Platform Strategy: Openness and Business Model Choices

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Declaration

I, Tong Guan confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Abstract

This thesis is a representation of my research interest in the strategy of digital platforms. To unpack this complicated concept, I first studied the creation of platforms by reviewing the literature on change at the cognitive level—how mental models influence search activity—and at the firm level—how nonplatform companies become platform companies. Then, I reviewed the concepts of open and openness in the management literature. They are the key attributes of strategies of digital platforms. Most importantly, I created a panel dataset to study the strategy (choice of business models) of UK peer-to-peer (p2p) lending platform businesses. I found that, first, scholars often assume that if a business is a platform, the business would use a platform strategy and adopt a platform business model. This assumption is correct when only looking at and studying large and influential platforms. I find that a platform business may not necessarily use a platform business model. Second, considering the rising power of platform companies, scholars tend to argue that platforms can outcompete nonplatforms. However, based on the separation of the platform as a structure and as a strategy, my empirical research shows that under certain conditions, intermediary platform businesses are likely to move away from platform strategies, i.e., from a marketplace model to a reseller model. More importantly, the knowledge and information that the platform gains via the marketplace model might be crucial for the successful operation of the reseller model. Last, in the literature of open strategy and open innovation, firm openness is often considered as being controlled by the focal business. I propose that "open" should be viewed as a boundary resource between the business and the audiences of the open policies. The openness of the business and its audiences co-create the impact of open policies.

Thesis Overview

Looking back and reflecting on my journey to become a strategy Ph. D, the central organizational form that has always triggered and kept my intellectual interest and curiosity has been the platform, or platform business. My study and research on platform businesses often involves two central elements. I tend to investigate platforms through a business model lens with a dynamic analysis. This interest and curiosity come from three sources.

First, platforms are so influential that they strongly impact my daily life, i.e., Amazon, App Store, Paypal, and Steam. However, what I learned from strategy courses, such as RBV, TCE, and Porter's analysis, has not helped me comprehend the behaviours of platforms.

Second, some of the largest and most influential firms' core competitive advantages come from their platform businesses. People appreciate and fear platforms at the same time. While nonplatform businesses attempt to achieve platform status by establishing a platform or becoming a platform, governments try to understand the power of platforms and to mitigate potential drawbacks, such as differential treatment allowed by their power. What is so different about platform businesses that makes them attractive?

Last, the literature attempts to suggest the superiority of the "platform" over the "pipeline" (nonplatform) and the process of platformization. Not all great businesses self-identify as platforms. What is the boundary condition for a platform to become a profitable and sustainable business model?

Motivated by these interests, the chapters in this thesis appear in the order of my gradual understanding of platform-related topics. Chapter 1 is more of a literature review that shows an understanding rather than making any novel contribution. In contrast, Chapters 2 and 3 attempt to provide new insights into well-known issues.

In Chapter 1, the first set of questions I ask myself is as follows: How does a business change? What is a platform? To understand these questions, I undertook a literature review to see what scholars

have said about platforms in different literature streams, including the organisation change literature, which was reviewed to understand how nonplatforms can change to platforms.

After providing an understanding of what a platform is and the diverse ideas behind the term platform, I focus on a particular characteristic of platforms, namely, platform openness. However, my initial literature review shows that there is not only a lack of understanding of platform openness but also a general ambiguity about what the terms open and openness mean in the management literature. Therefore, I decided to take a step back to review and categorize the meaning of the terms open and openness in the management literature. After identifying different types of openness in management, I attempt to make connections between openness and platforms.

In the last chapter of my thesis, I bring my theoretical knowledge on platforms and change to reality to see how it fits with empirical data. To do so, I choose a particularly interesting setting: the UK peer-to-peer lending industry. This setting is unique in that the industry consists of different types of platforms that I categorise in Chapter one, reflects interactions between more than one hundred platforms, and shows different degrees of platform openness.

I want to emphasize some of the findings and realisations that comprise the essence of this thesis. First, scholars often assume that if a business is a platform, the business would use a platform strategy and adopt a platform business model. This assumption is correct when only looking at and studying large and influential platforms. However, my chapters insist that the platform as a structure is different from the platform as a business model. A platform business may not necessarily use a platform business model. For instance, my research in p2p lending shows that while all of the p2p lending platforms are platform businesses, many of them operate based on a traditional "reseller" model or use a "pipeline" strategy. This distinction is crucial for our understanding of platform and platformization.

Second, considering the rising power of platform companies, scholars tend to argue that platforms can outcompete nonplatforms. However, based on the separation of a platform as a structure and as a strategy, my empirical research shows that, under certain conditions, intermediary platform businesses are likely to move away from platform strategies, i.e., from a marketplace model to a

reseller model. More importantly, the knowledge and information that the platform gains via the marketplace model may be crucial for the successful operation of the reseller model.

Last, the majority of research on open and openness in management literature, such as open strategy and open innovation, often consider "open" to be a business feature that is controlled by the focal business. In other words, scholars tend to assume that audiences are very open towards the business's open policies so that the firm can determine its openness policies in areas such as open strategy and open innovation. I propose that "open" should be viewed as a boundary resource between the business and the audiences of the open policies. The openness of the business and its audiences co-create the impact of open policies.

Chapter 1 Summary: Change and Platforms

Summarising briefly, my first chapter starts with an examination of the literature on cognition and organizational change and then moves from the cognitive level to the firm level of analysis, looking at the literature on platforms and becoming a platform.

Subsection 1: Cognition and organization change

It is clear that the cognitive representation of an organization in the mind of managers is a critical factor influencing organizational change (Walsh, 1995; Rajagopalan and Spreitzer, 1997; Kaplan 2011, Eggers and Kaplan, 2013). Cognitive scholars believe that it is managerial cognition that mediates the environmental factors and real changes that occur in the organization, and therefore, differences in managerial cognitive representations are crucial for explaining the heterogeneity of organizations in a homogeneous environment (Rajagopalan and Spreitzer, 1997). By focusing on the differences in cognitive representation, organizational change scholars distinguish between evolutionary change and transformational changes (Webb and Dawson, 1991). When the change is associated with a shift in the knowledge structure of managers, change is considered to be transformational (Johnson, 1987).

Although scholars have discovered differences in managers' knowledge structures that influence organizational change, most of these studies either identify knowledge structures or compare knowledge structures using case studies (Rajagopalan and Spreitzer, 1997; e.g., Barr, Stimpert and Huff, 1992; Child and Smith, 1987; Webb and Dawson, 1991; Porac, Thomas and Baden-Fuller, 1989). The result of this approach is that almost all managers have different knowledge structures that are grouped in a taxonomical way. Hence, it is difficult to compare companies in different industries or product categories in terms of the impact of the mental model on organizational change. Some scholars have used a more quantitative method to achieve more external validity. As a result, they are able to compare different knowledge structures by dimensions such as the accuracy of representation (Gary and Wood, 2011) or complexity (Nadkarni and Narayanan, 2007). The implication of this approach is that the mental models of managers can evolve incrementally. Following the cognitive perspective of organizational change, a deliberate cognitive effort could influence a manager's behaviour, which could influence organisational change (Eggers and Kaplan, 2013). However, little is known about deliberate cognitive effort. As a result, although researchers

focused on cognitive search (e.g., Gavetti and Levinthal, 2000; Csaszar and Levinthal, 2015) support that the mental representation of managers can influence cognitive search results, they make no distinctions between different mental representations and assume that all mental representations have an equal chance to be used by managers. Following this implication, when searching for new strategies, Csaszar and Levinthal (2015) claimed that, "Eventually, all the possible benefit of searching in the mental representation will have been realised".

However, research using case studies has indicated distinct types of mental models held by managers within one industry. It might be difficult to switch between these mental models. For example, according to the cognitive strategic group argument of Porac, Thomas and Baden-Fuller (1989), although the knitwear managers in their study are aware of the potential competition of other companies, they often define their competitors in a narrow way. Using this logic, it is likely that when the manager positions the company in the "fully fashioned classic" part of the cognitive taxonomy and is searching for improvement possibilities, they are likely only to search in the "fully fashioned classic" world. They are unlikely to search in the world of "fashion"; that is, managers are unlikely to shift their mental representations from "fully fashioned classic" to "fashion".

Therefore, it would be useful to distinguish between mental models of managers from a typological perspective. This approach would allow researchers to study the impact of the mental model on organizational change in different industries and could account for distinct types of mental models held by managers, for which continuous cognitive search may not yield all possibilities. This research agenda also echoes the microfoundation movement in strategy and organizational theory suggested by Felin, Foss and Ployhart (2015). More importantly and directly related to this paper, a typological approach to study mental models would allow a consideration of cognitive inertia that is absent in the current cognitive search literature (i.e., Csaszar and Levinthal, 2015).

For example, Martins, Rindova and Greenbaum (2015) argued that, via analogical reasoning and conceptual combination, managers could influence what the organization is changing to. However, in both processes, the manager needs to identify a source of an idea. Tesla Motors found Apple Computers to be its analogue, and Starbucks used the bar to be its modifier (Martins, Rindova and Greenbaum, 2015). Thus, it is clear that the industry does not limit the extent to which the source of an idea could be remote. Although these authors claimed that the identification of the source

concept could be intentional or accidental, they discussed little about the underlying process that influences the identification of the source; that is, why did Tesla Motors find Apple Computers to be its analogue? Could Starbucks have used Google Search as a source? Was the manager of Starbucks only able to think of a certain source of ideas, not all sources of ideas? Therefore, the issue I want to address is how mental models influence idea generation regarding strategic change.

Recent studies on business models from a cognitive perspective present such opportunities. Baden-Fuller et al. (2016 working paper) proposed that, according to the interaction between companies and customers, there are two broad types of business models as a typology: a dyadic business model that provides products or services to customers directly and a triadic business model in which a brokerage role is used to connect previously unconnected customers. In this typology, a business model is defined as "a cognitive framing that directs beliefs and actions for understanding the mechanism by which firms and markets are created". Therefore, the business model could be viewed as a specific mental model of managers regarding the boundary between the firm and customers.

Note that managers could have different mental models for different issues. Managers can have a mental model for who their competitors are, as shown in Porac, Thomas and Baden-Fuller (1989), or for what resources and capabilities the company has, as shown in Danneels (2011). As discussed in this paper, changing mental models is about substituting mental models focusing on the same issue and is not about switching between mental models focusing on different issues. Borrowing from the business model literature, the focus of the mental model in this paper is the boundary between firm and customers. Additionally, in the cognitive literature, there are studies on model switching (e.g., Louis and Sutton, 1991). However, that literature is primarily concerned with automatic thinking and active thinking, which is about the amount of attention given to a scenario. In this paper, I focus on the content and structure of mental models. Borrowing the cognitive business model typology, I investigate how mental models influence search results and explain the differences in mental models.

By adopting the cognitive business model perspective, I assume that business models can be viewed as a particular kind of mental model used by managers and that both cognitive business models and mental models are difficult to change. Using the dyadic business model and triadic business model

as typological examples, based on the concept of the NK landscape model, I illustrate that changing managerial mental models within dyadic or triadic landscapes is much easier than changing managerial mental models across the landscape (especially from dyadic to triadic).

Therefore, even though multiple searches are possible, new ideas in the triadic landscape may not be detectable by managers having a dyadic business model. Consequently, this paper presents how managerial mental models could shape the content of search results (in addition to search frequency and information source) and could potentially shape what the organization is changing into. In Chapter 3, which explores the p2p lending business reasons firms might choose a particular business model as well as the reasons they might change the model, some of the concepts outlined above are mobilized. In particular, the original business model choice of the first p2p lending platform in the UK resembles the dyadic features of funders' prior background—banking and online banking. Despite the funders' acknowledgement of Ebay (a representative of the triadic model), the lending platform Zopa attempted the triadic business model only after the rise of a direct competitor, Prosper, who used a triadic model.

Subsection 2: Platforms and becoming platforms.

In this digital age, many companies are exploring the possibilities of employing a platform strategy. However, a platform strategy is given different meanings in different research streams and different contexts. For instance, some scholars have explored the product platform strategy (Robertson and Ulrich, 1998; Krishnan and Gupta, 2001; Huang, Zhang and Liang, 2005); some have explored the strategy of becoming a platform leader in an ecosystem (Tiwana, Konsynski and Bush, 2010; Gawer and Henderson, 2007; Gawer and Cusumano, 2014); and others have explored the two-sided platform strategy (Rochet and Tirole, 2003 & 2006; Economides and Katsamakas, 2006; Hagiu and Wright, 2015; Van Alstyne, Parker and Choudary, 2016; Zhu and Furr, 2016).

Among these different meanings, scholars are able to identify some core similarities. One of the most important similarities is the emphasis on the structure or the architecture of platforms. Baldwin and Woodard (2009) suggested that a "platform architecture" has a unique structure with three components: a set of stable core components (the platform itself), a set of more dynamic peripheral components, and linkages between the core and the peripherals (the interface). This architecture view of a platform can help us to judge if something is a platform or not.

Building on the concept of platform architecture, Gawer (2014) provides a highly motivating review and hints at two themes of platforms: the first considers platforms from a supply perspective (creating value through supply-side synergy such as economies of scope in supply and innovation) and the second considers platforms from a demand perspective (creating value through demand-side synergy such as economies of scope in demand).

Thus, by using concepts from the demand-side strategy, I reorganized types of platforms by synergies. For those scholars focusing on supply-side synergy, the platform is a complementary asset to other components or products that are internal or external to the firm that controls the platform (Robertson and Ulrich, 1998; Gawer and Henderson, 2007). From this perspective, platforms serve as a foundation upon which these components or products can be built. Higher profits might be achieved via lower production costs or easier innovation. Customers may also receive benefits via higher customization, as platform-based products could adopt environmental changes more easily and quickly due to the flexibility of peripheral components (Baldwin and Woodard, 2009).

For those scholars focusing on the demand side, the platform creates synergies by connecting different customer groups (e.g., Baden-Fuller, Giudici, Haefligher and Morgan, 2017; Rochet and Tirole, 2006 and Economides and Katsamakas, 2006). These demand-side synergies (often called two-sided network effects) are likely to result in higher revenues and profits that may be realized even if there are no supply-side synergies.

I propose that platform companies may utilize either of the synergies or both (integrated platform). While my reorganization is consistent with previous reviews, I further stress the lack of understanding of demand-side synergy compared to supply-side synergy. The unit of analysis is different for the two kinds of platforms: complementary assets for supply-side platforms and relationships for demand-side platforms.

Building on my knowledge of organizational change and platforms, I further investigated the dynamisms in the process of becoming a platform. I contrasted how different kinds of platform streams describe the transition from nonplatforms to platforms. I noticed that while the demand-side platform stream emphasizes cognitive change in the management and understanding of

customer groups, it pays no attention to the process of forming a vision of the platform to fit the ecosystem and to the development of the technical architecture and connectors. Thus, I probed three important research questions:

1. What is the role of the managerial vision and the vision of potential customer groups in developing demand-side platforms?
2. How could effectuation interact with the process of creating/becoming a demand-side platform?
3. How are connectors made in demand-side platforms, especially the connectors between customer groups?

Although this section provides little novel contribution to the platform literature, it helps develop a foundation for understanding platform and platform businesses. I differentiate between a platform as a structure and a platform as a business model in Chapter 3 and investigate the impact of different business model choices.

Chapter 2 Summary: Open and Openness

To briefly summarize the content of this chapter, it starts with a literature review of the concepts of open and openness in the management literature. Then, by identifying two foundations of openness, I challenge some assumptions of the current literature.

In today's social and economic activities, being "open" is an important characteristic. Being "open" as an adjective and its associated measurement for the degree of being "open"—openness, are often used by entrepreneurs, politicians, and scholars in various disciplines to communicate certain messages. More specifically, the terms open and openness are central constructs for understanding and building platforms. However, when reading articles that use the construct of openness in both the platform openness literature and general management literature, it is surprising how few seem to reference the foundations of the concept that is being leveraged. This article identifies that there is no single foundation of the openness concept; rather, this study identifies the various foundations that exist and how they are used in many different streams of management. This study also leverages the differences to generate some ideas on how openness might be considered and used going forward.

The first foundation is to view openness as a boundary of exchange, and the second foundation is to view openness as a number of possibilities. The exchange view can be traced back to the literature on the system theory, populated by Bertalanffy in 1950 and imported to management by Scott in 1981. The essence of an open system is that a system's survival and prosperity depend on factors outside its system—labelled the outer environment (Scott, 1981). As a result, "an open system, e.g., a social system, is thus defined on the basis of three characteristics: its inner environment, the outer environment and a series of linkages" (Leoncini, 1998). Thus, the openness of an open system rests at the exchange between the inner and the outer. Exchange implies bilateral transactions. Hence, the exchange perspective has two subdimensions: inflow and outflow. There is no limitation on what is exchanged. It could be information, assets, human resources, technology, etc. This foundation is behind the majority of open and openness concepts in management. In the well-established literature of open strategy, open innovation and open government, scholars tend to capture the two subdimensions of the exchange view, which are often labelled inclusiveness and transparency, inbound and outbound, or inflow and outflow, which are the terms I use here.

The second foundation is rooted in social science and political science. Contrary to the necessity of an outer environment in the exchange perspective, in the context of society, social science scholars found openness by looking inside, i.e., the relationship between social norms and people within society. In this context, openness is viewed as possibilities or flexibilities.

This foundation can be traced back to The Open Society and Its Enemies (Popper, 1945). Following the publication of Popper, Armbruster and Gebert (2002) introduced Popper's openness concept from social science into management. The open society in Popper (1945) stands as the opposite of a totalitarian society. Openness is defined as a "pattern of thinking", as it emphasizes what people think. When people think that their future is fixed, predetermined or bounded, society is more closed, and when people think their future is open-ended and filled with different possibilities, society is considered to be open. For example, in ancient China, in approximately 700 BC, when GuanZhong was managing Qi, he proposed that "scholars should be sons of scholars, artisans should be sons of artisans, businessmen should be sons of businessman, and farmers should be sons of farmers". In the Ming dynasty, the status of "soldier" as a profession had to be inherited by a son. Therefore, an individual's future profession and thus destination was determined when he or she was born. Gebert and Boerner (1995) identified three dimensions of openness: a social dimension in which openness means the degree to which people do not have a predetermined social slot/position; an epistemological dimension denoting the degree to which human knowledge can be free from error and can be questioned; and an anthropological dimension denoting the degree to which social norms can be predetermined. Scholars in an open strategy who embrace this perspective of openness are able to identify two dimensions, namely, content openness and procedure openness (Dobusch, Dobusch and Muller-Seitz, 2017), where content reflects the outcome of decisions and procedure reflects the decision-making processes. In the Wikipedia, it is argued that "…...openness regarding participation in crafting strategy content depended on certain forms of closure related to procedures of the strategy-making process. Alternatively, when openness is interpreted as the absence of rules and instructions in the sense of structurelessness, it will lead to a reproduction—or even reinforcement—of preexisting biases among potential groups of participants in open strategy-making"

Three issues have emerged from my review on openness: 1. the self-centricity of openness, 2. the dynamics of openness, and 3. the cross-level interaction of openness.

The self-centricity of openness indicates that the dominant exchange view of openness tends to position scholars in the shoes of a focal organization, i.e., openness of a team, a firm, a government, etc. Therefore, a common underlying assumption is that the openness of the organization is determined by the organization. The possibility view of openness, on the other hand, has no such assumption. In contrast, it considers that knowledge is distributed among all participants in a system. Therefore, there is limited self-centricity. This led me to reconsider the exchange view of openness. I found that, traditionally, scholars have investigated the dependency between openness inflows and outflows; i.e., Cassiman and Valentini (2015) found no empirical complementarity between inflow and outflow open innovation of the same organization. Instead, we should consider that the dependency is between the inflow (outflow) openness of the focal company and the outflow (inflow) openness of the counterparty or stakeholders. In Fontana et al. (2006), the selective revealing of technology could signal the firm's openness, and thus, the firm can gain more potential partners to work with. In TMT openness, if managers show their interest in employee opinions, e.g., views on gender equality issues, they are more likely to receive employee feedback regarding these opinions. This implies that for a successful openness strategy, it is equally important for the firm to modify the openness of these other stakeholders. This also implies that openness strategies of organizations should include a component on stakeholder management. The outcome of openness strategies is codetermined by the organization and its stakeholders.

Second, there is confusion regarding the persistency or the dynamics of open and openness. In some literature, openness is often considered difficult to change; i.e., openness is viewed as a personality trait or as a social network position of an organization. In some other research, scholars have documented firms' changing attitudes and actions regarding openness. For example, a software company can have software with different licences with varying degrees of openness (as outflow openness) for the same software project; i.e., Android may be used for the controller—but Google (at any time) can change Android's openness (as outflow openness) through the project's life time (from more open to more closed).

Last, my literature review has shown that the concepts open and openness are observed and studied in the management literature from the individual level to the group/team level, the organizational level, and the societal level. However, this is a very limited explicit explanation of how openness at different levels of analysis interacts. Scholars tend to assume that a certain degree of consistency exists, i.e., that a firm with open employees echoes an open firm and that teams with open members echo an open team. However, there has not been an explicit connection between openness at different levels. Moreover, given that the dimensions of openness can be complex, e.g., inflow, outflow, and possibilities, it is even more complicated to study how different dimensions of openness interact with each other across levels.

Although the review on openness in management itself is fruitful, it is also a stepping stone for understanding platform openness. In particular, the current platform literature tends to emphasize one element of inflow openness—participation—and one element of outflow openness—information disclosure. In my research of p2p lending platforms, the participation element is directly connected with business model choice in two regards. First, in borrower participation, the marketplace model tends to be more open than the reseller—the marketplace model encourages applicants with diverse financial backgrounds, while the reseller model tends to aim at borrowers with good financial histories. Second, over the years, the p2p lending platforms in general have become less open to investors. An increasing number of platforms have stopped serving retail (individual) investors and only engage with institutional investors.

Chapter 3 Summary: Platform business model choice in UK p2p lending

To briefly summarize, my last chapter starts with a quantitative examination of the UK p2p lending industry and the impact of business model choice on platform survival. Then, I substantiate the chapter with more detailed data to capture how some platforms change and some keep their business model.

A core issue in the field of strategy is the key steps that firms can take to survive and prosper. Strategists have carefully considered many key steps, such as capturing key resources (Barney, 1991), managing routines and capabilities (Winter, 2000), understanding the dynamics of capabilities (Winter, 2003), and positioning in the preferred market or industry (Porter, 1980). However, the rise of platform businesses may suggest that another equally important step also requires careful consideration, namely—interdependency, which is particularly important for enhancing our understanding of the emergence of digital platforms (Lanzolla and Markides, 2021).

One of the key features of digital platforms is the existence of multiple related user groups. How the platform manages relationships between these user groups can be seen as a key element of interdependency. In this essay, I intend to use the business model perspective to closely examine how digital platforms—particularly intermediary firms—manage such relationships and the impact and dynamics of different business models.
Thus, the overarching research question is as follows: How does business model choice influence the performance of digital platforms?

The platform literature reveals that different scholars have used different labels to categorize platform business models. However, at the theoretical level, two contrasting business models for digital platforms are particularly important and relevant: a marketplace model and a reseller model.

Hagiu and Wright (2015) explicitly compared the marketplace model and reseller model in an intermediary platform setting. For them, the key differentiating factor is the distribution of residual control rights between platforms and their suppliers. From a different perspective, Van Alstyne, Parker and Choudary (2016) contrasted the “platform” strategy and the “pipeline” strategy. The

authors concluded that platform firms emphasize resource orchestration, external interaction, and ecosystem value, while pipeline firms emphasize resource control, internal optimization and customer value.

In the business model literature, Baden-Fuller, Giudici, Haefliger, and Morgan (2017) identified business models in "dyadic arrangements" and "triadic arrangements". The central distinction between dyadic and triadic business models is whether the relationship between business actors can be reduced to a set of dyadic relationships. If the reduction is possible, then the business model is "dyadic"; otherwise, the business model is "triadic".

I view the three sets of concepts as sharing strong similarities. They all describe similar phenomena—the business model of firms that is used for different purposes. For Hagiu and Wright (2015), the determination of the type of business model should be made from the perspective of a product and whether the product should be sold under a matchmaker or by a reseller. Based on this product-business model fit, companies should then choose the corresponding business model. Van Alstyne et al. (2016) emphasize the competition between different kinds of business models. In their view, platforms will outcompete pipelines in most situations through mechanisms such as platform envelopment. Therefore, they describe in detail what a pipeline firm should do to transform itself to a platform firm. In Baden-Fuller et al. (2017), the distinction between using a dyadic or triadic business model is made by creating different mental templates or cognitive models so that researchers and practitioners can manipulate different business models imaginatively and then possibly adjust their real-life businesses.

Aware of the distinction of the two business model types, i.e., marketplace and reseller, I found an empirical setting—UK p2p lending—where platforms have adopted different business models and compete directly in the same industry. The UK p2p lending industry mainly comprises digital intermediary platforms that connect previously unknown lenders and borrowers, and is an industry where lenders are satisfied by receiving loan interest and borrowers are satisfied by obtaining additional loans. These platforms are not required to obtain a banking licence, and lenders' money is not protected by deposit protection schemes. Some of these platforms decided to operate as a marketplace, and others operate as a reseller. Moreover, my initial research also finds that these platforms may change their business model over time.

Thus, I unpacked my overarching research question into three parts: Why do some platforms start as a marketplace, while others start as a reseller? How does the initial business model choice impact the performance of these platforms? Why do platforms change their business models?

For the first question, the data that I collected could only answer this question indirectly via two answers. Quantitatively, I find a positive and significant relationship between the reseller model and firm financial resources (measured in total assets, debtors, and creditors). Assuming that business model decisions are made prior to actual platform operation, I would suggest that, in this specific context, running a reseller business model requires more financial resources than running a matchmaker business model. Therefore, most platforms start by using marketplace business models.

