevant industries and firms. It is important to recognize, however, that many real-world organizations make choices that determine how close or how far they are from a multi-sided economic model, and that these choices carry significant economic trade-offs.

For instance, Amazon started off as a pure retailer but has moved closer to a MSP model over time by enabling third-party sellers to trade directly with consumers on its website. Zappos, an online shoe retailer, went in the other direction, abandoning its initial model based on partnerships with shoe manufacturers that fulfilled customer orders directly. Increasingly, professional service firms are moving away from pure vertically integrated models in which all client services are provided by their employees (e.g. traditional staffing agencies, consulting firms and taxi companies), and towards the MSP model, in which they enable independent contractors or professionals to deal directly with

clients (e.g. Elance–oDesk, the Gerson Lehrman Group, and Uber). There are interesting exceptions and nuances. In the private hospital market in Singapore, Raffles Hospital has bucked the trend by employing and managing its doctors as a vertically integrated firm rather than renting out its space to groups of independent specialists by way of clinics, as other private hospitals have done. Internet-enabled professional service intermediaries such as the Gerson Lehrman Group enable corporate clients to hire independent professionals from around the world for specific projects. Yet they maintain a significant degree of control over the contractual terms between clients and professionals, unlike pure MSPs such as Elance–oDesk, on which contractors have almost complete freedom to set their own terms or negotiate them with employers.

In this paper, we study the economic trade-offs that drive organizations to position themselves closer to or further away from a MSP model, relative to more traditional alternatives such as vertically integrated firms, resellers, or input suppliers. In so doing, we will provide a new definition of MSPs that clarifies what makes them special.

In terms of new modeling, we focus on one particular choice of business model, the choice that a firm faces between operating in the MSP mode and operating in the vertically integrated (VI) mode. We have in mind markets for professional services, which clients can obtain directly from professionals through a MSP or from a VI firm. At a high level, the model emphasizes a key trade-off that arises between the coordination benefits of the VI mode when there are spillovers across the decisions of individual professionals/employees and the benefits of the MSP mode in making professionals residual claimants of their individual demand, which can better motivate them to provide unobservable individual effort and can ensure that they better adapt their decisions to their private information.

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In the specific model we propose, there are two decision variables at play, both of which affect demand—a transferable action and a non-transferable action. The non-transferable action is always chosen by the individual employee or professional, and we interpret it as unobservable costly effort. The transferable action is determined either by the firm (in VI mode) or by each individual professional (in MSP mode). It is thus the control rights over this transferable action which determine whether the firm acts in VI mode or MSP mode. We assume this transferable action generates demand spillovers across the services offered through the firm (in both modes). The transferable action could represent costly quality investments or marketing activities with respect to the service in question. The payment of commissions (bonuses) based on sales in VI mode can help motivate employees to address the moral hazard problem in which they invest too little in costly effort. However, commissions cannot perfectly solve this problem because they also distort the choice of the transferable action. Furthermore, commissions do not help the firm's choice of transferable actions adapt to professionals' private information. As a result, the MSP mode dominates, provided that coordination benefits are not too strong. We show how this trade-off is shifted if the MSP can charge fees based on the professionals' sales, and by the nature of professionals' expectations with respect to how many other professionals join the VI firm or MSP.

A few other authors have noted the possibility that platforms can sometimes choose whether or not to vertically integrate into one of their sides, although they have not modeled this choice (see [Evans et al., 2006](#); [Gawer and Cusumano, 2002](#); [Gawer and Henderson, 2007](#); and [Rysman, 2009](#)). They discuss some of the economic drivers of these decisions. For instance, in the personal computer market, Apple produces its own hardware, whereas Microsoft leaves this to independent manufacturers. As a result, Apple manages only a two-sided platform between consumers and software providers, while Microsoft manages a three-sided platform between consumers, software providers, and hardware providers. These authors argue that Apple's model leads to higher quality products, whereas Microsoft's model generates more product variety and broader indirect network effects.

While we focus our formal modeling on the VI vs. MSP choice, we recognize that vertical integration is but one of several ways in which organizations can move away from a MSP mode. Specifically, we summarize the key insights from our recent work on the trade-offs faced by an intermediary choosing whether to be a MSP marketplace or a reseller ([Hagiu and Wright, 2013, 2015](#)). We also provide a discussion of the trade-offs between operating as a MSP or as an input supplier.