Qualitatively, by collecting and analysing the platform's historical website, I found that platforms tend to use two types of analogical reasoning—being different from banks and being the eBay for the loan market. Knowing that the business model for bank loans/deposits is more consistent with the reseller business model and that the business model for eBay is more consistent with that for the marketplace, it is reasonable to argue that when founders design their business models, they tend to use these two types of analogical reasoning, which leads to the preference of marketplaces.

For the second question, I have some very interesting findings. I have operationalized "performance" to "survival" because almost all of the platforms are not making a positive profit, and they usually are extinct after a couple of years. The usual performance indicators would not make sense if they were applied to this specific sample.

Using binary logistics, first, as anticipated, platforms with more financial resources survive longer. In addition, we know already that resellers tend to have more financial resources than matchmakers. However, when both factors are considered, including other control variables, I found that starting as a reseller has a positive relationship with extinction ($p=0.056$). This result is held under both a linear regression ($p=0.039$) and Cox regression ($p=0.024$), which examine the length of survival.

The direct and usual interpretation of the finding would be that in the p2p lending market, marketplace platforms outperform reseller platforms; therefore, they survive longer. However, if we move the focus from the founding business model of the platforms to the current business model of p2p lending platforms, according to FCA CP18/20, the discretionary model (reseller) comprises 60% of p2p platforms and 88% of the market share. This means that between 2005 and 2018, a significant change in the p2p platform's business model occurred. What we observe from the data is that, although when entering the p2p lending market the reseller is likely to become extinct more quickly, after 13 years of development in the industry, the reseller has become the dominant business model in the market.

For the last question, I sampled 22 platforms with substantial financial resources and that have survived for a sufficient length of time such that a change in business model could happen. Among the 22 platforms, 10 of them started with reseller business models. I found that nonreseller platforms do change to reseller platforms, while the reverse change did not happen. More importantly, nonreseller platforms are more likely to change to resellers when the originated loans are unsecured individual loans (compared to secured loans and business loans). I collected more refined data on each of the 22 platforms and found the following: 1. The change process is continuously manifested by many practices that gradually change the balance of residual control rights. 2. Perceived differentiation rather than product differentiation may determine the "right" business model choice. 3. A change to the reseller model may also be induced by the learning differential, where platforms can learn faster about loan pricing than investors and borrowers.

This chapter mainly contributes to the platform literature. First, I have attempted to clearly indicate the difference between a platform using a platform strategy and a firm that uses a platform. All of the p2p lending platforms are architectural platforms, but not all of them use platform business models.

Second, while previous literature discusses the two different types of business models cross-sectionally, this chapter illustrates the value of considering the two business models longitudinally, showing the conditions under which nonreseller models are changed to reseller business models. In the p2p lending context, the matchmaker can be a great business model when entering a new

market; however, as the market matures, the reseller model is a better business model to capture value from the market.

Last, the chapter makes a connection between the conceptual level—the cognitive model—in which entrepreneurs and scholars think about businesses, and the real activity level, at which the platforms actually operate and implement their policies and practices. Although the distinction between business models is clear at the conceptual level, real platforms tend to include features or activities at both levels. Platforms change some activities over time.

Future research possibilities

1. Openness, business model and dynamic capabilities

In the literature of dynamic capabilities, Teece (2007) has emphasized firms' abilities to sense, seize and transform so that firms can evolve and coevolve with their environment. Sensing and seizing are often considered to be similar to the concept of exploration and exploitation in strategic management.

I think that digital platforms can be a great setting for studying such attributes of dynamic capabilities. For a new digital platform, a particular path of growing is to start as an open platform and gradually reduce openness. The open start serves as a way for platforms to practice sensing or exploration of opportunities. At this stage, the platform welcomes participation and emphasizes survival and participation growth, that is, it seeks to create a functioning platform architecture and emphasizes value creation for platform participants. Once the platform is mature, indicated by a certain market share, the platform owner can then shift its focus to value capture, seizing and exploration. At this stage, the platform's target shifts from survival and participation growth to profitability ratios. To make a profit, platforms can use openness-reduction practices, e.g., restricted access to the platform, restricted access to the functions of the platform, and the exploitation of information asymmetries between different participant groups.

For example, according to my findings in UK p2p lending, there is a great advantage in starting a platform using a marketplace business model. Marketplace business models tend to be more open than reseller business models. In particular, the marketplace model tends to be less strict on the participation of both sellers and buyers, allows transparent bidding mechanisms on the pricing of loans, and releases more loan-related information for investors to analyse. In addition, even the financial objectives of the marketplace model platform tend to be unrelated to profit, and the open nature serves as a foundation for the platforms to practice sensing or exploration of opportunities; in particular, the platform can learn about loan pricing. Gradually, some platforms' business models have been changed from marketplace to reseller, illustrated by openness-reduction practices, such as reducing availability of borrowers' information, eliminating manual bidding processes, and

determining the interest rate by the platform alone. These practices enable platforms to seize opportunities and capture value.

In this view, the development of platforms can be seen as having two stages: a sensing stage and a seizing stage. The seizing stage may return to the sensing stage when there are environmental shocks, i.e., the open software movement. The business model of platforms may change accordingly. Empirical research on this topic can be important for organically combining business model research and dynamic capabilities.

2. Marketplace, reseller, outsource and insource

My thesis has mainly focused on the distinction and consequences of marketplace and reseller models in intermediary platforms. Another set of models that are frequently studied by strategists are outsourcing and insourcing models. Scholars have used different strategy theories, such as RBV and TCE, to discuss the conditions under which certain products should be outsourced (or insourced) for manufacturing companies.

Although the two sets of concepts are used for different kinds of business, I propose that two conditions will dramatically thin the boundary between reselling and outsourcing. First, when there is a limited manufacturing process to enhance outsourced components, the outsourced product becomes the final product to be sold. For example, supermarket A can resell branded products made by Manufacturer B and can also outsource similar white labelled products also made by Manufacturer B. In this example, the content of the product and manufacturing process can be identical (both made by Manufacturer B), and the main differentiating factor is the product brand.

Second, based on Condition 1, and when there is no unique product brand, the boundary between outsourcing and reselling disappears. For example, a vegetable reseller who purchases various vegetables from farmers could be interpreted as a reseller as well as an outsourcer. In UK p2p lending, one can interoperate reseller model platforms as businesses that outsource loans from borrowers and sell them in a repackaged format to lenders.

If I can establish that reselling is a special case of outsourcing, then a connection could be made between the marketplace-reseller literature and the outsource-insource literature. In other words, the discussion of the marketplace might be additive to the discussion of outsourcing and insourcing.

Empirically, scholars studying platforms have touched on this phenomenon. Zhu and Liu (2018) investigated Amazon's entry into their complementors' market. Effectively, the authors compare the marketplace model and outsourcing model. I think there is an opportunity to apply to platform businesses knowledge from strategy theories that are built for manufacturing businesses.

3. Business model choice and change of other intermediates in different industries

Citing the EC decision of 26.4.2018, the European Commission's Expert Group for Observatory on the Online Platform Economy stated the following: "The notion of the online platform economy should be understood to cover all economic activity arising out of actual or intended commercial transactions in the internal market and facilitated directly or indirectly by online platforms, in particular, online intermediation services and online search engines". Intermediary companies are a central element of the online platform economy.

Therefore, my research focus on the comparison between the platform model and the pipeline model within the scope of intermediary companies is particularly relevant. However, my empirical study is only based on the context of UK P2P lending. By investigating the UK p2p lending industry, I have established that, for profit-seeking intermediaries, entering the market with the reseller model (compared to the nonreseller model) will reduce the survival duration of the platform firm. However, intermediaries with nonreseller models are likely to change to reseller business models under two conditions: 1. buyers can hardly differentiate the offerings of the intermediary, and 2. the platform firm can accumulate knowledge of offerings at a faster speed than buyers.

A natural next step for future research is to study the extent to which current findings in UK p2p lending are applicable and relevant to intermediaries in other industries. One possibility is to test my findings in other industries with better collected data. A more interesting next step in the study

of this topic is to observe and analyse the current business model of intermediaries across industries.

Figure: 0-1 Key platforms in different industries and their dominant business model

Platform name	Industry	Current dominant business model
Steam	Digital game distribution	Marketplace
Apple app store	Mobile app distribution	Marketplace
Ebay	Retail goods distribution	Marketplace
Liquid	Crypto currency distribution	Marketplace
Spotify	Digital music distribution	Reseller
Netflix	Digital video distribution	Reseller
Lianjia	Property distribution	Marketplace and Reseller
Booking	Hotel room distribution	Marketplace and Reseller

Figure 0-1 illustrates some top digital intermediary platforms in different industries. It clearly shows that there is no single dominant business model across industries. Top intermediaries in their respective industry could use marketplace, reseller or both marketplace and reseller business models. The variance of business models is consistent with my finding in the UK p2p lending industry.

Future studies could contextualize variances in key industry-level factors and see if there is a connection with business model choice. Many factors have been previously identified in the literature but have not been empirically tested for their impact on business model choice, for example, network effects, multihoming and degree of competition between platforms.

Future studies could also analyse the impact of business model choice on firm performance. When only studying large and successful platforms, profits and revenue may be used to measure success and to investigate profitability differences between different business models.

Despite cross-sectional analysis, longitudinal analysis could also be carried out in different industries. This could be helpful in answering questions such as the following: Is the marketplace model always the preferred entry model in different industries? Do these platform companies change their business model over time? Is there a common pattern for business model change?

4. Business model and risk

For intermediary platforms that offer physical goods, ending a platform mainly influences future search and transaction costs for both buyers and sellers using the platform. For intermediary platforms that offer digital or nondigital services, ending a platform will not only influence future search and transaction costs for both buyers and sellers but also interrupt the current service. Buyers and sellers may need to find an alternative way to reconnect and resume the service. However, ending a p2p lending platform might have a catastrophic impact on loan buyers—investors.

In p2p lending, many platforms end in a "collapse" manner, and lenders have great difficulty recovering their investments. Lendy and Funding Secure are two representative examples in the UK. This scenario is not unique to the UK p2p lending market and can also be found on a much larger scale in China. At the peak of the Chinese market in 2015, there were approximately 3800 platforms, and by 2019, the number was reduced to approximately 300 platforms (Statista, 2010). By 2022, all p2p lending platforms had been suspended, with approximately 70 billion GBP of loans outstanding (Shuqing 2022).

The business model choice of these platforms may have had a great impact on the consequences of platform closure in two particular ways.

First, marketplace model platforms allow lenders to have some information on each borrower. When the platform business uses the reseller model, lenders have almost no information on the

borrower side. Borrowers are a black box for lenders. The higher transparency of borrower information enables lenders to verify and analyse borrowers and loans. More importantly, it is more difficult for the lending platform firm to use lenders' money for purposes not permitted by lenders. Under a reseller model, the platform firm can fraud lenders at a lower cost. In the case of China, many p2p platforms were created to absorb lenders' investment to practice a Ponzi scheme. When these platform firms ended operations, lenders had great difficulty retrieving their investment.

Second, in the marketplace model, the loan contract is between lenders and borrowers, while in the reseller model, the loan contract is between lenders and the platform firm. The closure of a marketplace model platform firm does not influence the contract between lenders and borrowers. However, the closure of the reseller model platform firm would make the investors creditors of the platform firm. These investors would have to compete with other creditors for the remaining assets of the platform firm. In other words, in the marketplace model, the lending risk mainly arises from borrowers, while in the reseller model, the lending risk arises from both the borrowers and the platform firm.

Therefore, from the perspective of p2p lending platforms, choosing takes place between different business models. From the perspective of investors, choosing marketplace model intermediaries reduces risk.

From the perspective of regulators, a dilemma may emerge. On the one hand, to protect the benefits of investors, regulators should encourage platform firms to adopt marketplace business models. On the other hand, a typical marketplace model would require borrowers to submit some personal information to lenders, which may undermine the data privacy of borrowers. As a result, to protect the benefit of both investors and borrowers, regulators may encourage some in-between models that protect the critical personal information of borrowers and provide enough relevant borrower information for investors to analyse.

Current business model research in the platform context tends to be firm-centric, studying firm performance-related factors. The central firm tends to be the platform owner or firm participants on the platform—sellers on the platform. Future research could study the topic from the regulatory perspective and the buyers' perspective, which are currently under-researched.

Chapter 1 Subsection 1: How do managerial mental models shift search results?

Introduction

The cognitive representation of an organization in the mind of managers is a critical factor influencing organizational change (Walsh, 1995; Rajagopalan and Spreitzer, 1997; Kaplan 2011, Eggers and Kaplan, 2013). Cognitive scholars believe that it is managerial cognition that mediates environmental factors and real changes occurring in the organization, and therefore, differences in managerial cognitive representations are crucial for explaining the heterogeneity of organizations in the homogeneous environment (Rajagopalan and Spreitzer, 1997). By focusing on the differences in cognitive representation, organizational change scholars distinguish between evolutionary change and transformational changes (Webb and Dawson, 1991). When the change is associated with a shift in the knowledge structure of managers, change is considered to be transformational (Johnson, 1987).

Although scholars have discovered differences in managers' knowledge structures that influence organizational change, most of these studies either identify knowledge structures or compare knowledge structures using case studies (Rajagopalan and Spreitzer, 1997; e.g., Barr, Stimpert and Huff, 1992; Child and Smith, 1987; Webb and Dawson, 1991; Porac, Thomas and Baden-Fuller, 1989). The result of this approach is that almost all managers have different knowledge structures that are grouped in a taxonomical way. Hence, it is difficult to compare companies in different industries or product categories in terms of the impact of the mental model on organizational change. Some scholars have used a more quantitative method to achieve more external validity. As a result, they were able to compare different knowledge structures by dimensions such as accuracy of representation (Gary and Wood, 2011) or complexity (Nadkarni and Narayanan, 2007). The implication of this approach is that the mental models of managers could evolve incrementally. According to the cognitive perspective of organizational change, a deliberate cognitive effort could influence managers' behaviour, which influences organizational change (Eggers and Kaplan, 2013). However, little is known about deliberate cognitive effort. As a result, although researchers focused on cognitive search (e.g., Gavetti and Levinthal, 2000; Csaszar and Levinthal, 2015) support that the mental representation of managers can influence cognitive search results, they make no

distinctions between different mental representations and assume that all mental representations have an equal chance to be used by managers. Following this implication, when searching for new strategies, Csaszar and Levinthal (2015) claimed that "eventually, all the possible benefit of searching in the mental representation will have been realised".

However, research using case studies has indicated distinct types of mental models held by managers within one industry, and it might be difficult to switch between these mental models. For example, according to the cognitive strategic group argument of Porac, Thomas and Baden-Fuller (1989), although the knitwear managers in their study are aware of the potential competition of other companies, they often define their competitors in a narrow way. Using this logic, it is likely that when the manager positions the company in the "fully fashioned classic" part of the cognitive taxonomy and is searching for improvement possibilities, they are likely to only search in the "fully fashioned classic" world. They are unlikely to search in the world of "fashion"; that is, managers are unlikely to shift their mental representations from "fully fashioned classic" to "fashion".

Therefore, it would be useful to distinguish between mental models of managers from a typological perspective. This approach would allow researchers to study the impact of the mental model on organizational change in different industries and could account for distinct types of manager-held mental models, where continuous cognitive search may not yield all possibilities. This research agenda also echoes the microfoundation movement in strategy and organizational theory suggested by Felin, Foss and Ployhart (2015). More importantly and directly related to this paper, a typological approach to study mental models would allow an examination of cognitive inertia, which is absent in the current cognitive search literature (i.e., Csaszar and Levinthal, 2015).

For example, Martins, Rindova and Greenbaum (2015) argued that via analogical reasoning and conceptual combination, managers could influence what the organization is changing to. However, in both processes, the manager needs to identify a source of an idea. Tesla Motors found Apple Computers to be its analogue, and Starbucks used the bar to be its modifier (Martins, Rindova and Greenbaum, 2015). Thus, it is clear that the industry does not limit the extent to which the source of an idea could be remote. Although these authors claimed that the identification of the source concept could be intentional or accidental, they discussed little about the underlying process that influences the identification of the source; that is, why did Tesla Motors use Apple Computers as

its analogue? Could Starbucks have used Google Search as a source? Was the manager of Starbucks only able to think of a certain source of ideas, not all sources of ideas? Therefore, the issue I want to address is how mental models influence idea generation regarding strategic change.

Recent studies on business models from a cognitive perspective present such opportunities. Baden-Fuller et al. (2016 working paper) proposed that, according to the interaction between companies and customers, as a typology, there are two broad types of business models. A dyadic business model that provides products or services to customers directly and a triadic business model that serves a brokerage role to connect previously unconnected customers. In this typology, a business model is defined as "a cognitive framing that directs beliefs and actions for understanding the mechanism by which firms and markets are created". Therefore, the business model could be viewed as a specific mental model of managers regarding the boundary between the firm and customers.

Note that managers could have different mental models for different issues. Managers can have a mental model for who their competitors are, as shown in Porac, Thomas and Baden-Fuller (1989), or what resources and capabilities the company has, as shown in Danneels (2011). Changing mental models as discussed in this paper is about substituting mental models focusing on the same issue and not about switching between mental models focusing on different issues. In this paper, borrowing from the business model literature, the focus of the mental model is on the boundary between firms and customers. Additionally, in the cognitive literature, there are studies on model switching (e.g., Louis and Sutton, 1991). However, that literature is primarily concerned with automatic thinking and active thinking, which is about the amount of attention. In this paper, I focus on the content and structure of mental models. Borrowing the cognitive business model typology, I want to investigate how mental models influence search results and explain the differences in mental models.

Review of the literature

Organizational Change and Strategic Cognition

A vast amount of literature has been written about organizational change in the past, and some of these papers acknowledge the crucial role of managerial cognition in organizational change. For example, Mintzberg (1978) connected organizational change with the cognition of leaders and argued that a distinct period of change and continuity of strategy is consistent with the human cognition that people do not react to change in the environment continuously. Tripsas and Gavetti (2000) used Polaroid as a case study and demonstrated that the mental model of top management influences the search behaviour of organizations, thus influencing the types of resources and capabilities that are acquired and developed. Additionally, they argued that, without the change in the mental model of managers, the business model of Polaroid (Razor/Blade) was difficult to change. Similarly, Barr, Stimpert and Huff (1992) used a comparative case study and showed that organizational renewal requires a change in the mental model of managers corresponding to a change in the environment.

However, compared to other perspectives of organizational change study, the cognitive perspective is still scarce. According to Rajagopalan and Spreitzer (1997), less than 14% of empirical studies on strategic change used a pure cognitive lens. Narayanan, Zane and Kemmerer (2011, p335) noted that the strategic cognition literature on organizational learning and strategic change is "very much in the nascent stages of development", and these areas are in need of theoretical and empirical development.

Because of the increasing attention that managerial cognition in organizational change has received, some scholars have written review articles to summarize past research and shed light on future directions. I used these literature review papers to help me identify important articles in the relevant literature, reading each of them to find the relevance of these papers to the relationship between the mental model and search results. Therefore, although many of the tables that I present below are based on the review papers, I have incorporated my own understanding of the literature.

Starting in the strategic change literature, I used the review paper of Rajagopalan and Spreitzer (1997) as foundational guidance. In that review, the authors included all empirical studies published

in more than 20 top journals on strategic change between 1980 and 1994. They clearly distinguished three lenses to view strategic change: the rational, learning and cognitive lenses. These lenses reconcile with three perspectives of the business model literature, which I will explain later. In their review paper, strategic change is defined as "difference in the form, quality, or state over time in an organisation's alignment with its external environment" (Rajagopalan and Spreitzer, 1997, p49). The rational lens is based on a rational model of people, according to which managers are not considered to be influential in strategic change. The learning and cognitive lenses are rooted in bounded rationality (Simon, 1955). The learning lens focuses on the behaviour of managers or managerial actions and how these aspects mediate the relation between exogenous factors and changes in the content of strategy. In addition to the learning lens, the cognitive lens explicated managerial cognition from managerial actions. To further indicate the differences between these three lenses, I have created Figure 1-1 below to address their key assumptions.

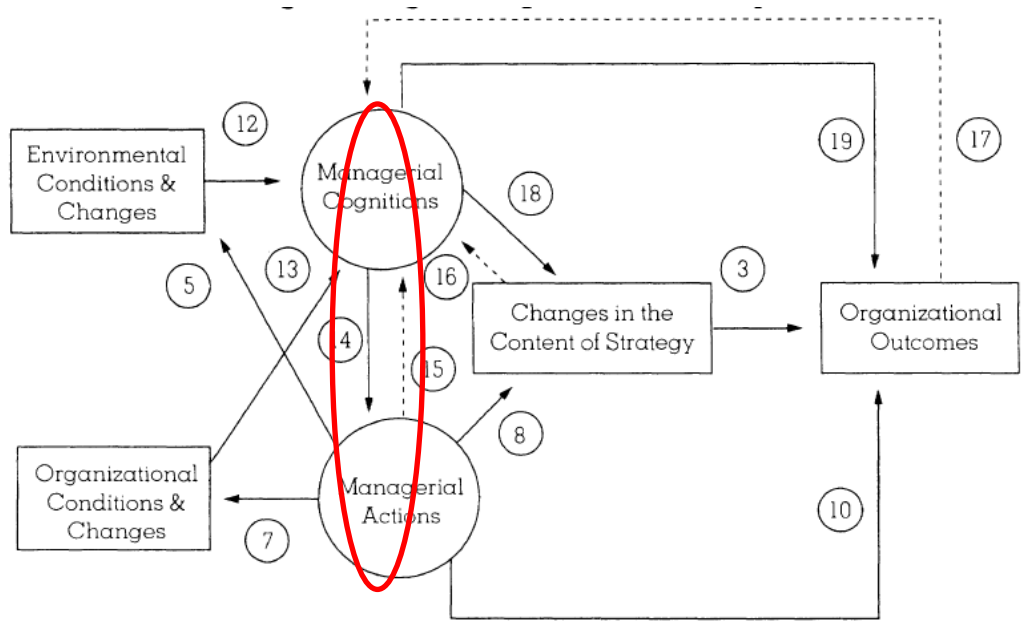
Figure 1-1-1: Comparison of three lenses of strategic change.

	Rational Lens	Learning Lens	Cognitive Lens
Assumption about the environment	Objectively Determined (Chaffee, 1985)	Uncertain and Dynamic (Quinn, 1980)	Enacted by managers and represented cognitively (Johnson, 1992)
Relationship between content and strategy and environmental/organizational factors	Direct (Ginsberg and Buchholtz, 1990; Harrigan, 1981)	Mediated by Managerial Actions (Yetton et al., 1994)	Mediated by Managerial Cognitions and Managerial Actions (Johnson, 1992; Meyer, 1982)
Change process	Feedbacks are not the focus (Rajagopalan and Spreitzer, 1997)	Iterative and managerial learning (Yetton et al., 1994)	Iterative and managerial learning (Rajagopalan and Spreitzer, 1997)

Type of changes	Unitary (Rajagopalan and Spreitzer, 1997)	Continuous and Discontinuous (Meyers et al., 1990)	Evolutionary and Transformational (Webb and Dawson, 1991)

To better understand the relationship between mental models and search, the cognitive lens is the most appropriate one. Therefore, I will start by examining the integrative framework of the cognitive lens on strategic change developed by Rajagopalan and Spreitzer (1997), which is shown below in Figure 1-1-2.

Figure 1-1-2: Strategic Change: A Cognitive Lens Perspective (Rajagopalan and Spreitzer, 1997)



This framework showed that, first, managerial cognitions interpret and are influenced by two factors, namely, environmental conditions and organizational conditions (links 12 and 13). Then, managerial cognition guides managerial actions and leads to changes in the content of strategy (links 14 and 18). Meanwhile, managerial actions also reshape the environmental and organizational conditions and directly influence the content of strategy (links 5, 7 and 8). In addition, managerial cognitions, managerial actions and the content of strategy influence organizational outcomes (links 19, 10 and 3). Last, managers learn cognitively from their actions,

the change in the content of strategy and the organizational outcome (links 15, 16 and 17). Note that the authors believe links 18 and 19 are not theoretically defendable, as managerial cognitions could not influence the content of strategy or organizational outcome without the intervention of managerial action. Table 2 below identifies some key authors and findings that correspond to these links.

Figure 1-1-3: Major links in organizational change (cognitive lens) and exemplary papers

Links	Authors	Key Argument
12	Barr et al., 1992 Ginsberg and Abrahamson 1991	Manager's cognitive ability to link environmental changes to strategy is crucial
13	Barr et al., 1992; Child & Smith, 1987; Webb and Dawson, 1991;	Change in organizational performance and TMT composition influence managerial cognition.
14	Barr et al., 1992 Child and Smith, 1987; Pettigrew, 1987; Webb and Dawson, 1991),	Managerial interpretation of the environment (instead of objective environmental measurement) influences the need for change and the timing of change.
5	Gioia and Chittipeddi, 1991	Managers influence stakeholders by sensegiving
7	Greiner and Bhambri, 1989	Building consensus with other members of TMT
8	Greiner and Bhambri, 1989	Evaluating new strategic objectives using help from various actors, i.e., consultants
3&10	Barr et al., 1992 Child and Smith, 1987	Organization improves performance (in terms of survival or productivity) when managers incorporate environmental changes into new strategies
15	Gioia and Chittipeddi, 1991	CEO changes his or her thinking during the revisioning phase and energizing phase by hosting

		meetings and talking to other actors in the organization.
16	Gaertner, 1989	Employees who lost power in change will support the change if the process is perceived to be fair.
17	Barr et al., 1992	Successful organizational renewal (compared to organizational decline) alters managerial mental model more

In this framework, the authors followed Walsh (1995), who defined managerial cognition as knowledge structures, core beliefs, cause maps, etc. Therefore, the mental model of managers is a part of managerial cognitions. In addition, the search activity or scanning is a part of managerial action (Rajagopalan and Spreitzer, 1997). Therefore, to study how mental models influence search results, my focus is Linkage 14 in the framework of Rajagopalan and Spreitzer (1997) and is highlighted in a red circle in Figure 1. Multiple papers connected organizational change with changes in knowledge structure (Child and Smith, 1987; Pettigrew, 1987; Webb and Dawson, 1991); these papers used a single case study, e.g., on Cadbury, an electronic instruments corporation, and on TESS. Hence, there is no distinction between different mental models that could be used to compare one company's mental model with those of other companies. Barr, Stimpert and Huff (1992) and Lant, Milliken, and Batra (1992) used a more quantitative approach to analyse link 14; however, both papers focused on the likelihood of initiating organizational change instead of the content of change. Nonetheless, it is made clear by Barr, Stimpert and Huff (1992, p17) that "just as mental maps selectively limit information attended to and similarly slant how this information is interpreted, existing mental maps will also limit the range of alternative solutions to the issues that have been identified". However, up until that time, no literature focused explicitly on how mental models influence search results. More importantly, there are no typologies identified in that review to distinguish between mental models, so it is difficult to compare mental models across companies and industries.

Solely relying on the review of Rajagopalan and Spreitzer (1997) may not be adequate to show a full appreciation for the area of organizational change and managerial cognition. One reason is that

newly developed articles since 1994 are not considered in the review paper. The other reason is that although Rajagopalan and Spreitzer (1997) mentioned confusion in the level of analysis in this literature, they did not indicate the level of analysis of the articles they reviewed. Therefore, these two issues need to be resolved.

The level of analysis is an important issue in the conceptualization and operationalization of research. One important assumption in the organizational change literature that focuses on the role of cognition is that owner-managers can decide the action of the firm (e.g., Mintzberg, 1978; Tripsas and Gavetti, 2000; Barr, Stimpert and Huff, 1992). In that way, change of cognition of the owner-manager is likely to be reflected in reality (i.e., change of resource acquisition and the capability development of organizations). This assumption becomes problematic when it is applied to incumbent companies with a large group of decision-makers. It is difficult to isolate a few decision-makers and claim that their cognition is more important than those of others. Without this isolation, when studying the whole top management team, it is difficult to account for social interactions (such as power plays, social capital, relationships, etc.) between team members, which would impact the collective scheme of the team (Walsh, 1995). Therefore, when I theorise, I carefully distinguish between managerial cognition, TMT cognition and organizational cognition. Although this assumption that the cognition of managers influences organizational behaviour is tested and supported statistically (for example Osborne, Stubbart and Ramaprasad, 2001), the assumption would be less problematic when it is applied to new ventures with limited employees. It is relatively easier to identify who the leader responsible for organizational change is in these small ventures. This would help to clarify the data collection process regarding who should be interviewed. Therefore, I need to collect empirical data in the future. I would like to target small companies such as new ventures and start-ups. In addition, when reviewing papers, I consider the studies that address the individual level more relevant for this paper.

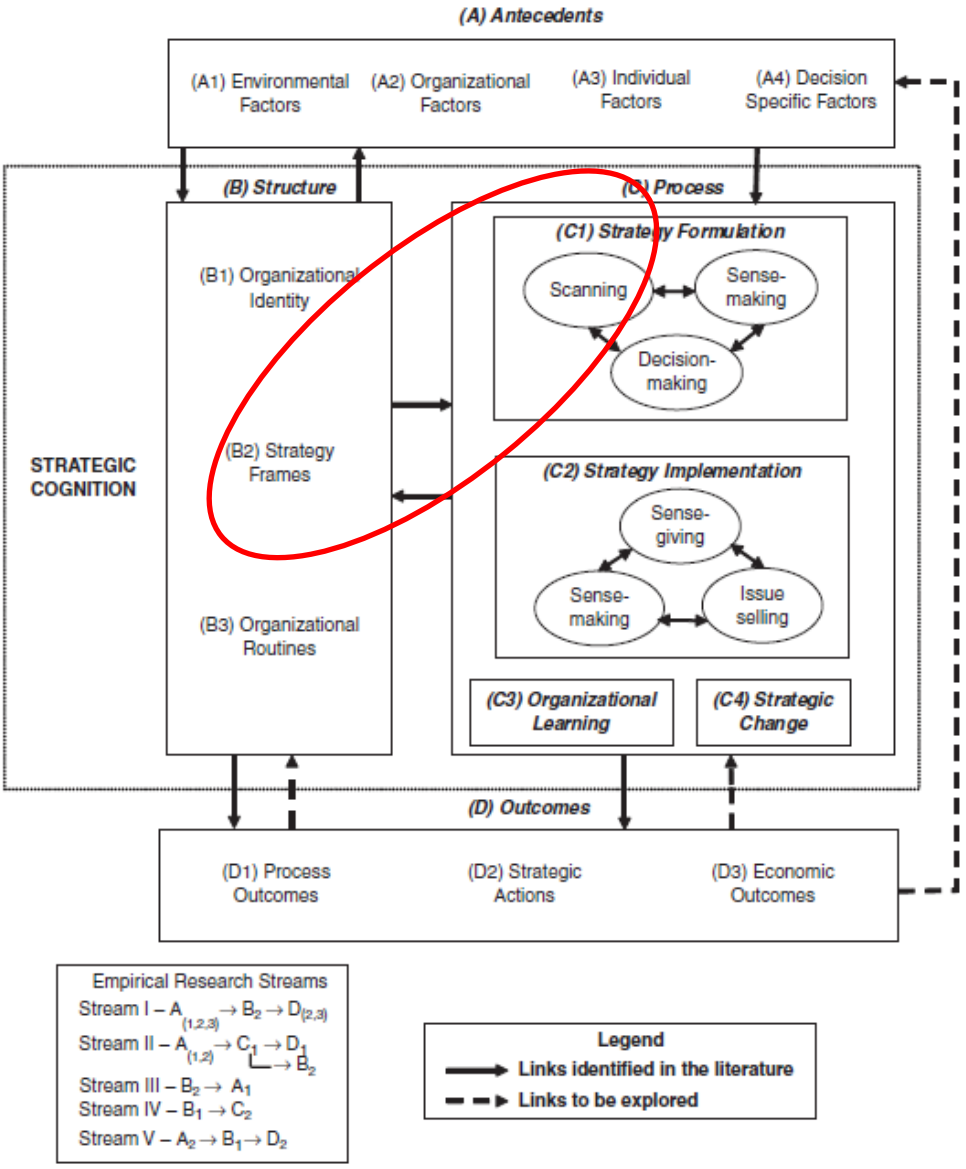
To address the issue of the level of analysis, I turned to Porac and Thomas (2006), who categorized the literature of managerial and organizational cognition at the individual, team, organization, and population levels. A similar method is used by Walsh (1995).

Articles identified by Porac and Thomas (2006) that address the individual level do not provide a clear categorization on different mental models and their impact on search activity. However, one

article that addresses the organizational level (Daft and Weick, 1984) viewed organizations as interpretation systems and outlined four types of modes that are determined by (1) management's belief about whether the environment is analysable and by (2) organizational intrusiveness, that is, the degree to which the organization is passive or active. The four modes identified are enacting, discovering, undirected viewing, and conditioned viewing. These four modes are explicitly linked with different ways of scanning, interpretation, and learning. However, with respect to scanning, the authors only addressed the frequency of scanning and source of information. There is no discussion about the content of information scanned, or in other words, what is searched. Nonetheless, this paper still provides evidence that mental models (at the organizational level) influence the search activity.

Narayanan, Zane and Kemmerer (2011) performed an extensive literature review on the cognitive perspective in strategy, including 164 articles published between 1993 and 2007. Therefore, Narayanan, Zane and Kemmerer (2011) showed further development of managerial cognition after the review of Rajagopalan and Spreitzer (1997), and they clearly identified the level of analysis of each reviewed article. Their central construct is strategic cognition, which focuses on the "linkages between 'cognitive structures' and decision processes in strategic management with respect to strategy formulation and implementation" (Porac and Thomas, 2002 cited in Narayanan, Zane and Kemmerer, 2011). To summarize this literature, they proposed an integrative framework, which is demonstrated in Figure 2 below.

Figure 1-1-4: Strategic Cognition: An Integrative Framework (Narayanan, Zane and Kemmerer, 2011)



There are strong similarities between Narayanan, Zane and Kemmerer (2011) and Rajagopalan and Spreitzer (1997) in terms of the structure of the framework. I summarized the similarities and differences in Figures 1-1-5 below by using the broad structure of Narayanan, Zane and Kemmerer (2011).

Figure 1-1-5 Similarities and differences between Narayanan, Zane and Kemmerer (2011) and Rajagopalan and Spreitzer (1997).

Broad labels used in Narayanan, Zane and Kemmerer (2011)	Narayanan, Zane and Kemmerer (2011)	Rajagopalan and Spreitzer (1997)
Antecedents	1. Environmental factors 2. Organizational factors 3. Individual factors 4. Decision specific factors	1. Environmental factors 2. Organizational factors 3.Individual factors are included in managerial cognition
Structure	1. Organizational identity 2. Strategy frames 3. Organizational routines	1. Managerial cognition, which included organizational identity and strategy frames but excluded routines
Process	1. Strategy Formulation 2. Strategy Implementation	1. Managerial action included formulation and implementation
Outcomes	1. Process outcomes 2. Strategic actions 3. Economic outcomes	1. Change in the content of strategy 2. Economic outcomes 3. Noneconomic outcomes

To understand the relationship between mental models and search results, the first step is to find similar constructs in this integrative framework. Although there is a section directly dealing with strategic change (C4), I will discuss this later. Within the framework, Strategy Frames (B2) is very similar to the mental model that I am trying to investigate. According to Narayanan, Zane and

Kemmerer (2011), the strategy frame can be seen as the cognitive representation of external stimuli that mediate behaviour and external stimuli. Therefore, it could be the mental model of managers. The search for alternative possibilities is mostly consistent with the scanning construct within Strategy Formulation (C1). This is consistent with Rajagopalan and Spreitzer (1997), where scanning is a part of managerial action. Therefore, the relationship between the managerial mental model and search results should be included and represented within the red circle in Figure 2 above.

When discussing the relationship between the strategy frame and scanning, Narayanan, Zane and Kemmerer (2011) pointed out that some of the scanning processes are strategy frame driven, which is consistent with my argument that mental models could determine the search results. The authors pointed to Gavetti and Levinthal (2000) and suggested the importance of forward-looking search and backward-looking search. Apart from Gavetti and Levinthal (2000), no other articles are identified by Narayanan, Zane and Kemmerer (2011) that explicitly discuss the relationship between strategy frame and scanning.

Although only one article explicitly examined the relationship between the strategy frame and scanning, multiple scholars have empirically investigated the antecedents and outcomes of strategy frames and scanning, which might help to understand the strategy frame-scanning relationship indirectly. Figure 1-2-6 below summarizes these articles that focused on the individual level of analysis.

Figure 1-1-6: Antecedents/outcomes of strategy frames/scanning at the individual level

Antecedents of strategy frames	Outcomes of strategy frames
Individual characteristics (nationality, age, functional background and position) influence managerial cognition to a small extent. (Markóczy, 1997)	Three types of mental representations of a particular issue are developed as follows: Interpretive, General, and Particular. However, mixed results are found regarding how differences in the mental representations could influence an individual's performance. (Boland et al., 2001)

Entrepreneurial thinking (cognition) is consistent with entrepreneurial intention, not with entrepreneurial outcomes. (Jenkins and Johnson, 1997)	Option buyers and sellers do not follow normative pricing structure due to gain vs. loss framing. (Miller and Shapira, 2004)
Positive correlation between diversity of a firm and complexity of managerial mental maps. (Calori et al., 1994)	Three cognitive types of actors that differ in their organizing frameworks are identified in the organizational change process: Analysts, Facilitators, and Organizers. In addition, different frameworks could influence organization structure after change. (Lowstedt, 1993)
Some major variations in mental models of individuals exist within a grocery retail firm and between two grocery retail firms. Role of individual is likely to cause the variation. Some similarities in mental models of individuals exist within the same retail firm. (Hodgkinson and Johnson, 1994)	
People in different cultures use the same cognitive process (arrangement, willingness and ability) to make decisions (venture creation). (Mitchell et al., 2000)	
Reported individual cognitive inertia in real estate industry, i.e., that the mental models of individuals in terms of competitive space are stable after a dramatic environmental change. (Hodgkinson, 1997)	

CEOs from larger and younger organizations are more likely to incorporate external referents. (Short and Palmer, 2003)	

Antecedents of scanning	Outcome of scanning
In Bulgaria, the relationship between perceived strategic uncertainty and frequency of scanning (no relation); use of personal source (positive); use of impersonal source (no relation); and more reliance on external source (positive). Need for the exchange of favours moderated perceived uncertainty and frequency of scanning. (Elenkov, 1997)	Information rich scanning leads to managerial perception of positive gain and control. (Thomas, Clark and Gioia, 1993),
In the U.S., relationship between perceived strategic uncertainty and scanning frequency (positive), and the use of personal source (positive). In addition, managers rely equally on internal and external source of information. (Daft, Sormunen and Parks,1988).	Higher scanning results in higher accuracy of managerial mental models in the dimension of environmental instability and munificence. (Sutcliffe, 1994)
Dominant logic (i.e., innovation or efficiency) would make managers more likely to scan external aspects and internal functions associated with the dominant logic. (Garg, Walters and Priem, 2003)	Informative availability is positively correlated with perceived controllability of managers. (Kuvaas, 2002)

	Procedural rationality (the extent to which decision-making involves information collection and analysis) is positively related to strategic decision effectiveness. In addition, procedural rationality is more important when the environment is unstable. (Dean and Sharfman, 1996)
	Positive impact of scanning on technology policy (aggressiveness of persuasion of new technology) is mediated by the strategic orientation of futurity (presence of a long-term view) (Lefebvre and Mason, 1997)

Apart from antecedents and outcomes of strategy frames and scanning, Narayanan, Zane and Kemmerer (2011) identified two papers that explicitly focused on strategic change. One is the review paper by Rajagopalan and Spreitzer (1997), which I have analysed previously, and the other paper is Greenwood and Hinings (1993), which deserves some attention.

Greenwood and Hinings (1993) proposed the idea of archetype, which is defined as "a set of structures and systems that reflects a single interpretive scheme" (Greenwood and Hinings, 1993, p1052). Following this idea, they developed two archetypes: corporate bureaucracy and heteronomous professional bureaucracy. By following 24 organizations between 1974 and 1982, they found considerable evidence that organizations tend to remain one archetype and that it is unlikely for them to change between archetypes. However, the concept of archetype is at the organizational level of analysis. This shows the difficulty of changing between interpretive schemes.

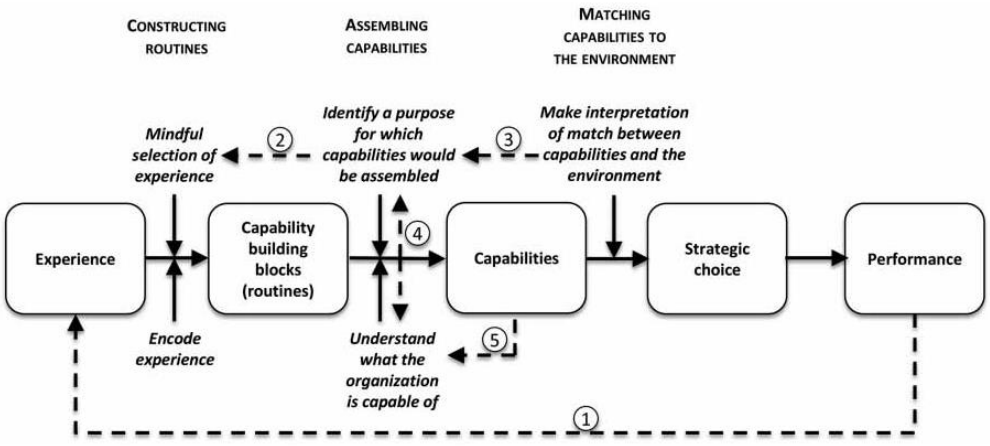
By reviewing the articles identified above, I was able to draw two tentative conclusions that helped me understand how mental models influence search results. First, strategy frames influence search activity (i.e., Elenkov, 1997; Daft, Sormunen and Parks, 1988). However, existing articles are mainly concerned with the frequency of search and the source of search information. Although Garg,

Walters and Priem (2003) mentioned that the scanned area is likely to be associated with the dominant logic, the emphasis of that article was on performance rather than on search results. Therefore, no articles explicitly assessed the impact of mental models on search results.

Second, there are contradictory findings regarding changes in managerial mental models or mental representations. Some scholars have argued that the mental representations of managers update according to environmental changes without much difficulty (i.e., Barr, Stimpert and Huff, 1992). Additionally, some scholars have argued the importance of switching between different mental models or choosing the right model to use at the individual or organizational level (i.e., Louis and Sutton, 1991; Boland et al., 2001). On the other hand, some scholars have argued for cognitive inertia, arguing that the mental representations of managers are unlikely to change (i.e., Porac, Thomas and Baden-Fuller, 1989; Hodgkinson, 1997). Accordingly, some scholars have developed types of mental models and argued that shifts between types are unlikely to happen (i.e., Daft and Weick, 1984; Lowstedt, 1993; Greenwood and Hinings, 1993).

Nevertheless, none of these articles explicitly connect mental representation with search results. Therefore, I moved to a more specific literature review that investigates the relationship between managerial cognition and the capabilities of organizations (Eggers and Kaplan, 2013). This review is important not only because it is more recent, providing me with the most up-to-date research in the field, but also because search activity is crucial in capability development (Tripsas and Gavetti, 2000). To an extreme extent, Eisenhardt and Martin (2000) view scanning as a dynamic capability of a firm. Eggers and Kaplan (2013) proposed a recursive model connecting cognition and capabilities, which is shown in Figure 1-1-7 below.

Figure 1-1-7: Cognition and Capabilities: a recursive model (Eggers and Kaplan, 2013)



Within the framework, the most relevant section is the cognitive process by which managers match capabilities and opportunities. Regarding the process of matching, Eggers and Kaplan (2013) identified two streams of research: attention-based and search-based. Attention-based theories mainly focus on how managerial attention influences resource allocation and development (i.e., Ocasio, 1997; Joseph and Ocasio, 2012); search-based theories focused more on finding the right opportunities that could fit with capabilities (i.e., Tripsas and Gavetti, 2000, Gavetti and Levinthal, 2000). In addition, analogical reasoning is one important method of finding these opportunities (i.e., Gavetti, 2012). Hence, to investigate how mental models influence search results, this search-based literature is most relevant to me.

In addition, Eggers and Kaplan (2013 p325) suggested that "less is known, however, about the cognitive aspects of how organisations identify and pursue opportunities for expansion in situations other than those brought about by radical environmental change." This reflects an important assumption or an implicit premise in the organizational change literature that changes are very often reactive; in other words, changes correspond/react to external changes (for example, Barr, Stimpert and Huff, 1992; Tripsas and Gavetti, 2000; Siggelkow, 2001). Although the change in environment is an undoubtedly important trigger for organizational change, many organizations change without the presence of an environmental shock. For example, Starbucks incorporated the "barista" concept to allow a "cashier" to become a "bartender". There was no major environmental change (i.e., technological, regulatory, etc.) prior to this decision (Schultz and Yang, 1999). Therefore, when investigating how managerial mental models influence search results, I do not include environmental change as a priori information, which is consistent with the prior literature on search.

To have the most up-to-date understanding of this identified search-based literature, in addition to the articles identified by Eggers and Kaplan (2013), i.e., Tripsas and Gavetti (2000), Gavetti and Levinthal (2000), Gavetti (2005), Gavetti et al. (2005), and Gavetti, (2012), I also found Csaszar and Levinthal (2015) fit into the search literature very well. However, when I examined this literature in detail, which will be presented later, I found that they have assumed that each individual can change their mental model freely and that there is an even chance for each mental model to be used by each individual. Therefore, these studies tend to claim that if there is infinite search time, all

possible alternatives/opportunities could be identified by managers; i.e., "eventually, all the possible benefit of searching in the mental representation will have been realised"(Csaszar and Levinthal, 2015). Although this conceptualization is consistent with Barr et al. (1992), who found that managers can change the mental representation of the environment quite easily, this assumption contradicts the concept of cognitive inertia identified previously (Hodgkinson, 1997), which argues that it is unlikely for managers or organizations to change mental models (Daft and Weick, 1984; Lowstedt, 1993; Greenwood and Hinings, 1993). To resolve this issue, I propose using recent developments in business model research and business model change. Below, I briefly review the business model literature and discuss why it is relevant to resolve the identified issue. Then, I will return to the search literature to explain the original conceptualization in detail and problematise, presenting more evidence, the conclusion that all possible results are searchable.

Business model and knowledge structure

The concept of the business model has gained increasing attention in the last two decades, especially after the emergence of successful e-commerce companies. The concept is considered a unique level of analysis that is distinct from product, firm, and industry analyses (Zott, Amit and Massa, 2011). Although there is still a lack of a consolidated/agreed definition for the business model, the business model is agreed to be a construct related to "how to do business?" and is closely related to value creation and value capture (Zott et al., 2011 Demil et al., 2015).

Currently, there are three streams of research on business models, and each has different assumptions. The first stream takes a realist view that sees the business model as a description of a firm's activities, resources and capabilities (i.e., Zott and Amit, 2007; 2010; Vidal and Mitchell 2013). The other stream takes a cognitive approach and views the business model as a mental representation of the business in the mind of the managers. Hence, it may capture some essence of the business but will not be a synthesis of reality and may not help managers make sense of the business (i.e., Teece, 2010; Baden-Fuller and Morgan, 2010; Doz and Kosonen, 2010). The last stream focuses mainly on the role of experimentation in reflecting business model components in reality (i.e., Chesbrough, 2010; McGrath, 2010. Therefore, it combines elements from the realist approach as well as the cognitive approach.

According to Martins et al. (2015), these three schools of business models have a unique view regarding how business models change and are similar to the three lenses of strategic change proposed by Rajagopalan and Spreitzer (1997). Figure 1-1-8 below summarizes the consistency between the two approaches.

Figure 1-1-8 Strategic change and business model

Strategic change			
	Rational lens	Learning lens	Cognitive lens
Key Features (Rajagopalan and Spreitzer, 1997)	Objectively determined environment. Managers can analysis the environment rationally and position the company correctly.	Uncertain and Dynamic environment. Managers learn from their actions and focus on changes via trial and error.	Environment is enacted by managers and represented cognitively. Best fit is found between manager's perception of environment and perception of the organization.
Business model			
Definition (Martins et al. 2015 p113)	"Optimal design of activity systems to manage key interdependencies"	"Optimal design of activity systems to manage key interdependencies "	"Cognitive structure organizing managerial understanding of interdependencies"
Source of Change (Martins et al. 2015)	Exogenous shock	Uncertainty	Schema change
Type of Change	Reposition and reconfigure the business model	Experiment with business model components	Modification of business model schema via

			analogical reasoning and conceptual combination
Key authors	Zott and Amit, 2001; 2007; 2010; Vidal and Mitchell 2013;	Chesbrough, 2010; Gambardella and McGahan, 2010	Chesbrough and Rosenbloom, 2002; Baden-Fuller and Mangematin, 2013; Baden-Fuller and Haefliger, 2013; Doganova and Eyquem-Renault, 2009

Within these three schools of business model conceptualization, the cognitive school is the most relevant one. Here, I provide evidence to connect the cognitive business model with the knowledge structure of managers.

In the managerial cognition literature, managers are assumed to be "information workers" (McCall and Kaplan 1985 cited in Walsh 1995), and managers absorb, process and disseminate information. Walsh (1995) suggested that the "information environment" is complex and ambiguous. To deal with this complexity, people use a "knowledge structure", also referred to as "schema". The knowledge structure is defined as "a mental template that individuals impose on an information environment to give it form and meaning" (Walsh 1995). This knowledge structure is a representation of the information environment. One knowledge structure is associated with one information environment.

When the complexity of the information environment is reduced via the knowledge structure, important elements may become invisible and hence neglected by managers. Thus, a trade-off exists between an extremely simple knowledge structure and a complicated knowledge structure. Baden-Fuller and Morgan (2010) raised similar concerns when discussing business models: when a very complicated business is reduced into a business model, not all of the key aspects are kept, and irrelevant aspects are reduced. Baden-Fuller and Morgan (2010) used "schema" to describe one use

of business models "as mediators to enable users to figure out how their world works in the practical context"; this conceptualization of a business model is consistent with the concept of knowledge structure. Moreover, their argument that the business model is "generic in-between kinds-of-descriptions that are neither general theory nor full empirical descriptions" reconciles with the fact that the knowledge structure cannot be too generic or too detailed. Doz and Kosonen (2010 p371) argued that "business models stand as cognitive structures providing a theory of how to set boundaries to the firm, of how to create value, and how to organise its internal structure and governance". Therefore, from a cognitive perspective, the business model could be seen as the knowledge structure or mental model of managers regarding their business.

There are several reasons which make the cognitive business model an appropriate construct to study the impact of mental models on search. First, central to the search literature is finding the most appropriate collection of attributes of the organization in the mental representation of the manager, and high interdependency exists between each of the attributes (i.e., Gavetti and Levinthal, 2000). This interdependency of attributes is consistent with the cognitive perspective of the business model, where the business model "……reflect(s) the critical interdependencies and value creation relations…… " and focuses on "organising managerial understanding of interdependency" (Martins et al., 2015 p105). Second, Martins et al. (2015 p106) also argued that changing the business model schema in a systematic way will require "executive attention and controlled information processing to search for target schemas". Therefore, search activity is central to business model change. Last, I have shown in the literature review of strategic cognition the existence of cognitive inertia; I want to find one mental model that exhibits this inertia feature. George and Bock (2011 p102) argued that "a business model is inherently nonreflexive". Therefore, using the business model as the mental model construct, I can better show how the mental model can influence search results.

Impact of mental model on search results

Building on the concept of bounded rationality, Gavetti and Levinthal (2000) proposed two types of search activities: a backward-looking search that searches locally and relies on online evaluation, that is, manipulation of actual business activity, and a forward-looking search that searches in the distance and relies on offline evaluation.