By equating the difference between MSPs and VI to the allocation of residual control rights between independent professionals and the firm, our work is loosely related to the voluminous literature on vertical integration and the theory of the firm (see [Gibbons, 2005](#) for an overview). Rather than studying “make or buy” decisions, we study “enable (MSP) or employ (VI)” decisions, which involve quite a different economic analysis. The key difference is the following: in the “make or buy” (vertical integration) decision, regardless of the choice, the focal firm contracts with and controls the sale to buyers. By contrast, in the “enable or employ” decision, the MSP mode involves contractual relationships between buyers and professionals, to which the focal firm is not a party, but merely an enabler of those contractual relationships.

Our analysis is a cross between what [Gibbons \(2005\)](#) calls “the incentive system theory of the firm” and “the adaptation theory of the firm.” The common feature with the incentive system theory of the firm is the existence of ex-post moral hazard issues (non-contractible effort provision by professionals), which is the rationale for incentives in the form of payment structures. The common feature with the adaptation theory of the firm is that one party (professionals) has superior information regarding the transferable decision variable relative to the other party (the firm). The novelty of our model relative to this literature is that we have two types of non-contractible decisions: one which is always controlled by the professionals and is the source of moral hazard; the other which can be controlled either by professionals or by the firm.

Our paper is also related to a more recent literature on organizational design which studies centralized vs. decentralized decision-making. At a high level, we share with this literature the focus on non-contractible decisions (ex-ante and ex-post) and the tradeoffs that arise from allocating the relevant decision rights to different parties. Loosely speaking, centralization corresponds to our VI mode and decentralization corresponds to our MSP mode. See, for example, [Alonso et al. \(2008, 2014\)](#), although their focus on strategic communication (in their 2008 paper) and the tradeoff between information breadth and depth (in their 2014 paper) is very different from ours.

The rest of the article proceeds as follows. [Section 2](#) gives a definition of MSPs and discusses what makes MSPs special. [Section 3](#) provides a formal analysis of the trade-offs between the MSP mode and the VI mode. [Section 4](#) discusses the trade-offs between MSPs and resellers. [Section 5](#) discusses the trade-offs between MSPs and input suppliers. [Section 6](#) concludes.

2. What makes multi-sided platforms special?

The purpose of this section is to clearly identify the elements that make multi-sided platforms (MSPs) different from regular firms and other intermediaries. Existing definitions of MSPs suffer from excessive specificity, over-inclusiveness, or being too vague to be of use. As a result there is disagreement among those in the literature about what constitutes an appropriate definition. The most common approach to date has focused on the presence of important cross-group or indirect network effects between the two or more customer groups participating on the platform (e.g., [Armstrong, 2006](#); [Caillaud and Jullien, 2003](#)).¹ [Rochet and Tirole \(2006\)](#) proposed an alternative definition, which focuses on whether the structure of prices set by the platform is non-neutral (i.e., whether the allocation of fees across the two sides matters for the total volume of transactions). Both approaches have limitations (see [Rysman, 2009](#)). For instance, suppliers of supermarkets and discount superstores that take on inventory risk care about the number of consumers visiting the stores (and vice-versa), so that indirect network effects exist. Furthermore, if supermarkets and discount superstores pay their suppliers more and increase their prices to consumers, this change is unlikely to be neutral for their sales. Thus, such stores along with most other retailers appear to be MSPs according to the definitions above, yet most economists would agree that they are not.

We believe that at the most fundamental level, MSPs have two key features beyond any other requirements (such as indirect network effects or non-neutrality of fees):

- They enable direct interactions between two or more distinct sides.
- Each side is affiliated with the platform.

Broadly speaking, by “direct interaction” we mean that the two or more distinct sides retain control over the key terms of the interaction, as opposed to the intermediary taking control of those terms. Where the interaction involves trading, the key terms of the interaction could be the pricing, bundling, marketing and delivery of the goods or services traded, the ability to determine the nature and quality of services offered, the terms and conditions, etc. By “affiliation” we mean that users on each side consciously make platform-specific investments that are necessary in order for them to be able to directly interact with each other. The investment could be a fixed access fee (e.g., buying a videogame console),

¹ A cross-group network effect arises if the benefit to users in at least one group (side A) depends on the number of users in the other group (side B) that joins. An indirect network effect arises if there are cross-group network effects in both directions (from A to B and from B to A). In this case, the benefit to a user on side A depends on the number of participants on side B, which in turn depends on the number of participants on side A. Thus, the benefit to a user on side A depends (indirectly) on the number of users on side A.

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