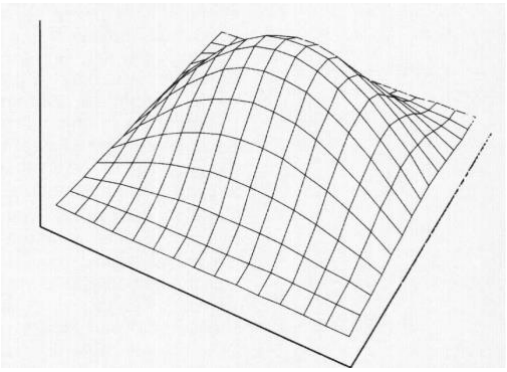
To illustrate the search process, a fitness landscape model (also called the NK landscape model) (adapted from Kauffman 1993) introduced to management by Levinthal (1997) is often used by scholars to study search (i.e., Gavetti and Levinthal, 2000; Siggelkow 2001; Gavetti 2005; Csaszar and Levinthal, 2015). Very importantly, Gavetti and Levinthal (2000) used it to study the cognition of managers regarding cognitive search. Hence, this model is suitable for studying cognitive constructs. Furthermore, this framework is based on bounded rationality instead of perfect rationality, which is consistent with the assumption of the cognitive business model. Last, the framework was used to study search activities, and search processes are directly related to idea generation (Schilling and Green 2011). In this paper, idea generation is about having a new business model idea. Therefore, I use the NK landscape model to connect ideas from the search literature with the business model.

Brief introduction of the NK landscape model

According to Gavetti and Levinthal (2000), the model contains two variables N and K. N indicates the total number of distinct attributes resulting from all possible choices of an entity. For example, a firm needs to decide if it should outsource or self-produce certain components, how long the lead time should be, if a credit policy should be allowed for customers, etc. Each of these decisions will result in a distinct attribute of the company. K indicates on average the extent to which the benefit of one attribute depends on the benefit of another attribute. Using N=2 as an example, the Razor/Blade model of Polaroid worked in the 1980s because the machine was sold inexpensively (attribute 1) and the film was sold expensively (attribute 2). The cheap machine enabled the product to penetrate the market such that people could purchase more films. Thus, the benefit of attribute 2 increased due to attribute 1.

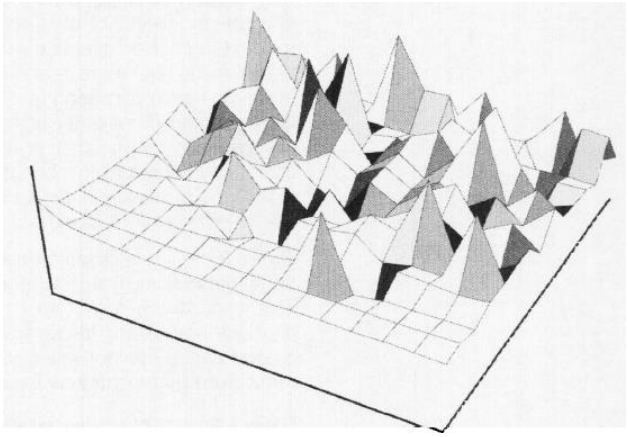
The landscape model also contains an additional dimension to indicate the result of different combinations of N and K. It is usually performance or fitness (Gavetti and Levinthal, 2000; Siggelkow, 2001). Because in their conceptualization, high fitness implies high performance, this result indicator is often illustrated on the Y-axis. Figures 1-1-9 to 1-1-11 below help to explain the landscape model.

Figure 1-1-9 Low K condition landscape (Gavetti and Levinthal, 2000)



When K is low, it means that limited attributes interact with other attributes to have a better/worse result. Therefore, a change in one attribute has a limited effect on the performance of adjacent attributes. However, when K is high, a change in one attribute has a more significant effect on the performance of adjacent attributes. As a result, the landscape becomes rugged (Gavetti and Levinthal, 2000)

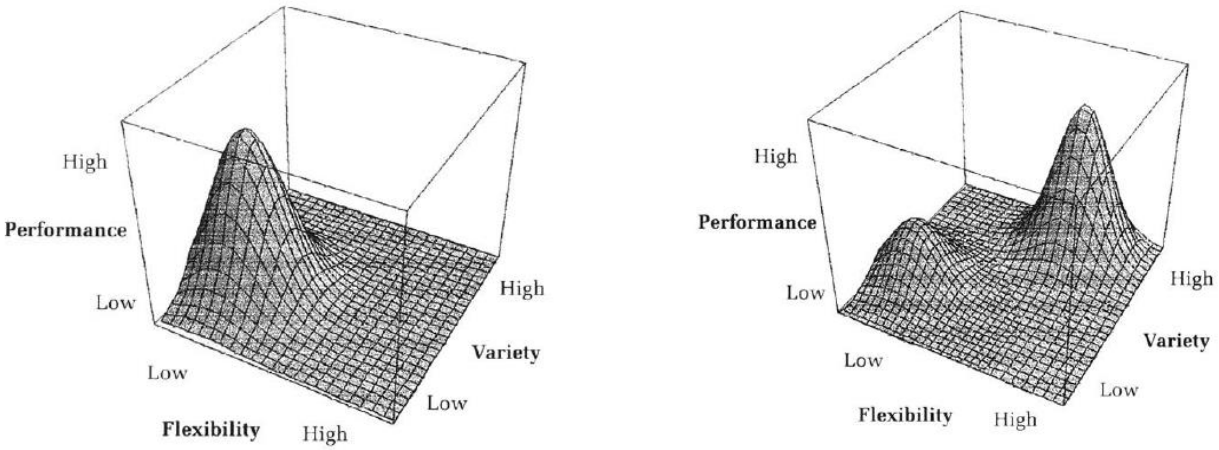
Figure 1-1-10: High K condition landscape (Gavetti and Levinthal, 2000)



In the rugged landscape, there are many peaks. According to Siggelkow (2001), each peak represents a set of attributes with high internal consistency. At each peak, a change in any attribute that formed the peak while other attributes remain constant would cause a reduction in performance.

The more the attributes in a particular set are associated with each other, the steeper the peak. In this case, the K value for the particular peak formed by this particular set of attributes is high.

Figure 1-1-11: Change in landscape (Siggelkow, 2001)



A. Car production 1900s B. Car production 1980s

Siggelkow (2001) used an example of a car production system to illustrate environmental change. In this example, although an exogenous shock is not a necessary condition for change, it is possible in this framework. When we only consider the choices regarding variety and flexibility, in the 1900s, a combination of low variety and low flexibility yielded high performance, which was demonstrated by the Ford production system. Over the years, new technologies were invented, and thus, the combination of high variety and flexibility became feasible and desirable, which was demonstrated by the Japanese production system. Meanwhile, the traditional Ford production system became less desirable.

All the above discussions about landscape models are based on the rational choice model of individuals; that is, an individual knows all the possible choices and consequences of a different combination of choices. However, due to bounded rationality, individuals only know N1 attributes, where N1<N, and perceive a lower K value, written as K1, where K1 < K, as the interaction beyond N1 is not taken into consideration. Unlike NK, which represents a full landscape, N1K1 represents

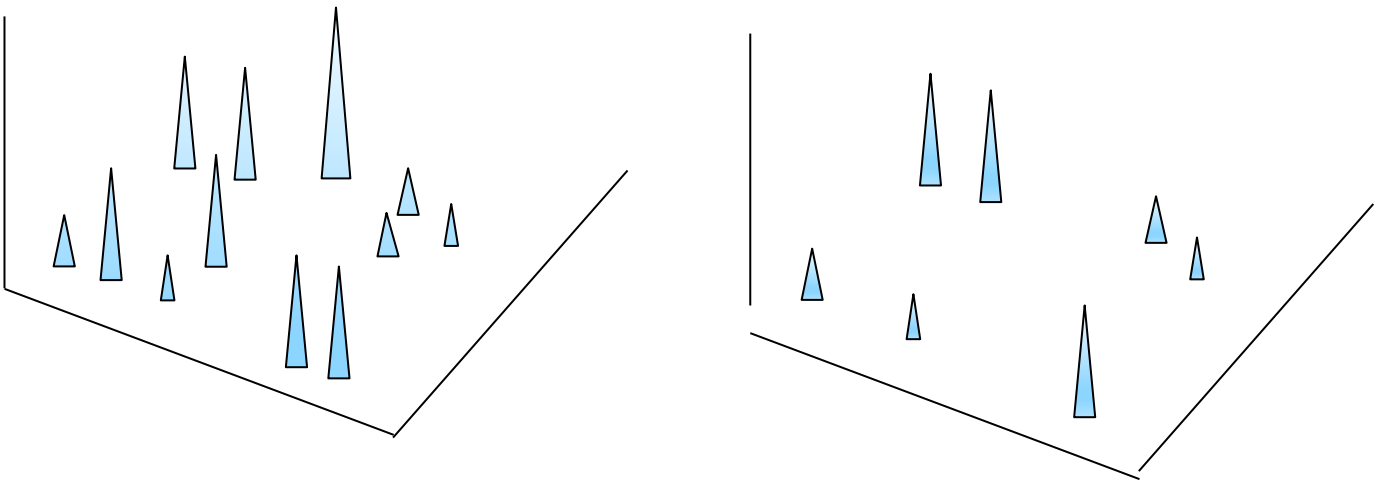
a simplified representation of the landscape in the mind of individuals (Gavetti and Levinthal, 2000).

The landscape model and business model

Using the case study of Shane (2000) as an example, because of the effect of the creation of 3D printing technology on the hypothetical/full landscape, there are X peaks for business models to monetize 3D printing. Each of the peaks represents a specific set of attributes combined that has a high K within each set. Each set of attributes could represent different ways to create, deliver and capture value. For example, the founder of Z Corp's idea, i.e., to use 3D printing technology to make a machine that enables fast 3D printing and to sell these machines to architects, represents their cognitive business model that guides the creation of the new business (Shane, 2000). Therefore, each peak on the full landscape represents a business model.

In reality, due to bounded rationality, entrepreneurs could not fully evaluate all attributes (denoted by N) that could make a business model possible; hence, they could not evaluate all peaks (on the full landscape). Therefore, in their simplified landscape, there is a subset of peaks that they can evaluate, which is created by the combination of N1 attributes (N1<N); that is, each manager would have a small list of business models. Figure 1-1-12a and 1-1-12b below illustrate a full landscape and a simplified representation of landscape, where each triangle represents a peak.

Figure 1-1-12: Full landscape and simplified landscape



A. Full landscape B. Simplified representation of landscape

Managers should evaluate the full landscape and select the highest peak. However, they can only evaluate the simplified landscape and select the highest peak. They are assumed to select the "best" business model in the simplified landscape (Gavetti and Levinthal 2000).

Proposition Generation

Search in landscape model

Following this research tradition illustrated by Gavetti and Levinthal (2000) and later by Csaszar and Levinthal (2015), managers initiate change via two types of search. One is a backward-looking experiential search that usually searches locally, and the other is a forward-looking cognitive search that usually searches from a distance.

The backward-looking search is captured mostly in organizational learning and in the evolution of stable organizational routines (Nelson and Winter 1982). Managers change one attribute of an organization at a time as an experiment to see if performance improves. The change is kept if the experiment provides a positive result. Siggelkow (2001) showed that the experiment of Liz Claiborne to add a reordering system into its current business activities did not add value for Liz Claiborne.

This type of search is consistent with the research on business models and in the context of entrepreneurship. From the entrepreneurship literature, Davidsson (2015) proposed a possible feedback loop between new venture creation and new venture idea, which is defined as "imaginary combinations of product/service offerings; potential market users, and means of bringing these offerings into existence". This definition of a new venture idea is consistent with the business model from a cognitive perspective that views the business model as a cognitive representation of

managers regarding how the business could create value, deliver value and capture the value (Teece, 2010; Baden-Fuller and Haefligher 2013).

Additionally, in the business model literature, Chesbrough (2010) used the term business model experimentation to demonstrate how Radiohead released free CDs on the internet, asked fans to pay whatever they wanted, and gained huge success with this experiment. This type of change is also consistent with the effectuation proposition of Sarasvathy (2001). When there is little information available such that entrepreneurs cannot use a causal relationship to make inferences, they can use experimentation to gain slightly more information and adjust the business model accordingly.

Managers could incorporate the new experience into their cognitive business model. Research in the cognitive business model suggests that when there is plenty of information, managers can cognitively experiment with their business model without changing their company's activities in the real world (Baden-Fuller and Morgan, 2010). In this case, managers use causal inference to determine whether the change in an attribute will produce a positive result.

However, one problem with this type of change is that when an experiment provides negative results, i.e., adding re-ordering system at Liz Claiborne (Siggelkow, 2001) and becoming more market oriented at Polaroid (Tripsas and Gavetti, 2000), it does not mean that the addition is worthless in all conditions. Siggelkow (2001) showed that when only adding a reordering system, Liz Claiborne was not rejuvenated when facing the challenging market change. Liz Claiborne regained market power only after many parts of the company's 'value chain changed in combination with the addition of a reordering system.

This kind of radical change, or a complete change in firm activities, requires a change in entrepreneurs 'cognitive representation of the business environment. This change in cognitive representation is better associated with the forward-looking search activity. Csaszar and Levinthal (2015) explained experimental search and the cognitive search in the following way. Experimental search is concerned with a change in policies: "For instance, the manager of a restaurant can choose policies such as staffing levels, the quality of ingredients, and the recipes used", while cognitive search is concerned with the change in focused performance dimensions. For example, if the

manager believes food quality is the most important dimension (usually a business has a set of dimensions that managers use to evaluate policies; for simplicity, in this example, I only discuss the most important one), then high-quality ingredients and recipes are preferred policies. If the manager changes his or her belief and thinks service quality is the most important dimension, then high staffing levels (compared to the other two polices) are preferred. When there is only an experimental search with no cognitive search, then the manager is manipulating different policies under the condition that food quality is the most important dimension. When there is only a cognitive search, the manager is looking for the best performance dimensions to use when holding all the current policies constant. Managers may change some policies or dimensions according to the two types of search.

Following their argument, managers are crawling the web for many alternatives (based on the simplified representation); they can either change the attributes/policies of the business little by little to position the business higher on the peak that they are on or change the simplified representation and hence move to a different peak with the existing attributes/policies. For most managers, both search processes are used. As a result, these authors believe that if there is a long time period allowed for search, "eventually, all the possible benefit of searching in the mental representation will have been realised" (Csaszar and Levinthal, 2015).

Problematization of the search processes discussed above

Surprisingly, these studies assumed that each simplified landscape is randomly assigned to different managers (i.e., Gavetti and Levinthal, 2000; Gavetti 2005; Csaszar and Levinthal, 2015). In other words, they did not consider the fact that, for some managers, some peaks/business models are more likely to be represented in the simplified landscape than others.

One reason for this uneven representation could be the prior knowledge of managers. As Shane and Venkataraman (2000) and Shane (2000) showed, prior knowledge can influence the opportunity that an individual discovers. There might be other reasons, such that when all entrepreneurs have equal knowledge, some peaks are less likely to be represented in the simplified landscape.

More importantly, this unevenly distributed chance of including certain business models within the simplified landscape may still hold even if multiple searches are carried out (if not an infinite

amount of search). This means that, for a particular manager, it is possible that regardless of the number of cognitive searches, the manager may only find certain business models while another group of business models remain undetected. A similar phenomenon was shown in the basic research of cognitive science and the mental model of individuals. Legrenzi and Girotto (1996) showed that when they gave participants the instruction, "*You have to decide whether or not to go to see a certain film. I will give you any information you want until you can make the decision",*on average, the participants asked three questions to require more information about the decision. All of the questions were about the film, and no questions were asked about alternatives to the film. In other words, when they have infinite search opportunities, participants only searched in the "go to film" landscape, and they did not search in the "do not go to film" landscape, despite being asked to assess "whether or not to go".

Furthermore, the notion of cognitive inertia indicates that, in some circumstances, people do not change their mental models. For example, Porac et al. (1989) and Hodgkinson (1997) showed cognitive inertia in the perception of competitors. In the cognitive taxonomy of Scottish knitwear firms (Porac et al., 1989), although the managing director of the Scottish knitwear firm acknowledged the presence of competitors in other places, the manager only considered other producers in Hawick as its competitors and "perceived threats by potential competitors outside the Scottish group were sometimes dismissed". Following this line of thinking, it is likely that when the manager searches for new opportunities, they would only search in the competitive landscape of "Knitwear", which is "fully fashioned classic" with "high quality". Even though opportunities exist in the "cut and sew" taxonomy, the manager is unlikely to search due to cognitive inertia, or the "ingroup-outgroup perceptual bias" in particular.

Similarly, in the categorization of Lowstedt (1993), people who focus based on a "decision rational" are unlikely to change their organizing framework to an "action rational". In the framework of Daft and Weick (1984), an organization with a "discovering" interpretation mode is unlikely to change to an "undirected viewing" interpretation mode. Organizations in different interpretation modes would have different patterns of search (regarding frequency of search and source of information). Moreover, in the categorization of Greenwood and Hinings (1993), organizations that belong to the cognitive archetype of bureaucracy are unlikely to become heteronomous professional bureaucracy

archetypes, and vice versa. Therefore, these typology-based theories tend to suggest the difficulty of changing mental models.

Therefore, the conclusion drawn in Csaszar and Levinthal (2015) that if managers search cognitively long enough they will find all possible cognitive representations might be problematic. I would like to propose the following:

Proposition 1: Even though cognitive search is allowed for a long period of time, not all the possible benefits of searching in the mental representation will have been realized.

However, these prior typologies are either at the organizational level (Daft and Weick, 1984; Greenwood and Hinings, 1993), or they are not connected with search activity (Lowstedt, 1993). Below, I propose to use a typology from the cognitive perspective of the business model. As I showed in the review earlier, search activity is very important in business model development.

Fissured landscape model

In the business model literature, researchers tend to use taxonomy and typology to categorize different business models (Baden-Fuller and Morgan, 2010). Because taxonomy is a classification system that is based on real-world observations of different business models, it is subjective to environmental changes. For example, Lambert (2006) summarized a list of 10 different categorizations of e-business models. Many of these business models did not exist before the creation of the internet. On the other hand, because typology is based on theoretical analysis, a change in the environment, i.e., new technology or new regulation, would not impact the accuracy of a typology. Therefore, categorizing the landscape using a typology would always hold against changes in the landscape itself. All business models would and should fit into the typology.

I propose using the business model typology of Baden-Fuller et al. (working paper) because it is the only business model typology from a cognitive perspective. In their article, the authors argued that, in terms of the interaction between companies and customers, there are only two relationships, namely, dyadic and triadic. Focusing on the interaction between companies and customers is also consistent with strategic thinking. As Porac and Thomas (2002) suggested, market networks can be subdivided into buyer communities and producer communities. A dyadic relationship between a

company and customers indicates that the firm serves goods to customers directly, whereas the triadic relationship indicates that the firm is connecting two previously disconnected sets of customer-consumers. This typology is likely to reveal the "undetectable" part of a landscape also because it focuses on "embeddedness", which is how social relations influence economic actions. More importantly, it represents the social relation with customers. This relationship is usually not considered in strategic management. In addition, it is unlikely that there is a comparable attribute in the cognitive landscape. For example, "transaction cost economics is pre-occupied with dyadic relations, so that network relations are given short shrift" (Williamson 1994 p85 cited in Uzzi 1996).

Because the typology argument is based on the social network literature (Baden-Fuller et al., working paper), I try to find possible explanations in social network theory as well. The traditional network literature focuses on the individual level and the networks made by individuals and may seem to be far removed from business model research. According to Keinbaum (2012), interorganizational network literature applies to intraorganizational network literature. More importantly, because this paper is about managers' cognition, it is consistent with the level of analysis of social network theory.

In the social network literature, I found that there is a positional treatment effect that causes knowledge asymmetry (Hahl et al., 2016; Davis et al., 2011). Therefore, the party as a broker (ego) has a better understanding/knowledge of the whole network structure than parties who are connected by the broker (alters). Therefore, the manager who is already in the triadic landscape understands the dyadic landscape much better than a manager who is in the dyadic landscape understands the triadic landscape. Therefore, for managers who are currently using a dyadic business model, the triadic business model landscape becomes less detectable. In addition, when they search for new business models, they might come up with plenty of dyadic business models but not triadic business models.

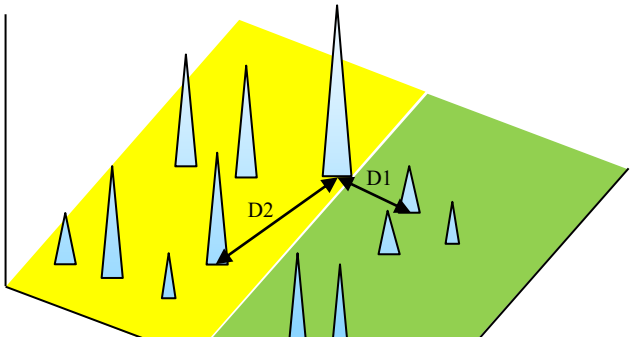
To clarify what I mean by "less detectable", it does not mean a manager of a dyadic business model would never be connected with businesses using triadic business models. It is very likely that the manager of a bookshop (most likely to be a dyadic business model) has used Google search (a triadic business model) in his or her life. The bookshop manager would know of Google, just as managers of Scottish Knitwear companies are aware of competitors in Hong Kong and other places. However,

this does not mean that managers understand businesses that require another mental model in a meaningful way. The manager of a bookshop is unlikely to understand the triadic business model that guides the operation of Google search.

If each business model is seen as a schema, it will include slots and relationships (Wisniewski, 1997). Using the typology of Baden-Fuller and Haefliger (2013), there are four slots of business models: customer identification, customer engagement, value chain and linkage, and monetization. Within each slot, there could be different attributes (for example, Furnari 2015). When changing the business model within the dyadic landscape, the manager could only change the content (filler) of the slot, the relationship among the four slots, and the slots and the relationships within each of the four slots. However, when changing from a dyadic business model to a triadic business model, the number of slots doubles. Thus, two groups of customers are identified: two separate customer engagement methods, two separate value chains and two separate monetization methods. Managers thinking about a triadic business model must not only fill the eight slots, but they must also think about the interactions between them, i.e., how the monetization of customer Group 1 influences the engagement of customer Group 2.

If these two types of business models are displayed in the original landscape model (shown in Figure 1-1-13 below), the distance between a particular triadic business model and the adjacent dyadic business model (D1) will be shorter than the distance between two dyadic business models (D2). This shorter distance would imply that fewer changes are needed between the dyadic business model and the triadic business model than between dyadic business models. Since I already argued that the triadic business model requires eight slots, which doubles the slots of the dyadic business model, the traditional landscape model would not fit. There must be something in between the dyadic landscape and triadic landscape to ensure that it is always more difficult (cognitively) to change from the dyadic business model to the triadic business model than between the two dyadic business models.

Figure 1-1-13: Distance between business models



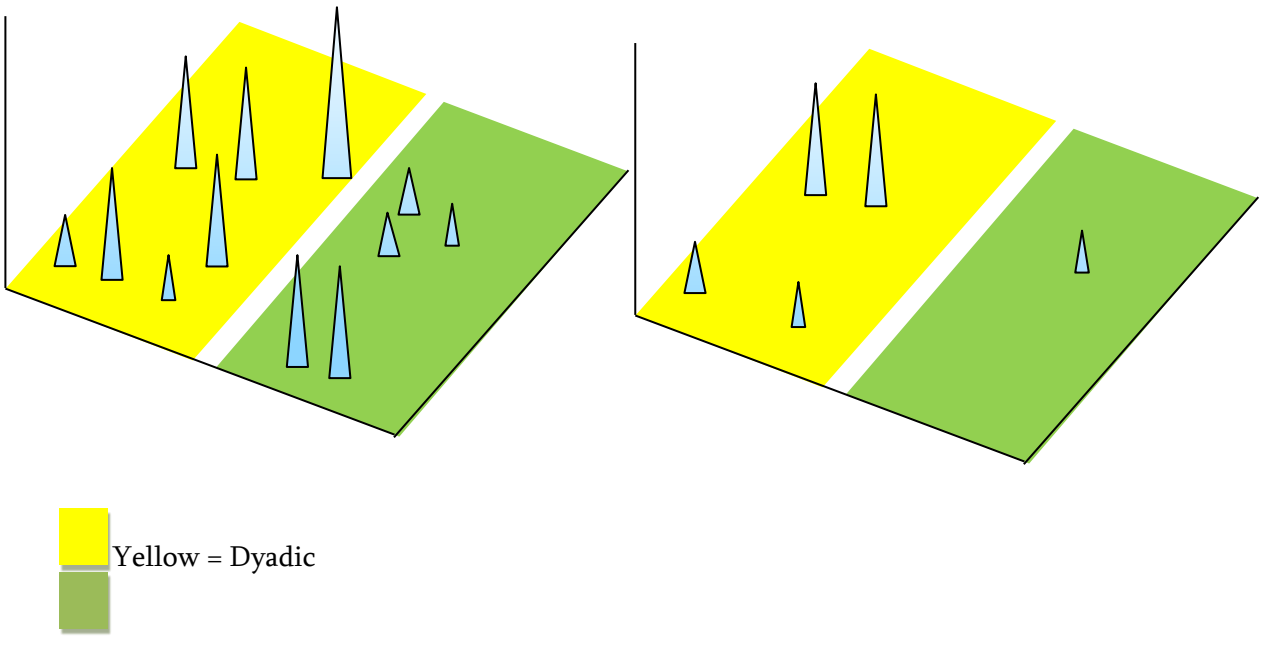
Yellow = Dyadic landscape

Green = Triadic landscape

A. Full landscape

It could be argued that the triadic landscape, which represents an undetectable landscape for managers who are thinking about their original business model in a dyadic way, is simply further away. Thus, managers could employ distant search to determine the triadic landscape. However, the concept of further away implies a continuous feature of the landscape; I am trying to argue for a distinct difference between the two landscapes. To illustrate my conceptualization, I made some changes to the original landscape model shown in Figure 1-1-14.

Figure 1-1-14: Newly proposed landscape model: Landscape with triadic and dyadic business model



Yellow = Dyadic

Green = Triadic

A. Full landscape B. Simplified representation of landscape

The new model emphasizes the following points:

1. All business models are categorized as either dyadic or triadic.
2. A fissure (gap) exists between dyadic and triadic business models, indicating that crawling the dyadic landscape (regardless of local search and distant search) is not sufficient to move from dyadic to triadic. This change could not be achieved by simple manipulation of certain business attributes via a trial-and-error process or cognitive search.
3. Triadic business models have less chance to be represented in the cognitive landscape of managers who are operating dyadic business models.

Proposition 2: It is cognitively easier to change between different dyadic business models than to change from a dyadic business model to a triadic business model.

This proposition is hinted implicitly in the recent business model literature. For example, Zhu and Furr (2016) used the term "making the leap" to describe the change from the product business model (belonging to dyadic) to the platform business model (belonging to triadic). However, there is no discussion about the leap from a cognitive perspective.

To increase the clarity of this fissured landscape concept, I recapitulate the following four scenarios:

Scenario A: I am managing a business using a dyadic business model, and all my direct rivals and customers are dyadic businesses. Can I search for triadic possibilities?

Scenario B: I am a managing a business using a dyadic business model, but my competitors include triadic firms. Can I search for triadic possibilities? In addition, is it even more likely that I will search for triadic possibilities if my largest customers or largest suppliers are triadic?

Scenario C: I am a managing a portfolio of businesses, all of which serve the same or similar customers, and they are all dyadic (like Kodak). Can I search for triadic possibilities?

Scenario D: I have a portfolio of businesses, but they have different economics and are funded differently (such as Ferrari). Can I search for triadic possibilities?

Scenarios A, B, and C have a similar foundation in that my current business model is dyadic. The difference between Scenario A and Scenario C relates to the number of different dyadic mental models I have. Thus, when I search in Scenario C, I might find more possible business models than when I search in Scenario A. However, in both cases, I am unlikely to search in a triadic landscape. This is not because I subjectively refuse to search due to inertia but because I do not know the triadic landscape exists. If an unknown factor provides me with the chance to search in the triadic landscape, I might resist searching in the triadic landscape if I am in Scenario C. My action might be embedded in the existing way of doing business, and I might refuse to search for triadic opportunities. This phenomenon was captured in the Polaroid case study of Tripsas and Gavetti (2000). The difference between Scenario A and Scenario B is that in Scenario B, although my cognitive business model is still dyadic, I interact with companies that have triadic business models. If the interaction is distant and infrequent, as suggested in the social network literature, I as an alter would still not understand triadic relationships (Davis et al., 2011). However, if the interaction is intense, i.e., if I am providing a management consulting service to Google, who is my largest customer; I would be required to understand the triadic business model of Google. In addition, this would help me to see the triadic landscape. Last, in Scenario D, if I have a portfolio of businesses, some of which are triadic and the others are dyadic, when I search for opportunities for one of my businesses that use a dyadic business model, I am much more likely to see opportunities in the triadic landscape. For example, after Valve developed Steam, a video game publishing platform that allows developers to publish games to gamers that use a triadic business model, Valve was able to find triadic opportunities in the games it developed (i.e., Dota2) and in the events it hosted (i.e., The International) and gained huge success.

Discussion, Conclusion and Future Research

Using literature reviews in strategic change and strategic cognition (Narayanan et al., 1997; Narayanan et al., 2011; Porac and Thomas, 2006), I found that limited research had been done to investigate the interaction between managerial cognition and action or the interaction between strategy frame and scanning. One particular aspect of the interaction that is important but often overlooked is how mental models of managers influence the search result. To facilitate organizational change, one of the first steps is to find the new opportunity, the new strategy, or the new business model that could better fit with the perceived existing or modified organizational resources and capabilities (Eggers and Kaplan 2013). Central to the process of finding the fit are the search-based theories (i.e., Gavetti and Levinthal, 2000).

By reviewing the search-based theories in depth (i.e., Gavetti and Levinthal, 2000; Gavetti, 2005; Csaszar and Levinthal, 2015), I found that although these researchers correctly point out that the mental model of managers influences the search result, they did not explicitly incorporate the aspect of cognitive inertia into their argument. Thus, they have assumed that managers could change their mental representation according to their will. Therefore, they concluded that given a sufficient amount of time, managers could find all possible opportunities in the fitness landscape via experiential search and cognitive search.

To bring cognitive inertia into search-based theory, I borrowed from the business model literature and classified two types of mental representations of businesses, namely, dyadic and triadic. Using cognitive theories as well as social network theories, I showed that if a manager is managing a business with a dyadic business model, when he or she searches for new opportunities or a new combination of organizational attributes, the manager might find multiple opportunities in the dyadic landscape but no opportunities in the triadic landscape, because the manager would not understand the existence of triadic landscape in a meaningful way. Thus, a fissure exists in the landscape that distinguishes between dyadic business models and triadic business models.

In the fissured landscape, managerial innovation of business models, exploration of new opportunities, and changes in the content and structure of business models are still allowed. However, these changes are likely to occur in a limited manner. They are likely to change within

the dyadic or triadic landscape. Cognitive inertia is represented by the difficulty of changing from a dyadic business model to a triadic business model. This framework supports my proposition that infinite cognitive search combined with experiential search would not find all searchable results. This is not because managers reject some results but because some results are not searchable for certain managers (i.e., triadic opportunities for dyadic managers).

Future research possibilities

First, as I have illustrated by the four scenarios, it is possible for managers with dyadic business models to explore triadic opportunities. For example, before 2000, Google made money by leasing technologies to other companies, such as Yahoo, that used a dyadic business model, and its triadic business model Google Adwords only emerged after 2000. Many companies have successfully achieved the leap from the dyadic business model to the triadic business model, as shown by Zhu and Furr (2016). It would be interesting to further investigate the factors that enabled managers to leap from the dyadic landscape to the triadic landscape. One way to start the enquiry is by following the four antecedents of strategic cognition, namely, environmental factors, organizational factors, individual factors and decision-specific factors, identified by Narayanan et al. (2011). Using individual-level factors as an example, the self-monitoring personality (Flynn 2006, Oh and Kiduff, 2008 Sasovova et al. 2010) might increase the chance of searching in triadic landscapes because people with high self-monitoring might be cognitively more inclusive of the world (Kegan 1994). Additionally, at the individual level, people with a high entrepreneur personality index (Burt 1998) may be more likely to explore triadic opportunities. Additionally, prior experience (Keinbaum 2012) and brokerage-related training (Burt and Ronchi 2007) might increase the chance for triadic exploration. Last, general cognitive accuracy/accurate network perception (Krackhardt 1987, 1990), which accounts for the degree of correspondence between an individual's cognitive representation of the entire network and the confirmed network, might allow managers to see the triadic opportunities of its competitors and customers in a meaningful way. I anticipate that by reviewing the antecedents of strategic cognition, the factors that can only enable within-landscape mental model change and the factors that can enable between-landscape (from dyadic to triadic) mental model change could be identified.

The second related research possibility is the step after the search, i.e., the sense-making process (Narayanan et al., 2011) or interpretation process (Daft and Weick 1984). I want to suggest that even though a combination of attributes that fit very well are identified by the manager (Gavetti and Levinthal, 2000) or a modifier is accidentally identified by managers (Martins et al., 2015), the question emerges whether the manager can understand or make sense of the idea/alternative possibility. For example, Bertermann, the founder of the Auto1 group—a unicorn company that is valued at 1.2 billion USD (Fortune, 2016)—claimed: "We're building a stock exchange for used cars, using technology to connect buyers with sellers" (Bloomberg 2015). This implies that the founder is using a stock exchange as an analogy for his own organization. However, a closer examination of the operation of the Auto1 group revealed that the company purchases cars from the public and sells them to car dealers, which is very different from what the stock exchange does. This example may illustrate that it is difficult for a manager with a specific mental model to interpret identified alternative possibilities that require different mental models.

Chapter 1 Subsection 2: Platforms and Platform Evolution

Introduction

A core question in strategy is how firms could take specific actions to increase their profits, and this has given rise to extensive discussions of topics such as capturing key resources, positioning in the preferred markets and industries and accumulating capabilities, including dynamic capabilities. It has also spurred a large body of literature on organizational transformation.

In this digital age, many companies are exploring the possibilities of employing a platform strategy. However, this platform strategy is given different meanings in different research streams and different contexts. For instance, some scholars have explored the product platform strategy (Robertson and Ulrich, 1998; Krishnan and Gupta, 2001; Huang, Zhang and Liang, 2005); some have explored the strategy of becoming a platform leader in an ecosystem (Tiwana, Konsynski and Bush, 2010; Gawer and Henderson, 2007; Gawer and Cusumano, 2014); and others have explored the two-sided platform strategy (Rochet and Tirole, 2003 & 2006; Economides and Katsamakas, 2006; Hagiu and Wright, 2015; Van Alstyne, Parker and Choudary, 2016; Zhu and Furr, 2016).

Gawer (2014) provides a highly motivating review identifying two themes: one considers platforms from a supply perspective (creating value through supply-side synergy, such as economies of scope in supply and innovation) and the second considers platforms from a demand perspective (creating value through demand-side synergy, such as economies of scope in demand).

For those scholars focusing on supply-side synergy, the platform is a complementary asset to other components or products that are internal or external to the firm that controls the platform (Robertson and Ulrich, 1998; Gawer and Henderson, 2007). From this perspective, platforms serve as a foundation upon which these components or products can be built. Higher profits might be achieved via lower production costs or easier innovation. Customers may also receive benefits via higher customization, as platform-based products could adopt environmental changes more easily and faster due to the flexibility of peripheral components (Baldwin and Woodard, 2009).

For those scholars focusing on the demand side, the platform creates synergies by connecting different customer groups (e.g., Baden-Fuller, Giudici, Haefligher and Morgan, 2017; Rochet and Tirole, 2006 and Economides and Katsamakas, 2006). These demand-side synergies (often called two-sided network effects) are likely to result in both higher revenues and profits that may be realized even if there are no supply-side synergies.

There is important empirical work bridging these differing views. For example, Eisenmann, Parker and Van Alstyne (2011) suggested that "ranked by market value, 60 of the world's 100 largest corporations earn at least half of their revenue from platform markets". Looking at "The World's Most Valuable Brands" (Forbes, 2016), the top three companies, namely, Apple, Google and Microsoft, reply on their platform business model to a very large extent. This work does not distinguish carefully between demand and supply effects. Rather, it suggests that platforms in general are ubiquitous and important and are found in many sectors, such as shopping malls, housing agents, street markets, and even universities.

In the next section (Section 2) of this paper, I use the literature to show a proper understanding of the conceptual differences between demand- and supply-side platform synergies, noting that they can coexist. In the third section, I address the question of "what we know about how firms become a platform". Here, I show that there is a good understanding of how firms create supply-side synergies—but, in contrast, there is a lack of understanding of how firms create demand-side synergies. I use this contract to generate two research questions that I believe are both conceptually important in their own right and that serve as a basis for undertaking the rest of my thesis.

Literature review on platforms

The realization that platforms are studied from different and sometimes opposing perspectives and that contrasting and potentially integrating these perspectives could be useful is not new. Baldwin and Woodard (2009) are the first to systematically review the platform literature with the objective of identifying similarities among different literature streams. They identified three waves of literature in management that discussed platforms: product development (i.e., Wheelwright and Clark, 1992; Kogut and Kulatilaka, 1994; Meyer and Lehnerd, 1997), technology strategy (i.e., Bresnahan and Greenstein, 1999; Gawer and Cusumano, 2002), and industrial economics (i.e., Rochet and Tirole, 2003 & 2006; Parker and Van Alstyne, 2005; Economides and Katsamakas, 2006). Baldwin and Woodard argue that for platforms, there is a common architecture that is discussed in the three different streams. This platform architecture has three parts: a set of stable and low-variety components that forms the core; a set of less stable and high-variety components that complement the core; and a set of potentially more stable interfaces that govern the relationship between the core and the complements. They argue that platform architecture tends to evolve via frequent improvement on the complements and much less frequent improvement on the core, while the interface tends to be more stable.

It is important to be clear about the relationship between platform and platform architecture. In the argument of Baldwin and Woodard (2009), regardless of the level of analysis (within firm or cross firms), the essential feature of a platform that is based on supply-side synergy—economies of scale and scope—is the economic logic of component reuse. These reused components are often stable components in the system. Thus, the stable core components in the system is the platform and the system is the platform architecture. The platform architecture, on the other hand, not only includes these stable components but also comprises the system around the platform, specifically the peripheral components and the interface between the platform and the peripheral components. Therefore, the unit of analysis of the platform is at the asset level or comprises bundles of components, and the unit of analysis of the platform architecture is at a system level, which includes the platform. Using a car as an example, the entire car could be considered a product architecture. Using platform terminology, the car represents the platform architecture. The reused components across a product family, i.e., the car chassis or engine system, comprise the platform. Baldwin and Woodard (2009) further argued that at the architecture level, platforms that are based on supply-

side synergies are the same as platforms based on demand-side synergies.[1] Both have the three important platform architecture components: core components, peripheral components, and interfaces.

This notion of platform architecture and its similarity addressed in different platform literature streams has been taken and advanced by Gawer (2014). Building on Baldwin and Woodard's (2009) notion of a stable core, flexible periphery and interfaces, Gawer (2014) looks at different kinds of platforms: internal platforms, supply-chain platforms, and industry platforms. Gawer (2014) proposed viewing a platform (in my understanding, she means platform architecture) as a meta-organization that "(1) federate and coordinate constitutive agents who can innovate and compete; (2) create value by generating and harnessing economies of scope in supply or/and in demand; and (3) entail a modular technological architecture composed of a core and a periphery". This approach opens many new possibilities for research because she includes both the economic view (focuses on demand-side synergy) and the engineering design view (focuses on supply-side synergy) of the platform. The former views the platform as a market that connects two separate groups of customers, e.g., Rochet and Tirole (2006). Value is created through demand-side economies of scope. The latter views the platform as a technological architecture. Gawer (2014) summarized commonalities in definitions of technology platforms as a "systematic re-use of components across different products within a product family, which allows economies of scope in production to occur."

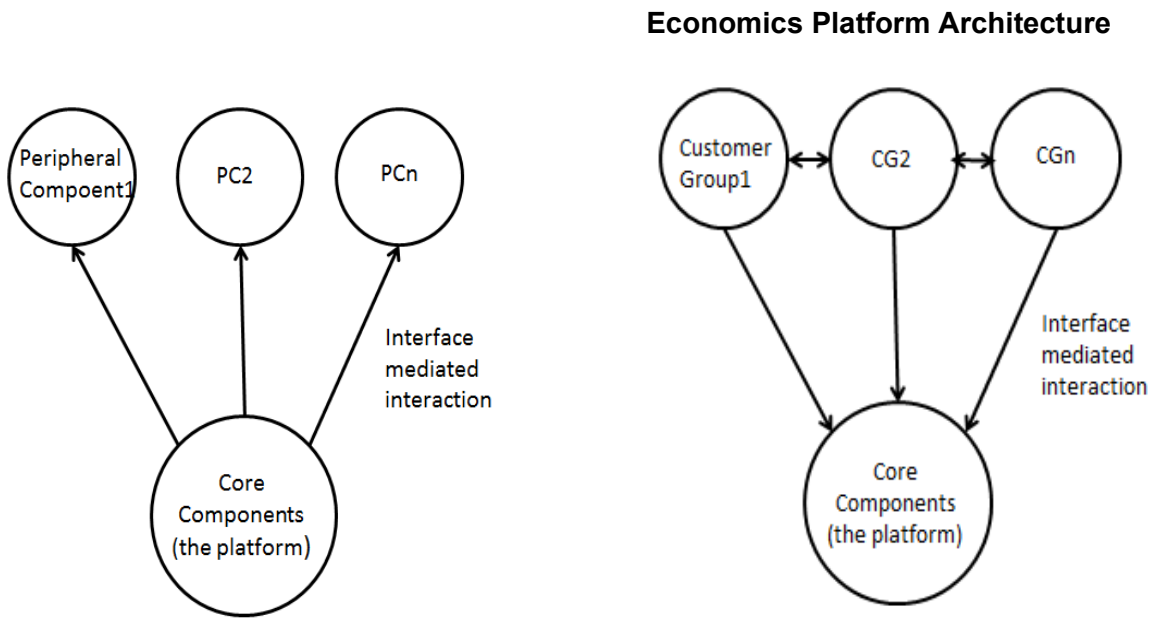
Thus, according to both Baldwin and Woodard (2009) and Gawer (2014), at a very high level of abstraction, economists' view of platforms is similar to that of engineers. The noticeable difference is that terms such as "peripheral components" in the engineering design perspective are replaced by "customer groups" in the economists' perspective.

Figure 1-2-1 below illustrates that, at a very abstract level, both perspectives have the same platform architecture, but there are small differences. In the figure on the left side, I show the engineering view, where the main focus is on the selection and creation of stable core components and adjust peripheral components. The focus of the interface is between the core and peripheral, and these

[1] The differences between platforms that are based on demand-side synergy and platforms that are based on supply-side synergy are not the specified in Baldwin and Woodard (2009), as this is not the intention of that article.

interfaces are most likely being predesigned by owners of core components. On the right side, I show the economists' view. The focus is on the relationships between customer groups and between customer groups and the platform.

Figure 1-2-1: Shared architecture of two perspectives with different focuses.



The meta-organization level (Gawer, 2014) or platform architecture level (Baldwin and Woodard, 2009) views similarities between the economic and engineering design views of platforms. There are important differences that are more apparent at a detailed level. One of the crucial differences is that the engineering design perspective has a precise and articulated definition of what platforms are and what their characteristics are. Economists, on the other hand, are not interested in concrete physical structures. They tend to emphasize the relationship or the interaction from the point of view of customers (typically seen as consumers) between the core (platform) and peripheral (customer groups).

Put more forcefully, the engineering design perspective is more concerned about how the core could influence the peripherals through the interface, as Baldwin and Woodard (2009) suggested:

"They [core components] are the long-lived elements of the system and thus implicitly or explicitly establish the system's interfaces, the rules governing interactions among the different parts". In comparison, combined with the frequent use of "design rules" (Baldwin and Clark, 2000; Baldwin and Woodard, 2009), the economic perspective of platforms is more concerned with how different assumptions regarding customers and customers' behaviour could influence platforms (Economides and Katsamakas, 2006; Hagiu and Wright, 2015; Baden-Fuller et al., 2017).

Although economists are interested in the interactions between different customer groups, these interactions may not be direct in all situations. In some traditional two-sided markets, different customer groups interact directly, i.e., buyers and sellers in a shopping mall or in a vegetable market, merchants and cardholders who want to make a purchase, and celebrities and other participants in a social gathering. In many digital or technological two-sided markets, one group of customers tends to interact with the other group of customers via the platform, e.g., consumers and software developers at the app store and two parties on a dating site. As a result, it is harder to identify the difference in focus of the engineering design perspective and the economic perspective.

We can see economists' thinking of the platform in the following sentence. Economides and Katsamakas (2006) argued that "we show an equivalence between a specification that assumes complementarities and a specification that assumes explicit network effects across the two sides of the market (users and application providers), thus confirming the close relationship between the two-sided networks literature and the systems literature".

If we now return to the other important platform literature review, we see a continuation of our tension between demand- and supply-side platforms. Thomas, Autio and Gann (2014) used a framework synthesis approach to conduct an in-depth review of management-related platform literature up to 2010 (n=183) and hinted at this issue of demand vs. supply synergy. Thomas et al. (2014) identified five literature streams that studied platforms: the product family stream echoes the product development stream that discusses how common assets are used to develop subsequent product generations; the market intermediary stream echoes the industrial economics stream that deals with a two-sided market; and the platform ecosystem stream echoes the technology strategy stream that views "the platform as a hub or a central point of control within a technology-based business system". The two additional streams are the organizational stream, in which the "platform

is the organizational structure that stores organizational capabilities" and the general technology stream, which views platforms as "general-purpose technologies where generations of technology are subsequently built on dominant designs". The fifth stream is disregarded in their analysis because it is less relevant to management, and only 2% of sample articles subscribed to this stream.

They also found that among the five streams, there are three logics of leverage—the ways that platforms could generate impacts that are disproportionately larger than inputs:

1. Production leverage that focuses on the shared use of a set of assets repeatedly to achieve economies of scale and scope.
2. Innovation leverage that focuses on the shared use of a set of assets repeatedly to achieve innovation.
3. Transaction leverage that is "based on the manipulation of the market pricing mechanism and market access, which drives transaction efficiency and reduces search costs in the exchange of goods and services" (Thomas et al., 2014).

Production and innovation leverage are clearly based on utilizing supply-based synergies that are focused on the use of complementary assets, and transaction leverage is based on utilizing demand-based synergies connecting complementary groups.

Through the above discussion, I have demonstrated that broadly speaking, there is a recognition of the demand and supply perspective but at conceptual and practical levels, there is a lack of probing of their differences: the platform based on supply-side synergy that focuses on systematic reuse of shared assets and the platform based on demand-side synergies, specifically those connecting complementary customer groups. I make this claim recognizing that Thomas et al. (2014) suggested the possibility of a "platform ecosystem" or an "industry platform" that represents a multilogic architecture that utilizes both demand-side and supply-side synergies. In addition, I believe that Gawer (2014) leads us to underappreciate these important differences when she argues that a multisided market is considered to be only a special case of an industry platform where the coordination mechanism is done though pricing exclusively. For me, the role of demand-side synergy is fundamentally different from that of supply-side synergy.

In Figure 1-2-2, I seek to show simply and boldly that there are two fundamentally different platforms, referred to as Type 1 and Type 2. There is also a possibility to have the two platforms coexist, which is the Type 3 platform.

Figure 1-2-2: Platform classification

A classification of platform		Supply Side Synergy	
		Not encouraging systematic reuse of the platform as an asset	Encourages systematic reuse of the platform as an asset
Demand Side Synergy	Not connecting complementary customer groups	1. Not a platform	2. Pure complementary asset platform
	Connecting complementary customer groups	3. Pure complementary customer group platform	4. Integrated platform that features coexistence of demand and supply platform.

The above classification has allowed for four possible outcomes by combining the existence (or nonexistence) of a particular demand-side synergy—connecting complementary customer groups, and a particular supply-side synergy—systematic reuse of an asset that serves as a foundation for other inventions. When there is only supply-side synergy, the object is usually considered to be a technological platform from an engineering design perspective. When there is only demand side synergy, the object is usually considered to be a two-sided market platform from an economic perspective. This typology also suggests that an object would not be considered a platform when it has neither of the synergies, and the typology explicitly provides for the possibility of an integrated platform where both demand- and supply-side platforms coexist.

The nature of this classification is similar to the notion of ideal types (Webber, 1904). This is not a classification scheme that represents common or average characteristics of platforms in reality. It focuses on the essential and typical characteristics of platforms, and these characteristics are derived from the platform literature, which often has empirical evidence. This is a device to help us

understand the often-complicated platform literature and more complicated platform firms in the real world. Coser (1977) made the purpose of ideal types more explicit, stating that "an ideal type is an analytical construct that serves the investigator as a measuring rod to ascertain similarities as well as deviations in concrete cases." Therefore, the objective of the above typology is not truly to decide if a particular real platform firm fits within one category or the other. It is a tool to help us understand the relationship between the different types of platforms.

In the following section, this paper will compare and contrast different dimensions of platforms based on demand-side synergy and on supply-side synergy. It will start as a static comparison of features and units of analysis at a model level. Then, this paper compares and contrasts the two types in a dynamic manner to discover the emergence of the two types of platforms.

Static Comparison

Supply-side platform as a complementary asset

Most previously identified platform streams take a supply-side perspective that focuses on the systematic reuse of components. Table 2 below illustrates seminal definitions of platforms.[2] This table contains three important definitions of platforms that have occurred in previous platform literature reviews and are based on supply-side synergy. They are also matched with the labels applied to them in previous literature reviews.

[2] There is also an organizational stream of platform literature that defines a platform as follows: "A platform is a meta-organization, a formative context that molds structures, and routines shaping them into well-known forms, such as the hierarchy, the matrix and even the network, but on a highly volatile basis." (Ciborra, 1996). In addition, from a supply-side perspective, a stream considers that new innovation is in the form of new resources and low-order capabilities (Winter 2003) that could enhance the efficiency of the organization, and this new innovation is only made possible because of platform organizations in the form of high-order capabilities within the firm that "support the purposeful reorganization of lower-order processes to realign with shifting environments" (Thomas et al., 2014). However, this platform stream is not central to my discussion.

Figure 1-2-3: Platforms utilizing supply-side synergy

Author	Definition	Research Stream (Baldwin and Woodard 2009)	Research Stream Thomas et al. (2014)	Research Stream Gawer (2014)	Level of analysis
Robertson and Ulrich (1998)	"(Platform is) collection of assets that are shared by a set of products. "	Product Development	Product Family	Internal Platforms	Within Firm
Gawer and Henderson (2007)	"We define a product as a "platform" when it is one component or subsystem of an evolving technological system, when it is strongly functionally interdependent with most of the other components of this system, and when end-user demand is for the overall system, so that there is no demand for components when they are isolated from the overall system."	Technology Strategist	Platform Ecosystem	Industry Platforms	Between Firms
Bresnahan and Trajtenberg (1995)	"(General Purpose Technologies) are characterized by the potential for pervasive use in a wide range of sectors and by their technological dynamism"	N/A	General Technology	Industry Platforms	Between Industries

Understanding the above definitions from a strategic management angle, a strategy concept that shares strong similarities with these definitions, is the complementary asset concept (Teece, 1986). He explained that "the successful commercialization of an innovation requires that the know-how in question be utilized in conjunction with other capabilities or assets. Services such as marketing, competitive manufacturing, and after-sales support are almost always needed. These services are often obtained from complementary assets which are specialized."

Treating a platform as an asset is very consistent with the typology of Gawer (2009), who identified the internal platform, supply-chain platform and industry platform. For instance, she defined an industry platform as "products, services or technologies that are developed by one or several firms and that serve as foundations upon which other firms can build complementary products, services or technologies." Thus, the platform is a complementary asset to future innovations based on the platform.

It was clear in Teece's (1986) argument that complementary assets could be found within the firms' boundary and outside the firms' boundary. This is consistent with Table 2, which shows that a platform utilizing supply-side synergy could exist at different levels of analysis. When the asset is within the firm, such as in the product platform literature, the innovation (new product) is utilized in conjunction with product platforms previously designed internally to "better leverage investments in product design and development." (Krishnan and Gupta 2001). The shared car chassis of Citroën 2CV, Citorën Ami and Citroën Dyane could be one example, where different car models are based on the same chassis. When the complementary asset is outside the firm's boundary but within the industry boundary, it may form the basis of the industry platform. For example, Microsoft Windows is often considered to be the platform of the software industry. In addition, firm-branded services, i.e., Platform-as-a-service (PaaS) offerings, also fit this category. For example, Apprenda provides a framework to developers that they can build upon to develop or customize an application. In both cases, Windows and Apprenda act as complementary assets to other software that is outside the boundary of the firm.

It is challenging when conceptualizing a general purpose technology as a complementary asset. The original complementary asset notion is "implicitly thought of as belonging to private sector firms located somewhere in the marketplace" (Teece, 2006). Instead of complementary assets, Teece

(2006) called them supporting infrastructure. For instance, the TCP/IP, a standard regulating data transmission on the interest, acts as a general purpose technology platform that enabled the creation of many internet-related inventions. However, the standard is not owned by any private party. It is now a shared standard by all internet users, although it was originally developed by the US Department of Defence. Therefore, at the societal level, a platform utilizing supply-side synergy could be seen as an infrastructure.

Although these supporting infrastructures are instrumental for the success of new innovations and are an important form of platform, this paper intends to confine the boundary of discussion to strategic management. Since these infrastructures are not privately owned by firms, a discussion of the platform strategy of this infrastructure is less comparable to that of other strategies.

The notion of complementary assets is also consistent with the different degrees of openness of platforms. Teece (1986) identified different types of complementary assets. When the complementary asset and the innovation have low dependency, the complementary asset is generic; thus, low investments are needed to make the complementary asset and new innovation compatible. When the dependency is bilateral, the complementary asset is cospecialized; thus, investments in both the asset and the innovation are needed to make them compatible. When the dependency is unilateral, the complementary asset is specialized; thus, investments are needed in either the asset or the innovation to make them compatible. Different types of complementary assets echo the openness of the platform. When it is costly to make the innovation compatible with the platform, the platform tends to be closed, and when there is no cost to make the innovation compatible with the platform, the platform tends to be open. The cost of compatibility could be caused by many factors. For example, a firm could prevent anyone else but itself from creating innovation that is compatible with the platform it created by setting policies or making patents; a firm has a lower cost of making innovation that is compatible with the platform created by itself because of its platform knowhow. However, the platform owner could reduce the cost of making compatible innovation by making internal knowledge of the platform external and explicit.

Thus, this article defines the unit of analysis of platforms that is based on supply-side synergy as a complementary asset. In other words, a platform based on supply-side synergy is a complementary

asset that is (1) systematically reused by agents (within and outside the firm) and (2) acts as a foundation for other components or inventions to build on.

Demand-side platform as relationships

Rochet and Tirole (2003, 2006) are some of the first scholars to consider the two-sided market arrangement. This focus has been captured in previous platform literature reviews and has been labelled the industrial economist (Baldwin and Woodward 2009), market intermediary (Thomas et al. 2014) or two-sided market platform perspective (Gawer 2014). However, as discussed previously, this stream tends to be underrepresented. In many ways, the study of a two-sided market fits with the demand-side approach in strategic management. The demand perspective or demand-side approach is defined as "work that looks downstream from the focal firm, toward product markets and consumers, rather than upstream, toward factor markets and producers, to explain and predict those managerial decisions that increase value creation within a value system" (Priem, Li and Carr, 2011). However, the current demand perspective in strategic management mainly focuses on the impact of customer heterogeneity on firms' strategic decision-making. While customer heterogeneity is a key characteristic in demand-side platforms (Hagiu and Wright, 2015), the two-sided market literature stream focuses more on the interaction of two or more distinctively different customer groups (which is different from customer segmentation in the marketing sense).

Instead of focusing on how a platform acts as a complementary asset to new innovations or explicitly defining what a platform is, the two-sided market platform stream investigates the relationship between the platform and the customer groups and between different customer groups (referring to Figure 1). Specifically, this stream studies the incentives and outcomes of having a two-sided relationship with customers compared to having a one-sided relationship.

Although there are disagreements regarding the precise definition of a two-sided market, two-sided platform or two-sided strategy, the disagreements are mostly about how inclusive or exclusive this term should be. For instance, Rochet and Tirole (2003, 2006) emphasize the characteristic of price neutrality, i.e., that when keeping the price level (sum of fees paid by the two customer groups) constant, the price structure will influence transaction volume. However, this price neutrality rule is deemed unnecessary in Hagiu and Wright (2015). To take a real-life example, Rochet and Tirole (2003, 2006) would not consider a street food market as a two-sided market because any burden

that the market host places on food sellers could be passed away to food consumers by raising the food cost. Thus, the Coase theorem would hold in this situation. However, Hagiu and Wright (2015) consider a street food market as a two-sided market or multisided platform because the market enables two distinct parties to interact with each other directly, and each side is affiliated with the platform.

There is high consistency regarding the key characteristics of a two-sided market. There should be two (or more but using two as an illustration) distinct agent groups who are conceptualized as distinct customer groups that interact (making transactions) with each other via the platform (Rysman, 2009; Rochet and Tirole 2003 & 2006; Hagiu and Wright, 2015). For instance, Amazon traditionally purchases books from publishers, holds the stock and sells them to people who want the books. Although there are two distinct agent groups (publishers and book buyers), they do not interact with each other via Amazon. This is a one-sided or single-sided market arrangement. Later, when Amazon allowed third-party organizations (including book publishers) to sell products via the Amazon marketplace, book buyers now interacted with book publishers on Amazon. Thus, Amazon became a two-sided platform, the arrangement became two-sided. Note that as Rysman (2009) rightly points out, the one-sided or two-sided market arrangement is not exogenous; it is an endogenous choice.

Figure 1-2-4 below shows some foundational definitions of a two-sided market, two-sided platform, multisided platform or two-sided strategy and suggests that all the definitions do not focus on the "platform" but on "two-sidedness".

Figure 1-2-4: Foundational definitions of two-sided platforms

Author	Definition
Rochet and Tirole (2006)	A two-sided market is one in which the volume of transactions between end-users depends on the structure and not only on the overall level of fees charged by the platform.
Armstrong (2006)	Many markets involve two groups of agents who interact via "platforms," where one group's benefit from joining a platform depends on the size of the other group that joins the platform.

Hagiu and Wright (2015)	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.
Van Alstyne, Parker and Choudary (2016)	Platform businesses bring together producers and consumers in high-value exchanges. Their chief assets are information and interactions, which together are also the source of the value they create and their competitive advantage.
Zhu and Furr (2016)	Intermediaries that connect two or more distinct groups of users and enable their direct interaction.

Among these above definitions, over the last 10 years, under the demand-side perspective of the platform, the term platform has often become a part of the definition of a two-sided market. There is no clear definition regarding exactly what the term platform means. The comparison made in this stream is not the "platform vs. a nonplatform strategy" that appears to be the interest in the supply-based platform. This demand-side platform stream compares "two-sided platform strategy vs. one-sided platform strategy" (Economides and Katasamakas 2006). Therefore, the unit of analysis of platform based on demand-side synergy is not the platform or the core components of the platform architecture. The unit of analysis is the type of relationship (two-sided vs. one-sided) with customer groups and between customer groups.

Network effects in platforms

While the main motivation for platforms based on supply-side synergy is cost reduction and the main motivation for platforms based on demand-side synergy is revenue creation, there is a common and sometimes complicated phenomenon that is considered to be important in both demand and supply platforms—the network effects.

The origin of the network effect could be seen as being derived from the term "network externality". This term is an economic concept that is well defined by Katz and Shapiro (1985) as "products (products in economics include services) for which the utility that a user derives from

consumption of goods increases with the number of other agents consuming the goods". At that time, the term was used to constitute market failure. For instance, under Katz and Shapiro's oligopoly model, a dominant firm may choose to become incompatible to compete with its rival (Farrell and Saloner 1985).

Over the past three decades, scholars have identified different types of network effects. The definition used by Katz and Shapiro (1985) could be seen as a direct network effect. Typical examples are telephone users and Facebook users, where an increase in the number of telephone (Facebook) users will increase the value of the telephone (Facebook) for each of the individual users. This network effect does exist in both types of platforms, and it is so pervasive that it is not a defining characteristic for any type of platform. This type of network effect typically helps the firm with organic growth, where there is an intrinsic value for one user to introduce another user to join the network.

The second type of network effect is the cross-component network effect. It is also called the indirect network effect (Gawer, 2014). It is a situation where an increase in the number of users of an original product can stimulate the availability of complementary products; then, this increased availability will increase the value of the original product, and hence, more users are attracted (Economides and Salop 1992). This type of network effect, although not exclusive to supply-side platforms, is often considered to be a key feature, especially in the industry platform stream (Gawer and Cusumano, 2014). For example, the cross-component network effect could exist weakly between the iPhone and iPhone cases. When a new version of the iPhone is published, many firms in different industries (i.e., luxury and protection) publish a large number of different iPhone cases (with or without permission of Apple). There is an indirect network effect in which more iPhone users stimulate numbers and types of cases produced by complementary firms. These different cases with different functionalities increase the value of the iPhone for iPhone users. However, this does not make iPhone a supply-side platform for the cases. First, the value of iPhone depends on the cases in a very limited way, which contradicts the definition of Gawer and Henderson (2007), according to which the interdependency should be strong. Second, although the iPhone is a foundation based on which case makers could innovate, Apple did not intentionally manage or facilitate the inventions. Therefore, although indirect networks exist in both supply-side and demand-side platforms, this alone is not a sufficient condition for a company to become a platform.

The most discussed and impactful network effect to date is the two-sided network effect (Parker and Van Alstyne, 2005). It requires three parties in the relationship to exist: a platform provider, a group of customers and another distinct group of customers. A two-sided network effect exists when increasing the number of one group of customers increases the value of the network/product for the other group of customers, and vice versa. Moreover, as Economides and Katsamakas (2006) suggest, platform owners need to exploit this relationship to achieve a two-sided strategy by setting a price (positive or negative) for both customer groups. The Mac App Store, which was introduced on 16 January 2011 (Sorrel, 2010), illustrates a two-sided network effect. The Mac App Store monetizes from both software developers ($99/year membership fee (developer.apple.com, 2017)) and end users (membership fee is included in the cost of purchasing iMac) and treats both groups as customers. However, the previously discussed cross-component network effect between iMac end users and iMac complementors still exists because much useful and popular software on iMacs are sold directly from developer to end users (Gewirtz, 2015).

The difference between the two-sided network effect and the indirect network effect is that to nurture and utilize the two-sided network effect, the platform owner emphasizes making transactions between the two customer groups. Very often, there is a contract between the platform and the customer groups, which often does not exist in the indirect network effect, i.e., the iPhone case example. This contract, on the one hand, acts as a monetization method to allow the platform to extract profit from both customer groups; on the other hand, the contract makes the platform owner responsible to these customer groups. This responsibility can be in the form of consistency and stability of the platform (Altman and Trispas, 2015). As this responsibility does not exist between iPhone and case makers, Apple can change the shape and outer layout of iPhone in different generations without notifying these independent case makers. Thus, these case makers run the risk of producing unfit iPhone cases if they decide to produce before Apple's announcement of the next generation iPhone. When responsibility exists, as between Apple and App developers, Apple needs to ensure that previously made Apps should still function even if the next generation of iOS is implemented. If there is no fit between previous apps and the new iOS, Apple is responsible for providing the tools (i.e., Apple Beta Software (developer.apple.com, 2017)) to help developers adjust previous Apps or to make potential adjustments to iOS.

Benefits of being a platform

In becoming a platform, there are multiple consequences that act as an essential complementary asset. According to Thomas et al. (2014), through the logic of production and innovation, platforms can achieve economies of scale, economies of scope, economies of innovation, and complementarity. The main benefit of these four mechanisms is cost reduction in production and innovation processes. The cost reduction may come from activity cost reduction (Siddique and Repphun, 2001) or a reduction in development time (Siddique, 2001). Some other scholars have also discussed the benefit of flexibility, i.e., time to market and delayed assembly and the benefit of effectiveness, i.e., brand identity and positioning (Halman, Hofer and Vuuren, 2003). This kind of platform also facilitates product variety and mass customization (Simpson, 2004). Although higher variety and customization add value to customers, product platforms enhance this value via the quick and easy development of new products. Therefore, the starting point is still based on supply-side synergies. The analysis of the consequences of becoming a (within firm) product platform is applicable to platforms that are outside firms' boundaries. However, instead of lowering the cost of a product, platforms lower the costs of the whole system. As Gawer and Cusumano (2008) suggested, "Owners of industry platforms benefit from lots of innovation in complementary products as well as from competition at the overall system level that would bring its price down."

Different from the benefits of becoming a platform that utilizes supply-side synergies that are mostly cost related, the benefits of becoming a platform that utilizes demand-side synergies tend to be more related to creating value from the demand side, i.e., increasing customers' willingness to pay or increase revenue. For instance, Economides and Katasamakas (2006) argued that "a two-sided strategy, we have (found), as expected that if there are no costs of implementing the two-sided strategy, the platform firm is at least as well off implementing it, i.e., $V0 > 0$ since the one-sided strategy is a restriction of the two-sided strategy at $s = 0$.". Baden-Fuller et al. (2017) suggested that "in the case where the paying side brings benefits to the using side, we can say that value is unambiguously increased and the profit to the organizing platform-firm is always greater [than dyadic (one-sided) business model]" because a second paying group brings an extra revenue source to that platform firm. According to Van Alstyne et al. (2016), platform businesses have a competition advantage over product businesses: "When a platform enters the market of a pure pipeline business, the platform virtually always wins."

Dynamisms in becoming a platform

Dynamisms in becoming an industry platform

Thus far, I have considered the differences between supply- and demand-side platforms, seeking to add value by contrasting the two perspectives. I recognize that there is nothing fundamentally new within this section—yet it provides a very good basis for considering the dynamics of becoming a platform and showing that we have a real gap in platform literature.

The platform literature has developed a view on the processes for becoming a supply-side platform, and this view has been built without much regard for the wider literature on organizational change. This view can be summarized by Gawer and Cusumano (2014), who highlighted the key processes of platform emergence as a template in the industry platform literature stream. I will unpack this view, noting very briefly that it has a close parallel to the organizational change literature. I will then move on to consider what we know about the processes for creating a demand-side platform and highlight some important research gaps.

Figure 1-2-5: Key processes in becoming an industry platform (reproduced from Gawer and Cusumano, 2014)

1. Develop a vision of how a product, technology, or service could become an essential part of a larger business ecosystem
2. Build the right technical architecture and connectors
3. Build a coalition around the platform: share the vision and rally complementors into cocreating a vibrant ecosystem together
4. Evolve the platform while maintaining a central position and improving the ecosystem's vibrancy

Although the above processes are derived by Gawer and Cusumano (2014) from case analysis, the four processes actually echo the strategic management change process. Baden-Fuller and Stopford (1992) established four stages of the rejuvenation of mature businesses: galvanize, simplify, build and leverage. The galvanize stage requires a firm to establish a top management team to have a

broad understanding of the situation and long-term vision for the firm. The simplify stage requires the firm to have a focus on this business operation. This focus in the industry platform context, as suggested by Gawer and Cusumano (2014), is the technical architecture and the connectors. The build stage requires a firm to create new advantages for future development. Having a coalition with complementors is the most important advantage in an industry platform. Last, the leverage stage emphasizes the maintenance of the momentum, which is identical to the fourth process of the referenced template. Therefore, given their empirical relevance and theoretical grounding, the above four processes serve as an effective template to analyse platform emergence processes.

Dynamisms in becoming product platform

In the product platform literature stream, many efforts are made to identify the key processes to create a product platform. However, there is no aggregated or structured review of the processes. There is huge diversity regarding the types of platforms and processes of becoming platforms. For instance, there is a product platform, where core components are part of the finished product, and a process platform, which focuses on commonalities in production tools. Within the product platform, there is one approach that focuses on scaling variables of a product family (stretching or shrinking the product), and the other approach focuses on different configurations of a product family. This paper does not analyse in detail the difference between these different approaches; rather, this paper intends to identify some crucial processes that are shared in different approaches to platforms in the product family literature and to compare these processes with industry platforms.

In this section, I will use the template of Gawer and Cusumano (2014), who identified four key processes:

1. Vision for the platform,
2. Identification and creation of connectors,
3. Identification and development of coalitions,
4. Platform evolution.

I will compare and contrast each process and subprocess and add more subprocesses if these are not mentioned in Gawer and Cusumano (2014) but are discussed in the product platform literature.

1. Vision for the platform

The first theme is the need for a vision for the platform. Robertson and Ulrich (1998) emphasized the importance of platform planning. To achieve successful platform planning, the authors proposed three tools: a product plan, a differentiation plan and a commonality plan. The product plan requires companies to decide which customer segment or segments that this product family is going to target. This positioning of the product platform is consistent with the positioning of the platform in a larger business ecosystem (Gawer and Cusumano, 2014).

a. One important process according to Robertson and Ulrich (1998) is to make a trade-off between commonality and distinctiveness. Distinctiveness among different products increases product variety and could target different markets, while commonality in components is essential for reducing the cost of the overall product. Answering the trade-off question requires the firm to decide which components of the product architecture should stay as the stable core components and which components of the product architecture should stay as the flexible peripheral components. This stable core echoes the "platform potential" in Gawer and Cusumano (2014).
b. The product platform literature does not consider explicitly the involvement of 3rd-party complementors.
c. The logic of having a product platform is very supply oriented. Jiao, Simpson and Siddique (2007, p9) argued that "the original mindset of developing product families is to make wide variety of products available and letting customers "vote" on the shelf".[3]
d. Although not mentioned by Gawer and colleagues, creating a supply-side platform seems to be associated with high initial cost. In the product platform literature, scholars have found that the fixed cost of developing a product family could be huge. Ulrich and Eppinger (2000, p41) suggested that "platform development projects can take from 2 to 10 times as much time and money as derivative product development projects". Muffato (1999) noted that in the automobile industry, approximately 80% of the total vehicle development cost is spent on platform development—the stable core components of cars.

Note that the idea of a vision being a necessary component for organizational and technical transformation is a long-established theme in the management literature that dates back at least to

[3] Although more recently, scholars in the product platform literature stream have started to study more explicitly customers and customer demand and have tended to use customer related variables to determine optimal product platform development, according to Simpson (2004), more than 70% of the reviewed quantitative papers did not attempt to have demand-related variables.

the discussion of rejuvenation and change (Baden-Fuller and Stopford, 1984; Stopford and Baden-Fuller, 1994; Kotter, 1996).

2. Identification and creation of connectors (core components)

If the first process is about having a vision for the platform architecture and the core components, this second process is about the actual creation of the core components of the platform architecture. This idea also resonates with the established management literature that talks of the need to build competencies, capabilities and systems.

a. One way of helping companies solve the trade-off problem (between differentiation and commonality) is by understanding which components of the product could be easily influenced by external factors, as ascertained by using the generational variety index (GVI), and the degree to which change in one component will require changes made in other components, as ascertained by using the coupling index (CI) (Martin and Ishii, 2002). Companies should focus on standardizing the components that have a high GVI or CI to reduce the cost of future products. Companies need to not only select the core platform carefully but also develop standardized interfaces between the core and the peripheral components (Jiao, Simpson and Siddque, 2007)
b. The intellectual property of the core components is shared within the firm but not with complementors.
c. Some authors have suggested the possibility of entering new markets based on product platforms. Using the examples of Compaq and EMC, Meyer (1997) showed a beachhead strategy. The companies started with a particular line of products in a niche. Then, based on commonalities of the product platform architecture, these companies could achieve scaling vertically from the low-end market to the high-end market and leverage the commonalities horizontally to target a different segment.

3. Identification and development of coalitions

Compared to the previous two processes, this process of identification and development of coalitions is rarely discussed in the product platform literature. In the product platform literature, Jiao, Simpson and Siddque (2007) discussed cooperation with distributors and suppliers. However, they did not discuss explicitly the possibility of cooperation with complementors. However, of course, discussions of complementors are quite common in the wider management literature. In

the literature on the management of change, partners are regularly mentioned as key resources that help the process of adjustment.

a. The concept of a business model is not the focus of a product platform. Even in the discussion about a beachhead strategy (Meyer, 1997), the concern is still very supply oriented. In contrast, the business model literature tries to unpack questions from both demand and supply perspectives (Massa, Tucci and Afuah, 2017) and answer more broad questions; Who are the customers? How can value be created? How can value be delivered? How can value be captured? (Baden-Fuller and Haefligher, 2013).
b. In most cases, companies with product platforms do not need to externally evangelize the technical architecture. However, as discussed in the first process, there is an internal vision regarding the product architecture.
c. Since complementors are not involved in product platforms, there is no risk sharing. However, internally, risks are shared among core components and peripheral components because the firm owns both.

d. and e. Since the product platform literature is not concerned about ecosystems, there is no process of gaining legitimacy and developing a collective identity with ecosystem members. However, internally, the core components of the product architecture are not determined a priori (Jiao, Simpson and Siddque, 2007). There is a process for which the component becomes the core component, as discussed in the second process.

4. Platform evolution

Once again, the idea of continual improvement is a core theme in the management literature.

a. A major difference between product platforms and industry platforms exists here. The objective of the industry platform leader is to ensure its role as an essential function of the overall system so that the owner can generate revenue from the platform. Continuous innovation, as suggested by Gawer and Cusumano (2014), is one key method to achieve this objective. However, according to Simpson (2004, p9), the objectives of the product platform assume that "1. maximizing each product's performance maximizes its demand, 2. maximizing commonality among products minimizes production costs, and 3. resolving the trade-off between assumptions 1 and 2 yields the most profitable product family." In the product platform literature stream, revenue generation is the task of the whole product architecture, not the platform part of the product architecture. The objective of the platform

part is to reduce the production cost. The notion of resolving the trade-off could be helpful in the industry platform literature stream. Currently, scholars have discussed that an industry platform is the foundation upon which complementors could innovate and have also discussed the importance of unifying the whole ecosystem and creating a shared vision. The potential conflict of interest between the platform and the ecosystem is rarely discussed.

b. Long-term investments are necessary in product platform development. According to Robertson and Ulrich (1998), a product platform plan will determine products launched in the next 5-10 years. However, these long-term investments may not be related to coordination activities.

Mapping key processes in the product platform literature to the template of Gawer and Cusumano (2014), the above analysis suggests a strong similarity in the first and second key processes between the product platform literature stream and the industry platform literature stream. Both of the literature streams strongly emphasize the identification and creation of platform/core components and the standardization of interfaces. The difference, as discussed by Gawer and Cusumano (2014), is that the industry platform requires the platform owner to cooperate with complementors. This is highlighted in the third and fourth processes. Analysing the fourth process also helps to identify that in the product platform literature, profit comes from finding a trade-off between the revenue generated by the product architecture and the cost reduced by utilizing platforms. This profit source is different from that in the industry platform, where the value is only on maintaining the significance of the platform itself.

Dynamisms in becoming a demand-side platform

Different from the industry platform literature and product platform literature, where scholars have already summarized key processes to become platforms, the literature on platforms based on demand-side synergy is still relatively new. More importantly, as pointed out by Gawer (2014), most economists study platforms as given. A very limited number of articles have attempted to discuss the emergence of demand-side platforms. I have reviewed six influential articles that attempted to describe the process of platform emergence from different perspectives.[4]

[4] Three of the articles (Malone, Yates and Benjamin, 1989; Zhu and Furr, 2016; and Van Alstyne, Parker Choudary, 2016) are

Before going into the details of these articles, I want to highlight that the existing perspectives of the management literature may need adjustment when we consider the demand side. To create a demand-side platform, it is not just the firm that has to change but also the customers. Arguably, the management of change literature has rarely if ever dealt head on with customer change; in general, it is dealt with peripherally.

Returning to the six articles, I note that some of the processes are fairly generic and were emphasized previously in the strategic management literature. For example, additional benefits are needed to attract customers to use to the platform (Zhu and Furr, 2016; Malone et al., 1989); technological enablers are required to link different customer groups (Malone et al., 1989) and create competitive barriers through exclusive contracts or by setting up standards (Zhu and Furr, 2016).

When mapping the processes identified from these six articles to the template of Gawer and Cusumano (2014), as expected, the difference is much larger than the difference between the emergence of industry platforms and that of product platforms. First, the demand-side platform literature stream does not discuss developing a vision for the platform or the identification and development of "connectors". Hence, the first and second key processes that are important in both industry platforms and product platforms are missing from the demand-side platform literature.

However, there is a high consistency regarding the third process: development of coalitions. The difference is that while the industry platform literature studies developing coalitions with complementors, the demand-side platform literature extends the boundary of coalitions. For instance, Zhu and Furr (2016) suggested that platform firms should involve users in the creation and improvement of the platform. Moreover, Eaton et al. (2015) discussed the cocreation of boundary resources via action, reaction and negotiation between the platform owner and different customer groups and third-party organizations. These boundary resources help to determine what

from a practitioner-orientated journal (Harvard Business Review), one information system article by Eaton, Ben, Elaluf-Calderwood, Silvia, Sorensen, Carsten and Yoo, Youngjin (2015) was published at the MIS Quaterly, one economics article by Hagiu and Wright (2015) was published at the International Journal of Industrial Organization, and one article by Altman and Trispsas (2015) that emphasizes identity was published as a book Chapter at The Oxford Handbook of Creativity, Innovation, and Entrepreneurship

and how transactions are allowed and processed. Malone et al. (1989) also touched on the legitimacy issue, arguing that the match-making platform should not be obviously biased towards the platform owner who at the same time has competitive offerings to other sellers on the platform.

There are also similarities between the demand-side platform and the fourth process in Gawer and Cusumano (2014), which is about coordination and being a valuable platform for the system. However, the demand-side platform literature extends the boundary of members that need to be coordinated and players of the system to include different groups of customers. For instance, Van Alstyne et al. (2016) noted a shift from a customer value focus to an ecosystem value focus. The most important process is to persuade participants (including different customer groups and complementors) to join the platform (Van Alstyne et al., 2016; Malone et al., 1989; Altman and Trispas 2015). The key step after persuading the participants is to facilitate transactions between different groups of participants to create the two-sided network effect. Another extension of the process of platform evolution is that the demand-side platform literature discusses the importance of consistency more explicitly. Zhu and Furr (2016) noted that new offerings should be consistent with existing platform brands, while Altman and Trispas (2016) noted that platforms should be more discipline focused than innovativeness focused to maintain stability and consistency for participants.

Some processes that are highlighted in demand-side platforms are not emphasized in previous supply-side platform literature streams. Cognitive change is often mentioned as one key process. For instance, Zhu and Furr (2016) showed that Valve recognized the two-sided platform opportunity only after hackers distributed unauthorized modifications to players. Similarly, Eton et al. (2016) showed that according to Apple's plan, the iOS app market should not have existed. Apple realized the profitable two-sided platform opportunity only after the recognition of the demand for "jail-break" service. It seems that the cognitive change to recognize the two-sided platform potential often requires an external trigger. According to Van Alstyne et al. (2016), firms also need to change their cognition regarding what assets are, as "with platforms, the assets that are hard to copy are the community and the resources its members own and contribute". In this argument, the most valuable assets in a platform are no longer owned by the firm, which contradicts the traditional conceptualization of assets. Altman and Trispas (2016) suggested that firms that do not consider independence and self-reliance and firms that have a past alliance history may

overcome more easily the identity and cognitive crisis of moving from a single-sided firm to a two-sided platform.

The other emphasized process in the demand-side platform literature is about having a realistic understanding of customer characteristics. For instance, multisided platforms are preferred over a single-sided platform when there are high variations in customer demand, participants consider private information to be important, buyer-customer groups have a good understanding of offerings of the seller-customer group (Hagiu and Wright, 2015), customers appreciate multiple choices, and when customers can make choices based on a quantifiable information database (Malone et al., 1989).

Using Figures 1-2-6 below, I compare and contrast the key processes of platform emergence in the industry platform, product platform, and demand-side platform literature streams.

Figure 1-2-6: Comparison of Key processes

Key Change Processes	Industry Platform	Product Platform	Demand-side Platform
Vision of the platform to fit the ecosystem	√	√But not involving 3rd party firms	×No discussion
Development of technical architecture and connectors	√	√ But not involving 3rd party firms	×No discussion
Build coalition around the platform with complementors	√	×No coalition with complementors	√Extend the coalition to include different customer groups
Platform evolvement	√	√/× Different objective but seeks long term investment	√Similar objective, emphasis on consistency

Table 5 shows that the main difference between the key processes of becoming an industry platform and a product platform is the interaction with 3rd-party complementors. Because the industry platform tries to support and cooperate with the complementors, it shares more similarity (process 3 and 4) with the demand-side platform than with the product platform. In addition, in the review of demand-side platforms, two other issues are frequently mentioned that seem to be more unique to demand-side platforms: cognitive change management and understanding of customer groups. Although these two issues seem to be pervasive, they were rarely emphasized as much as in the demand-side platform literature stream.

One extremely important issue that arises through the above analysis and Table 5 is that the role of having a vision by the platform owner for the platform is not discussed directly in the demand-side platform literature. Given the importance of vision in change management, I start to question whether some special condition in the context of demand-side platforms reduced the importance of vision. For the inspiration of ideas, I could provide one speculative and plausible explanation, but the question of the role of vision in demand-side platforms remains a gap in the literature.

In the traditional supply-side platform literature, vision is something held by the platform owner. Most changes are designed and implemented by the firm and initiated by top management as a deliberate strategy (Mintzberg and Waters, 1985). Even in situations where the new strategy is emergent, it seems that the strategy emerges within the firm and is later ratified or recognized by the top management. However, in the demand-side platform, because of the dynamics in customer groups and the centrality of customers as the most valuable resources, as customers represent resources that are not fully controlled by the firm (Van Alstyne et al., 2016), it is difficult for the firm to have a clear vision as a priori.

One classic example is how Apple managed to create a demand-side platform via the establishment of the iOS App store. As described in detail by Eaton et al. (2015), 6 months before the launch of the iPhone in 2007, Steve Jobs declared that he had no intention to allow third-party developers to create Apps on the iPhone. Just prior to the release, Apple allowed third-party developers who use HTML5 technology to create web-based apps. Approximately one year after the resale, the iOS Apple store was established, and developer tool kits (SDK) were created and distributed by Apple.

This process of creating a demand-side platform shows that Apple or Jobs did not have the vision of a demand-side platform before or when releasing the iPhone. Most likely, the developers had a better and clearer vision than Apple in the early stage regarding the value of enabling transactions between third-party developers and iPhone users. The case discussed by Eaton et al. (2015) has much more detail regarding continuous action, reaction and negotiation between Apple and different parties. Although their paper focused on the cocreation of boundary resources, e.g., how Apps should be distributed and what Apps should be allowed, it also shows the cocreation of vision for the platform. Similar examples exist in other firms' transition, i.e., Valve and Lego Mindstorm (Zhu and Furr, 2016), where the actions of external parties helped the formation of a new vision. In these cases, before the transition of a business to create or become a demand-side platform, the "correct vision" is held by external parties who are often one group of the customers of the platform ex post. This customer group engages with the platform owner to share and change its vision. Therefore, it might be common in demand-side platforms that ex ante, the platform owner does not have a vision of becoming a platform. Nonetheless, this is only a plausible explanation that I offer in an attempt to answer the gap of the missing vision. This important research question remains important but unanswered.

Research Question 1: What is the role of managerial vision and the vision of potential customer groups in developing demand-side platforms?

Related to the difficulty of having an a priori vision of the platform, managers might be required to perform effectuation reasoning instead of causation reasoning (Sarasvathy, 2001). The effectuation reasoning is highly related to the cognitive change process that is identified to be related to the demand-side platform emergence process. As described, the external uncontrollable events or actions of external parties often play a key role in triggering the change process of becoming a demand-side platform. If the manager has a strong vision for the product while not receiving the external signals or lacking an effectuation reasoning ability, the manager might miss the opportunity to lead the firm to become a demand-side platform. Effectuation might help managers overcome cognitive barriers. This argument for the importance of effectuation has been discussed previously in the strategic management literature; however, I want to emphasize the importance of effectuation, especially in the context of transforming to a demand-side platform. Customer groups

are the most valuable assets of platforms and have the greatest uncertainty because firms do not own or control these assets.

Research Question 1b: How could effectuation interact with the process of creating/becoming a demand-side platform?

Naturally, the second gap in the platform literature is why the demand-side platform literature has not discussed connectors and technical architects. I do not have a reasonable and very sound explication for this question. This could be because of issues with the method of creating connectors for complementors; i.e., open API is not effective when applied to the end-user customer group. In addition, the degree to which the platform uses state-of-the-art technology may be a less important factor in determining the success of the platform, as demonstrated by the QWERT keyboard's victory (David, 1985). This could also be because some of the connectors connecting different customer groups are not created or owned by the platform. Customers themselves might create connectors with negotiate with each other outside the firm's boundary.

Research Question 2: How are connectors made on demand-side platforms, especially those between customer groups?

Chapter 2: How open is openness?

Introduction

Openness as a construct runs through many streams of the management literature, and, for at least one stream of that literature – the discussion of platforms – it is a central construct. However, when reading articles that use the construct of openness in both the platform openness literature and the general management literature, it is surprising how few seem to reference the foundations of the concept that is being leveraged. This article shows that there is no single foundation of the openness concept; rather, it identifies the different foundations that exist and how they are used in many different aspects of management. It also leverages the differences among those foundations to generate ideas about how openness might be considered going forward.

My most important finding is that there are two distinctive yet not mutually exclusive perspectives and associated foundations in the openness construct. One perspective is *outward openness*, which has its foundation in open systems or system theory (Bertalanffy, 1950; Miller, 1978; and Scott, 1981). The term *outward* is used to capture the emphasis on the existence of a boundary to separate the entity or the inner environment from others or the outer environment and that key information and resources exist in the outer environment. Once there is a boundary, there can be exchanges between the inner and the outer because key resources are assumed to exist in the outer environment. Such an exchange means outflow and inflow. Articles on openness that use terms such as transparency and inclusiveness address such outflow and inflow, respectively. The other perspective is *inward openness*, which is rooted in an open society (Popper, 1945; Armbruster and Gebert 2002; and Bunge 1996). The term *inward* is used to capture the emphasis on the internal members of an open entity; the existence or nonexistence of an outer environment is not important. It is assumed that key knowledge or resources are distributed among the members of the open entity and emphasises whether members think the current rules can be challenged. Openness articles that invoke terms such as open-ended and indeterministic are often used to describe *inward openness*.

Second, with both openness perspectives, it is important to understand that openness exists on a continuum formed by extreme closure at one end and extreme openness at the other. Complete openness may not exist in outward openness because it would demolish the boundary between inner and outer. Complete openness would also not exist in the context of inward openness because

a predefined procedure is necessary for openness to exist. Therefore, in all cases, a certain degree of openness implies a certain degree of closure.

Third, I discover that the term openness as it is used in the literature varies with regard to "persistency". I define persistency in two dimensions: a time dimension that describes how long an openness rule or policy will last, and a space dimension that describes the breadth of the applicability of the openness rule or policy. The distinction between these two dimensions is important because low persistency openness is more likely to be nurtured and trained so that organizations can manipulate it as a means to a preferred end.

Last, I summarize and present the cross-level interaction of openness at the individual, team, organizational and societal levels. The analysis of cross-level interaction is important because openness at one level may or may not lead to openness at another level. Moreover, factors that can induce openness at one level may result in closure at another (Nambisan, Wright and Feldman 2019). This presentation can inform both researchers and policy-makers with regard to the complexity of openness.

This paper will proceed with a brief introduction to the methodology used in the review article selection. Then, I will show how the articles are categorized into streams and levels, and I will describe 11 identified research streams in terms of their features, key findings and new insights into openness. By carefully analysing these streams, I will present my findings concerning perspectives on openness, persistency, and cross-level interaction. In the discussion section, I will discuss the implications of the article's findings for the organizational management research.

Literature Review

Article Selection

To obtain a diverse and adequate number of articles that used the term openness, I searched for openness in abstracts, keywords and titles in 15 top management journals via the Scopus database. The 15 journals were selected based on the Academic Journal Guide (Chartered Association of Business Schools, 2020). It included all Rank 4 journals in the general management field. AMP was included for its practitioner orientation. Representative high ranking journals in the field of strategy, organization studies and innovation were also included. The search resulted in 148 articles. I read through all of them and considered levels of analysis, meaning of openness, unit of openness (what is opened), key findings, possible stream, setting, year and other notes that I thought might be relevant to this review. Out of the 148 identified articles, 18 used openness as a very generic term, openness was not important to the article, and it was not well explained. Therefore, I included only 130 articles in my review. The list of journals and the number of articles reviewed are listed in Figure 2-1 below.

Figure 2-1: Article sources and selection

Journal	Number of articles included openness	Number of articles included in the review
Academy of Management Annuals (AMA)	1	1
Academy of Management Journals (AMJ)	7	7
Academy of Management Perspective (AMP)	1	1
Academy of Management Reviews (AMR)	3	2
Administrative Science Quarterly (ASQ)	20	12
British Journal of Management (BJOM)	3	2
Business Ethics Quarterly (BEQ)	5	4

Journal	Number of articles included openness	Number of articles included in the review
Human Relations (HR)	17	16
Journal of Management (JOM)	13	13
Journal of Management Studies (JMS)	3	3
Organization Science	6	4
Organization Studies	14	11
Research Policy (RP)	43	42
Strategic Management Journal (SMJ)	12	12

Note: Articles on ASQ were not included in the Scopus database. Thus, a search for ASQ was performed separately on the publishing website. Additionally, in using the keyword "openness", the website allowed "open" as an alternative for openness, creating a relatively large difference between the articles that were found and the articles that were reviewed. Open is more likely to be used as a generic term than openness.

These 130 reviewed articles are not a complete set of all articles that discussed openness. The above search method filtered out articles that did not use "openness" in the abstract, title or keywords but discussed "openness" in the discussion or analysis. However, these 130 reviewed articles present openness as important, and, given the diversity in their usage of the openness construct, I think they are sufficient sources upon which arguments can be formed.

Article categorization and description

A key step to uncovering how different scholars have thought about openness in different ways in different contexts is categorization. A categorized list of articles can facilitate a more systematic understanding of the literature.

Through my initial reading, I assigned each article to one of four levels of analysis: 1. Individual 2.Group 3.Organizational 4.Societal. The societal level includes sectorial, national and international levels. My initial reading also revealed that within the same article, openness can appear across levels and units of analysis. For example, Premeaux and Bedeian (2003) assessed the impact of TMT openness on employee speaking-up behaviour so that openness was assessed for both TMT and employees. Gupta and Briscoe (2019) assessed organizational openness by studying organizational members' political ideology so that openness is assessed for both the organization and the members of the organization. In these complex situations, I define the level of analysis of the article according to my perception of what is important for the author. In Premeaux and Bedeian (2003), the authors are more interested in TMT openness and its impact on employee behaviour; thus, I categorize it at the group level. In Gupta and Briscoe (2019), the authors seem to be interested in the impact of organizational openness (measured by individual political ideology) on the organization's response to social movements; thus, I categorize it at the organizational level, not at the individual level.

After categorizing the levels of analysis, during an iterative reading phase, I began to establish research streams. A research stream is defined as a series of related papers on one topic. They are likely to have similar research subjects, contexts and units of analysis. I started with many research streams and reduced them to 11 streams at the end of iterative reading. These streams are 1. Personality trait, 2. Self-expression, 3. Top management team openness, 4. Open network structure, 5. Open innovation, 6. Open strategy, 7. Open government, 8. Academia, 9. Other organization studies, 10. Standard, and 11. Economics It is not always clear to which stream an article belongs. Many articles do not treat openness as an essential construct and thus offer limited or no definition of the term. In the cases where the meaning of openness is unclear, I rely on my personal judgement to determine the meaning of openness. When there is strong doubt regarding the meaning or the importance of openness, I exclude the article. This is why the total number of articles reviewed was reduced from 148 to 130. Figure 2-2 below summarizes the result of the categorization process.

Figure 2-2: Categorization of articles

Level of analysis	No. of articles	What is openness?	Research streams
Individual Level	42	1. The degree to which an individual is willing to being inclusive of new perspectives based on cognition or personality. 2. The degree to which an individual is willing to share personal information with others.	1.Personality trait 2.Self-expression
Group Level	12	1. The degree to which the TMT is perceived by subordinates to be interested in those subordinates' opinions. 2. The degree to which subordinates are willing to share their opinions due to the perceived openness of the TMT.	3.Top management openness
Organization Level	57	1. The degree to which an organization is willing to provide access to and forfeit control over their private information. 2. The degree to which an organization is willing to account for diverse information and opinions when making decisions. 3. The degree to which rules and predetermined processes cannot be changed.	4. Social network 5. Innovation 6. Open strategy 7. Open government 8. Open research 9. Other organizational studies
Societal Level	19	1. The degree to which a country/industry relies on trading with other countries. 2. The degree of flexibility and boundarylessness and level of abstraction.	10. Standard 11. Economics

As shown in Figure 2-2, approximately half of the articles included in the review were at the organizational level. Another major area is at the individual level, which is mostly attributed to the study of personality. A specific personality trait, openness to experience, is well defined and studied in management research. In the following paragraphs, I will guide you through each of the research streams to show, in chronological order, what is written about openness in that stream, the key features and other distinctive features.

Individual level

Within the 42 articles that consider openness at the individual level, I identified two distinctive research streams. One addresses personality traits, which are rooted in personality studies. This stream is openness-related because one of the Big Five personality traits is "openness to experience". Management scholars have mainly focused on the impact of this trait on other management constructs. In this stream, the definition and measurement of openness to experience is well defined and agreed upon. The other research stream is "self-expression", which emphasizes individuals' sharing their private information with others. In this stream, researchers are from different backgrounds and emphasize different aspects of the sharing of private information. The key feature that distinguishes a personality trait and self-expression is that the former is a cognitive level construct (what people think) that emphasizes cognitive traits and the ability to absorb new information, whereas the latter is a behaviour-level construct (what people do) that emphasizes the choice and behaviour in the process of information sharing. Within stream 1, I also created a subcategory; stream 1.1, "individual cognition". These articles study a type of openness that is similar to openness to experience but not from a personality trait perspective, i.e., openness to interpersonal influence (Friedkin, 2011) and openness to culture (Levy, Lee, Jones and Peiperl 2019). Therefore, I created a moderate separation between them and the personality trait stream, which exclusively studies openness to experience. Key concepts and representative articles are demonstrated in Figure 2-3 below.

Figure 2-3: Key features of individual-level openness

Stream	Representative definition	Key characteristics	Key findings
1. Personality trait	"Openness is a fundamental dimension of personality that reflects the tendency to be broad-minded and intellectually flexible" (Grant and Patil, 2012).	1. Exogenous - openness to experience is taken for granted. 2. Coherent measurement. 3. Static - openness to experience never or hardly changes.	High openness to experience leads to higher intelligence measurement (Furnham, 2005); job switching (Woo et al., 2016); persistency in self-employment (Patel and Thacher, 2014); and CEO change initiatives (Hermann and Nadkarni, 2014).
2 Self-expression	"Mental nudist" and "Expressive maintenance" (Kaplan, 1978). "…the ground for interaction depends on the extent of mutual understanding, which depends in turn on the quality of attention and the will to openness and honesty" (Berger, 1996).	1. Endogenous - scholars study the foundations of openness regarding self-expression. 2. Lack of detailed and specific definition. 3. Dynamic - these types of openness can change over time due to circumstances.	Kaplan (1978) found two conditions for openness to occur: 1. An explicit psychological contract that such openness is the preferred way. 2. A symmetrical relationship between members caused by a noncompetition ideology. Being transparent to other parties in conflicts of interest is an effective strategy to improve outcomes for both parties (Berger 1996; McGinn and Kenos, 2002; Wiedner and Mantere, 2018).

Stream 1: Personality trait

The research on personality, especially the Big Five personality dimensions (John & Srivastava, 1999), has been greatly infused into management research. Nineteen articles in this review focused on an individual's openness to experience, which is one of the Big Five personality traits. Perhaps because the construct is extensively discussed before being applied to management, openness to experience is probably the most well-defined openness variable compared to other literature streams. Authors seem to have a consensus on the definition, i.e., "Openness is a fundamental dimension of personality that reflects the tendency to be broad-minded and intellectually flexible" (Grant and Patil, 2012); "a trait that describes whether people are imaginative, artistic, and broad-minded" (McFerran, Aqulno, and Duffy 2010); "at its heart, is about individuals' willingness to entertain new ideas rather than their fluency in shaping an idea" (Harrison and Wagner, 2016).

Most of the articles use openness to experience to explain other individual-level variances. For example, Furnham (2005) reported that openness to experience is positively related to various intelligence measurements, such as EQ and IQ. McFerran et al. (2010) reported that people with high openness to experience are more likely to have a "principled ethical ideology" rather than an "expedient ethical ideology". Moreover, openness to experience has an impact on an individual's behaviour or performance, for example, in the persistency to self-employment (Patel and Thatcher, 2014), the "propensity to quit jobs for the sake of novelty that comes with a change" (Woo, Chae, Jebb and Kim, 2016), or in generating new product ideas (Stock, Von Hippel and Gillert, 2016).

Two articles aggregated individual openness to experience within a team. Grant and Patil (2012) mentioned that "[w]hen a challenger attempts to advocate helping norms, work units composed of primarily open members are likely to show considerable elasticity with respect to reconsidering and reformulating a norm". Similarly, Homan, Hollenbeck, Humphrey, Knippenberg, Ilgen and Van Kleef (2008) reported that "teams with higher levels of openness to experience are more open to diversity than teams with lower levels of openness to experience". This indicates that openness at the individual level has an impact on the group level.

Herrmann and Nadkarni (2014) assessed 120 Ecoador SME CEOs and reported that CEOs with higher openness to experience positively influence the initiation of change initiatives. This connects individual-level openness to organizational-level outcomes. Harrison, Thurgood, Boivie

and Pfarrer (2019) found a moderation effect and claimed that "firm performance negatively moderates the positive relationship between CEO openness and strategic change".

The paper by Marcati, Guido, and Peluso (2008) is outstanding because it makes a connection between two types of individual-level openness: openness to experience and openness to newness (a cognitive style measured by Kirton based on his Adaption–Innovation Inventory). They reported a moderate positive relationship (correlation=0.4) between the two variables.

Although scholars have used openness experience to evaluate different variables at different levels, one common aspect is that management scholars have used it as an exogenous variable to investigate the impact of this personality trait. Therefore, in empirical studies, this variable tends to be an independent variable.

Perhaps because of the long establishment of the variable in the psychology research, most management scholars have adopted the "Revised Neo Personality Inventory" (Costa and McCrae, 1992) to measure openness to experience, e.g., Furham (2005) and Homan et al. (2008). Woo et al. (2016) used a more recent measurement, the Hogan Personality Inventory (Hogan and Hogan, 2007). Only in the more recent articles have management scholars started to apply self-developed measurements to assess individual openness to experience, e.g., Hasan and Koning (2019) and Harrison et al. (2019).

The other similarity among the usage of openness to experience is its sensitivity to time. All papers seem to assume that this individual variable is fixed per person. The focused variation of openness to experience exists among people, not across time. Therefore, openness to experience is very static.

It is also clear that the focus on openness to experience is on the inflow of information from outside (i.e., other people's experience) to the inside (the individual). According to definitions, the higher the degree of openness, the better the individual is able to absorb external diverse and different opinions, i.e., being open-minded.

Stream 1.1: Individual cognition

There are few more articles that, on the one hand, did not refer to openness to experience but, on the other hand, studied constructs that are very similar to openness to experience. It could also be said that while openness to experience captures an individual's generic openness to one's environment, the following usage of openness captures some specific openness aspects. The authors tend to assume that openness is well understood by readers, and they rarely provide an explicit definition.

Edwards (1984) used the concept of "openness to exploration of self-expression and intimacy through touch". Friedkin (2011) used the concept of "openness to interpersonal influence" to capture the likelihood of an individual being influenced by appraisals of other people in a group. Hoyer and Steyaert (2015) introduced "identity openness" using openness as an alternative word for ambiguity and/or complexity to capture workers' coping strategies during work transitions and the associated identity shifts. Rhodes and Carlsen (2018) used openness to recommend a reflexive writing style. The authors argued that "[s]uch teaching involves a radical openness to other people's difference such that knowledge arises from being affected by those others rather than claiming to know them in any categorical sense".

Two more concepts that are slightly better defined are openness to change and openness to other cultures. Datta, Rajagopalan and Zhang (2003) measured and tested CEO openness to change. However, there is no definition of CEO openness to change, and the measurement was a proxy consisting of three variables: age, education and tenure. Groves (2005) studied followers' openness to organizational change, which captures employees' willingness to accept an alternative future that is different from that of the status quo. The measurement of openness is adopted from the scale developed by Miller, Johnson, and Grau (1994).

The literature on openness to other cultures mainly comes from the cosmopolitan literature. Levy, Lee, Jones and Peiperl (2019) argue that high openness to other cultures is a necessary condition for cosmopolitans. In an anthropological study of transitional professionals, Skovgaard-Smith and Poulfelt (2018) found that professionals "defin[e] themselves as open . . . [and] establish a dual sense of commonality in difference by downplaying national affiliations and cultural differences through mutual social efforts of 'neutralizing' and being flexible while also marking national identity categories and 'cultural features' to maintain them as objects of celebration and embrace".

Nonetheless, what is similar in the reviewed articles between openness to experience and the above type of openness is that they all treat the variable as exogenous and vary across people but not across time. There is practically no discussion regarding why such individuals are open; they are just assumed to be naturally open. The emphasis of information flow is from outside-in.

Stream 2: Self-expression

Although the articles in this self-expression stream vary in their measurement, context and exact meaning of openness (most of them do not provide a definition for openness or openness), one similarity leads me to think it is reasonable to group them together: they all focus on the process of revealing private information to other people. Private information varies from secrets to feelings and experiences, and "other people" vary from neighbours to coworkers and even strangers. However, all the articles consider openness to be a dynamic process instead of a static trait. The information flow is from the individual to other people, which is the opposite of stream 1.

Horwitz, Glass, Ginger and Cohn (1966) is one of the earliest papers in my review. Their article considers whether explanations of the motivation for frustration acts could reduce the impact of such acts. Thus, in this article, openness is about A explaining to B why A did what A just did. In this case, openness becomes a process of explanation. Kaplan (1978) examined a Wisconsin farm that is famous for its openness culture. He explained openness as involving the individual's disclosing that which is true to themselves, without concern regarding the opinions of other people. This type of openness is also framed as that of a "mental nudist" or "expressive maintenance". In that article, the author identified some of the boundary conditions that allowed such openness to exist: 1. An explicit psychological contract that such openness is the preferred way. 2. A symmetrical relationship between members caused by a noncompetition ideology.

Scholars have also found that when two individuals are in competition, openness might be a preferred negotiation strategy. In his theoretical article, Berger (1996) suggested the importance of providing open information to the other party in an economic interaction. He thinks that the more an individual is able to inform his counter party about his situation, the better the counter party will be able to understand the situation. If mutual understanding can be formed, this understanding

can benefit transactions between the two parties. McGinn and Keros (2002) used an experimental method to manipulate negotiations between two parties. They found that one of the most effective methods that can be adopted by two negotiators is "opening up improvisation", which means full and mutual disclosure of private information regarding a trade. They also found that this opening up strategy is often used in embedded transactions, which means that the two parties have a prior relationship before the trade or that the communication method is face-to-face instead of by email or telephone. An embedded context allows each party to trust the other party and assume the other party is providing honest information. Wiedner and Mantere (2018) also reported on the importance of open communication in the context of NHS spin off, and they found that employees who are willing to be straightforward and disclose relevant information can facilitate appraisal respect and recognition respect.

Unlike openness to experience, which is treated as an exogenous variable, openness in this stream is endogenous. It is a decision made by an individual to be open fully or selectively. As a result, as shown above, researchers are interested in both the consequences of being open and the condition under which people can become open. In a review article, Mantovani (1994) discussed whether the usage of modern communication technology, i.e., email could cause subordinates or marginal employees to be more open. The argument is that email removes the audience during a conversation so that low-power individuals experience less pressure and are less careful in their language choices. This allows them to communicate by email more openly or freely. Viewing openness as freedom echoes Kaplan (1978) but comes from very different mechanisms and conditions. The degree to which an individual is open varies across time and can be manipulated by contextual variables.

One outstanding article at the individual level is Van de Men, Bechara and Sun (2019). In their discussion on openness to conflict, they captured the individual's willingness to both share and listen to conflicting opinions. It is the only empirical article at the individual level in my review that captured both information inflow - listening to others - and outflow - sharing with others. They found that openness to the conflicts of the powerful party with an empowerment approach can lead to dialectical learning.

Group level

I identified 12 articles that studied group-level openness. The majority of these articles considered a top management team (TMT) context. Therefore, I identified only 1 research stream at this level and labelled it "TMT openness". The key distinguishing feature between group-level openness and individual-level openness is not simply the shift in the unit and level of analysis but also how openness is conceptualized. In individual openness, the inflow and outflow of information are found to be two distinctive and mostly unrelated mechanisms for openness. However, at the group level, scholars have begun to make connections between the inflow and outflow of information. That is, when management expresses interest in employee issues (information outflow), employees are more likely to bring these issues to management (information outflow), and thus management is more likely to be informed about employee issues (information inflow). Therefore, in the TMT setting, openness concerns both information inflow and outflow and the interaction between TMT and employees. Figure 4 below summarizes the key features and definitions of TMT openness. The "what's new" column summarizes new concepts about openness in the current literature stream that have not been discussed by previous streams.

Figure 2-4: Key features of group-level openness

Stream	Representative definition	Key characteristics	Key finding	What's new?
3. TMT openness	"TMT's propensity to tolerate, encourage, and engage in open, frank expression of views" (Amason and Sapienza, 1997). "Subordinates' perceptions that their boss listens to them, is interested in their ideas, gives fair consideration to the ideas presented, and at least sometimes takes	1. Endogenous openness is considered to be a management choice in general, not a fixed characteristic. 2. Forming consensus on the importance of employee perception. 3. Dynamics are not discussed but are	TMT openness can positively influence 1. employees' taking charge (Morrison and Phelps, 1999), 2. female employees bringing up gender-related issues (Dutton et al., 2002), 3. employees speaking up (Premeaux and Bedeian, 2003).	1. Shift from openness characteristic of the focal entity to perceived openness. 2. Coexistence and interaction between inflow openness and

Stream	Representative definition	Key characteristics	Key finding	What's new?
	action to address the matter raised" (Detert and Burris, 2007).	assumed to be changeable.		outflow openness.

Stream 3: TMT openness

The most frequently studied context for group-level openness is top management teams (TMTs), especially the question of what information a TMT would consider when they are making decisions. Schermerhor (1976) is the first article in my review that studied TMT openness. It studies TMT openness to interhospital cooperation, which is defined as "the degree of willingness of [an] administrator to consider activities involving interhospital cooperation as a legitimate and important hospital operating goal".

Later, in the 1990s, scholars treated management openness as a more generic variable that captures how inclusive the TMT is when gathering information to facilitate decision-making. Roth (1992) argued for the openness of decision-making and that it "occurs when multiple individuals or preferences are incorporated in the decision process". Amason and Amason and Sapienza (1997) defined TMT openness as "TMT's propensity to tolerate, encourage, and engage in open, frank expression of views".

Scholars soon realized that openness of one group could be better assessed from the perspective of the recipients of such openness. In the context of TMT openness, the obvious recipients of TMT openness are subordinates or employees. Scholars quickly realized that the perception of TMT openness in the eyes of subordinates is probably as important or more important than the openness characteristic of the TMT. Thus, different from the individual level, for which scholars developed measurements for the "actual" openness of individuals, scholars at the group level view openness as the "perceived" openness of the group.

Following this change of thinking, Morrison and Phelps (1999) defined TMT openness as "the degree to which top management is believed to encourage and support suggestions and change initiatives from below". Dutton, Ashford, Lawrence and Miner-Rubino (2002) suggested that the TMT's willingness to listen signals its openness to sensitive issues and thus encourages employees to report such issues to their managers. This emphasis on perception and signalling is also discussed in Detert and Burris (2007), which defined managerial openness as "subordinates' perceptions that their boss listens to them, is interested in their ideas, gives fair consideration to the ideas presented, and at least sometimes takes action to address the matter raised", and Premeaux and Bedeian (2003), which defined top management openness as "the degree to which top management is believed to encourage employees to offer input and make suggestions".

The interaction between the open group, i.e., TMT and the recipient group, i.e., subordinates, is a distinctive feature of openness at the group level. Although the interaction is suggested at the individual level, particularly in stream 2, that interaction is between the individual and his environment. An environment can be broad and contain a wide range of possibilities. At the group level, however, perhaps because of the more defined context of the TMT, scholars explicitly show the openness of one group – their willingness to be inclusive – triggers the openness of the other group – their willingness to talk.

Premeaux and Bedeian (2003) showed that the higher employees perceive top management openness to be, the more likely the employees will be to speak up. Speaking up is a behaviour that is defined as "openly stating one's views or opinions about workplace matters, including the actions or ideas of others, suggested or needed changes, and alternative approaches or different lines of reasoning for addressing job-related issues". Similarly, Morrison and Phelps (1999) reported a

positive relationship between employees taking charge and TMT openness. Dutton et al. (2002) also reported that female employees identify TMT openness as a key signal for them to bring up gender-related issues. These employee behaviours resemble stream 2 of openness, which addresses freedom of self-expression, but at a group level.

Few articles are specifically interested in TMT openness and study openness in other organizational groups. These articles tend to aggregate members within a group and use that as a proxy for group openness. For example, Nielsen and Daniels (2012) aggregated individuals' openness to change using a four-item scale to interpret followers' openness to change, which is defined as "the extent to which participants welcome change and see the potential benefit from it". Mitchell, Boyle, Parker, Giles, Joyce and Chiang (2014) measured team openness to diversity. This type of openness can be defined as follows: "Openness to diversity depicts member desire to make use of the divergent perspectives presented by others and to consider alternative viewpoints with an open mind" (Tjosvold and Poon, 1998).

In short, at the group level, perhaps due to the well-defined context of TMT, scholars have found not only group-level openness, which is similar to individual-level openness, but also a clear interaction between inflow openness and outflow openness.

Organizational Level

Organizational level openness is central to the management literature. Many constructs at this level serve either as important theoretical lenses that help scholars understand phenomena, e.g., an open network structure in social network theory, or as important phenomena that management scholars have found to be important, e.g., open innovation, open strategy and open government. Open innovation is so broad that I identified two substreams, open source software and crowdsourcing, which are important specific applications of open innovation.

I also find a rather surprising research stream that I labelled "open research". This stream represents authors who make connections between openness and academic journals and publication processes. Openness discussed at the organizational level is not only more diversified given the number of streams identified but also more complex. Openness at the organizational level represents not only information inflow and outflow, as emphasized at the individual and group levels, but also

information that is open-ended. This open-ended dimension can be found in firm-researcher interactions, where certain engagement rules are predetermined by firms and cannot be challenged by researchers. Figure 5 below summarizes the key characteristics of each research stream at the organizational level. The "what's new" column summarizes new concepts about openness in the current literature stream that previous streams have not discussed.

Figure 2-5: Key features of organizational level openness

Stream	Representative definition	Key characteristics	Key findings	What's new?
4. Open network structure	"We define network openness as a function of (1) network membership diversity, (2) willingness to accept new members, and (3) the extent to which there are ties to organizations outside the cluster" (Eisingerich et al., 2010). An organization is considered to have an open network when it connects two (or more) otherwise disconnected parties (organizations) (Shipilov and Li, 2008; Tatarynowicz, Sytch and Gulati, 2015; Ter Wal, Alexy and Block, 2016).	1. Exogenous, open network structure is a given characteristic. 2. Consensus on meaning of openness. 3. Openness is static, scholars have not discussed the possibility of change.	Organizations can benefit from being open under the conditions of (1) specialized knowledge structure (Ter Wal et al., 2016); (2) high internal R&D investment (Tatarynowicz et al., 2015); (3) uncertain environment (Eisingerich et al., 2010).	Conflict of interest emerges between these otherwise unconnected parties because of sensitivity of information being shared. Therefore, in the focal entity vs. environment framework of openness, it might be important to separate actors

Stream	Representative definition	Key characteristics	Key findings	What's new?
				in the environment.

Stream	Representative definition	Key characteristics	Key findings	What's new?
5. Open Innovation	General open innovation: "Openness is in part defined by various forms of relationship with external actors and is thus closely coupled to a broader debate about the boundaries of the firm" (Dahlander and Gann, 2010). Crowdsourcing: "Disclosing problems, in removing barriers to entry to nonobvious individuals" (Jeppesen and Lakhani 2010). Open source software: "Two main features define the restrictiveness of a licence: (1) the extent to which the source code and any of its modifications can be subsequently embodied in commercial software and (2) whether modifications to the source code have to	1. Mostly an endogenous variable. Firm makes the choice regarding what to open and how open an innovation is, i.e., various OSS licences. 2. Emphasis on inbound openness and formed consensus on measurement. Less is known about outbound openness, lack unified measurement and definition.	1. Paradox of openness: a moderate level of external collaborate can best benefit firm's innovation appropriation (Arora et al., 2016; Wadhwa et al., 2017; Foege et al., 2019). 2. Inbound openness can best benefit a firm under conditions of (1) being in initial exploratory stage (Love et al., 2011) and (2) experience	1. Explicit emphasis on boundary between firm and its environment. 2. Explicit distinction between inbound (inflow) and outbound (outflow) openness. 3. Tension and reinforcement between inbound and outbound openness. 4. Restrictions on OSS

Stream	Representative definition	Key characteristics	Key findings	What's new?
	remain open source, i.e., the binary source code must remain open and accessible" (Belenzon and Schnkerman 2015).	3. Can be very dynamic. A firm can have different openness policies for different innovations and can gradually open up.	in previous collaboration (Love et al., 2014); (3) heterogeneous collaboration (Walsh et al., 2016).	licences can make innovation and technology more open.

Stream	Representative definition	Key characteristics	Key findings	What's new?
6 Open Strategy	"An openness in terms of inclusiveness, in other words the range of people involved in making strategy; and an openness in terms of transparency, both in the strategy formulation stage and, more commonly, in the communication of strategies once they are formulated" (Whittington et al., 2011).	1. Mostly an endogenous variable. Firms tend to start from a "closed" strategy and gradually develop an open strategy. 2. Consensus on the dimensions of inclusiveness and transparency. 3. Dynamics exist categorically between closed and open, but less is own after open strategy is reached.	1. Inclusiveness positively influences alliance performance when politicality is low, and it negatively influences alliance performance when politicality is high (Walter et al., 2008). 2. Open initiatives tend to include practices that create closure (Dobusch et al., 2019).	1. Explicit distinction between content and procedural openness. 2. Openness is not the opposite of closure. Procedural closure is necessary for content openness. 3. Explicit emphasis on the importance removal of assumptions for achieving openness. 4. Explicit reference

Stream	Representative definition	Key characteristics	Key findings	What's new?
				to open society.

Stream	Representative definition	Key characteristics	Key findings	What's new?
7 Open Government	"We will work together to ensure the public trust and establish a system of transparency, public participation, and collaboration" (Obama, 2013 cited by Kornberger et al., 2017).	1. Mostly an endogenous variable. Government agencies were thought to be closed and are gradually adopting open government practices. 2. Limited consensus on meaning of open government. 3. Dynamics exist categorically between closed and open, but less is own after open government	1. Open government ideology is translated into open government data that is only readable by machines in Viena (Kornberger, 2017). 2. Open government initiatives are more likely to be taken voluntarily under the pressure of external parties (Arellano-Gault and Lepore, 2011).	Decoupling between openness ideal and actual openness practices.

Stream	Representative definition	Key characteristics	Key findings	What's new?
		practices are adopted.		

Stream	Representative definition	Key characteristics	Key findings	What's new?
8 Research	"The openness of organization studies to philosophy-centred work, its balanced attention to philosophers from the three linguistic communities, and its receptivity to authors from both Europe and North America, represent important steps in the right direction" (Meyer and Boxenbaum, 2010).	1. Mostly exogenous. Level of openness of journal or discipline is given. 2. No consensus on definition. No explicit definitions on openness are given in any articles. 3. Different journals and discipline have their own level of openness. However, it is unclear how degree of openness can change.	1. "[T]he core technology of journals is not their distribution but their review process" (Davis, 2014).	N/A

Stream	Representative definition	Key characteristics	Key findings	What's new?
9. Other organizational studies	"Openness relates to the notion of 'visibility' in modularity theory (Baldwin & Clark, 2000) and is best seen as analogous to the 'vertical strategy' of Eisenmann et al. (2009), in that it considers the involvement of third-party suppliers for the production of both components and complements" (Thomas et al., 2014). "[O]penness encompasses open communication and sharing of information, exposure outside the company, continuous training, intellectual honesty, expectation and acceptance of conflict, and willingness to consult others (O'Reilly, 1989)" (Flores et al., 2012).	N/A (Articles are too separated to give a comment.)	1. Openness is necessary for and can benefit organizational learning (Snell, 2002 and Flores et al., 2014). 2. Open firms defined by members' political ideology towards liberalism, are more likely to respond to social movement (Gupta and Briscoe, 2019).	N/A

Stream 4: Openness in social network theory

There were 5 articles that made clear references to social network theory, identified by keywords such as "tie", "dyads", and "structural hole". In this stream, scholars refer to open networks as open networks. An organization is considered to have an open network when it connects two (or more) otherwise disconnected parties (organizations). (Shipilov and Li, 2008; Tatarynowicz, Sytch and Gulati, 2015; Ter Wal, Alexy, Block and Sandner, 2016). Eisingerich, Bell and Tracey (2010)[5] provided the most explicit definition of openness. They considered cluster-level openness, treated network openness as a matter of degree and identified three dimensions. "We define network openness as a function of (1) network membership diversity, (2) willingness to accept new members, and (3) the extent to which there are ties to organizations outside the cluster".

Similar to personality openness, with regard to which openness to experience is well studied before becoming important in the management literature, the concept of an open network structure is also well studied in social network theory before its application in the management literature. As a result, the openness of the social network structure is seen as an exogenous variable. Scholars tend to start their research based on a given network structure of a firm and draw conclusions and findings based on the network structure. As a result, the openness of the network structure of a firm seems to be static and not changed.

Because of the exogenous feature, scholars are much more interested in the consequences of the openness of network structure and moderating and mediating conditions for these consequences. One consensus among these articles is the advantages and disadvantages of an open network structure. The advantage is that because the firm is able to have connections with otherwise disconnected firms, it could gain information or even resources from different perspectives, which should be different from information that the firm already has. Thus, the relatively new information could give the firm a competitive advantage in generating new business ideas and opportunities. The disadvantage is also associated with the new information. Because the focal firm is not used to that information, it is more likely not to know how to deal with the information. In addition, there could be an overabundance of information that could lead to information overload.

[5] Although this paper studies cluster-level openness, because all other open network structure articles study organizational level openness, this paper is categorized at the organizational level.

As a result, the scholars in the reviewed articles emphasized the condition under which the company could benefit from an open network structure. Ter Wal et al. (2016) found a beneficial condition to be a specialized knowledge structure, meaning that the focal company and its connected companies should be within the same sector. Tatarynowicz et al. (2015) found a beneficial condition to be the focal company's R&D investment. The more effort devoted to internal R&D, the better the firm can understand and make use of "new" information. Additionally, Eisingerich et al. (2010) found that an uncertain environment could be a beneficial condition.

Not all of the scholars study how organizations can make use of external information; Tasselli and Kilduff (2018) is one exception. They hinted at the concept of openness to cliques to illustrate that a broker has a difficult decision to make regarding whether information obtained from one clique should be passed to another clique that has no connection with the first clique. However, the focus of that study was on the condition under which a Simmelian broker can be trusted.

The research in openness in social network theory is interesting because while most of the articles resemble the previously identified pattern of one party (focal company) being open to different information provided by another party (otherwise disconnected companies), Tasselli and Kilduff (2018) show a conflict of interest within the second party. If the conflict of interest is critical in the setting and for the firm, then it might be important to separate clique 1 and clique 2 as well as other cliques. Under this condition, openness is not a generic firm policy that is applied to all partners but a tailor-made policy for each partner, i.e., I share what I learned from clique 1 with clique 2 but not vice versa. However, this condition is not the focus of Tasselli and Kilduff (2018), and it could be an interesting future research direction.

Stream 5: Openness in open innovation

There are 31 articles that explicitly discussed innovation-related openness. Most of the articles (24) are about companies that practice open innovation. Given the unique setting of crowdsourcing because of the nature of three-party-interaction of seeker, solver and the platform, and of open source software because it is technology driven rather than profit driven, I created two additional substreams, 5.1 and 5.2, respectively.

Dahlander and Gann (2010) wrote an excellent review article on open innovation. Their definition of openness is deliberately broad and indefinite, stating that "openness is in part defined by various forms of relationship with external actors and is thus closely coupled to a broader debate about the boundaries of the firm". This indefinite definition is consistent with this current review, which shows the existence of openness in various settings, theories, and levels of analysis. In addition, the emphasis on the term "boundary" highlights a key feature of openness that has been thus far reviewed. This feature is that when speaking of openness, there is always an entity that is being opened and an environment that is being opened to. A boundary between the entity and its environment seems to be a necessary condition for openness.

Despite the difficulty in defining openness, the reviewed articles developed an analytical framework consisting of two dimensions: "(1) inbound and (2) outbound (Gassmann and Enkel, 2006) versus (3) pecuniary and (4) nonpecuniary". When the outflow of information is aimed at direct financial gain, it is commercialization and constitutes selling. When the information outflow is not aimed at direct financial gain, it is labelled revealing. When the firm can obtain external information to help with R&D without financial payment, it is called sourcing. When the firm pays for external information, it is called acquiring.

The first dimension of inbound and outbound is particularly important. Because this dimension is consistent with the current review, which mainly discusses openness, even outside of the open innovation literature, it could also be categorized as either inbound or outbound. The inbound openness represents information inflow, i.e., openness to experience. Outbound openness represents information outflow, i.e., openness in self-expression and perceived TMT openness.

This interaction between inbound and outbound information is also heavily discussed in the open innovation literature. Scholars have identified a "paradox of openness", specifically, "opening up to outside sources of knowledge to innovate may weaken the firm's power to capture rents from that knowledge" (Arora, Athreye and Huang., 2016; Wadhwa, Freitas and Sarkar, 2017; Foege, Lauritzen, Tietze and Salge, 2019). In support of the paradox, scholars have empirically found an inverted U-shaped relationship between the degree of openness and a firm's appropriation of innovations (Laursen and Salter, 2006 Laursen and Salter, 2014; Wadhwa et al., 2017).

There are two perspectives to interpret the paradox (Arora et al.,2016): the first involves the tension between inbound and outbound openness, and the second involves the reinforcement of inbound and outbound openness.

With regard to the tension aspect, during external collaboration, when the firm is able to gain external knowledge from partners, i.e., inbound openness, the firm will inevitably reveal its own knowledge and information to the partners, i.e., outbound openness. This outbound openness will give the firm less control over its innovation and thus less appropriation capability. Therefore, firms should aim to maximize inbound openness while minimizing outbound openness. Fey and Birkinshaw (2005) combined both the knowledge-based view and the open system perspective to "conceptualize the organizational boundary of the firm as a semipermeable membrane through which knowledge passes at different rates and to different degrees". They asserted that "[i]nflows of knowledge from the environment augment the firm's knowledge assets, but at the same time, outflows of knowledge (e.g., to competitors) erode their distinctiveness". Therefore, firms should seek to maximize information inflow to make use of external information while minimizing information outflow to prevent imitation by competitors.

With regard to reinforcement, the other perspective suggests that selectively revealing information to other companies could benefit the firm, for example, by sending a signal that the focal firm is willing to collaborate and thereby increasing the outbound openness of other firms to the focal firm (Henkel, 2006; Fontana, Geuna and Matt, 2006; Arora et al., 2016 and Hannigan, Seidel and Yakis-Douglas, 2018). Hannigan et al. (2018) further distinguished formal vs. informal information flow. Informal information inflow and outflow occur through communication channels such as rumours and blogs. Firms should assume that external rumours influence R&D decisions and that other firms generate rumours to influence stakeholders' decisions.

Despite the recognition of inbound and outbound openness, the majority of the reviewed open innovation articles are concerned with inbound openness. A consensus was developed regarding the measurement of inbound openness. By analysing UK innovation surveys, Laursen and Salter (2004) introduced openness as a firm's search strategy. They measured "the number of different sources of external knowledge that each firm draws upon in its innovative activities". Their 2004 article included 15 different types of sources. The more types of sources used, the higher the degree

of openness. This method of measurement was later labelled "search breadth" and has been used by authors such as Belussi, Sammarra, and Sedita (2010); Fu (2012); and Love, Roper and Vahter (2013). Laursen and Salter (2006) added "search depth" as an additional dimension of search openness, which measures how extensively the firm draws on a particular type of source. This measurement was later adopted by other scholars. such as Belussi et al., (2010) and Stanko and Henard (2017).

Fontana et al. (2006) made an important distinction between searching and screening with respect to openness. They argued that "[w]hile searching implies a general attitude of looking at potential valuable sources of information, screening involves identifying and selecting the best within the set of possible information providers" (Stiglitz, 2002). By analysing KNOW surveys in 7 European countries, they found that searching itself has no impact on the amount of R&D, while both screening and signalling have a positive effect. The measurement of the screening was made using two dummy variables: if the firm screens information from scientific publication and if the firm has received public subsidies.

Scholars in open innovation have also devoted attention to understanding the condition under which openness can benefit a firm's innovation. Love, Roper and Bryson (2011) found that inbound openness to external parties benefits firm innovation more during the initial exploratory stage. Later stages are more benefited by internal openness, e.g., that of a team working within the firm. Love, Roper and Vahter (2014) found that the experience gained through external collaboration in previous periods could enhance the effectiveness of opening up in the current period. Walsh, Lee and Nagaoka (2016) reported that innovation involving heterogeneous collaboration produces more technically significant results.

The benefit of open innovation can be realized at a societal level, such that the social return of openness might exceed the private return. Roper et al. (2013) and Roper, Love, Bonner (2017) labelled this the "externalities of openness".

Some scholars have studied the antecedents of an opening firm. Arora et al. (2016) found that leading innovation firms tend to take a more closed approach, i.e., engaging in more patenting because they are more vulnerable to unintended knowledge spillover, while follower firms are more likely to choose an open approach. Bahemia, Sillince, and Vanhaverbeke (2018) found that

firms shift from a closed innovation model to an open innovation model after enabling a proactive formal defence strategy, i.e., submission of a patent. Bogers, Foss, and Lyngsie (2018) found a positive relationship between employees' education diversity and firm-level openness.

Openness in open innovation is the best defined and most extensively addressed stream of all the openness streams in the management research. Articles in this stream discuss the benefits, beneficial conditions, antecedents, paradoxes, and different types of openness. Openness is treated as both an endogenous variable and exogenous variable.

Stream 5.1: Crowd Sourcing

Openness in the crowd sourcing context requires extra attention because it is no longer information inflow and outflow between the firm and its environment, as outlined in Stream 5. The addition of the crowdsourcing platform created a three-party interaction: seeker, solver and platform.

Contrary to my expectation that the platform should play a central role in openness, the three articles seem to treat the crowdsourcing platform as a communication channel. The impact of the platform on the openness of the solver and the seeker or the openness of the platform itself is not addressed by scholars in the reviewed material.

Jeppesen and Lakhani (2010) studied 166 science challenges involving 12,000 scientists. They defined openness as "disclosing problems, in removing barriers to entry to nonobvious individuals". Their focus was on how marginal individual solvers can benefit seekers because they are capable of ignoring prevailing assumptions and theories. They found that both technical and social distance can increase the chance of winning a science contest. In this article, the role of science contests was not important. Similarly, when Acar (2019) investigated the impact of solver motivation on solution appropriateness, the role of the crowdsourcing platform was not a central concern.

Foege et al. (2019) investigated both the openness of the seeker and the solver. Their article included both inbound and outbound information flow as well as the information flow between the individual level and the organization level. Most of the solvers were individuals. By investigating openness, they discovered seven value appropriation practices of solvers to protect themselves. Because there is a problem in crowd sourcing, seekers sometimes free ride information

provided by solvers. Again, there is no discussion regarding the role of the platform in openness paradox.

The dismissal of the platform influence is interesting from a platform perspective. The platform literature believes that the platform (crowdsourcing platform) could have a significant influence on questions such as "who can participate?" and "what are the terms of participation?".

Stream 5.2: Open source software (OSS)

OSS provides another very specific context in which to examine openness. Perhaps due to the narrowly but clearly defined phenomena considered in this research stream, scholars attributed deeper meanings to openness. For example, Demil and Lecocq (2006) emphasized that an "open source licence promotes openness and prevents contributors from appropriating the source code". The first reference to openness in the sentence echoes the type of openness involved in open innovation. It refers to granting others access to the information by reducing the cost of access to zero. The second part of the sentence employs a different type of openness. It refers to the type of openness that limits the power of contributors. Belenzon and Schankerman (2015) further clarified the concept, stating that "two main features define the restrictiveness of a licence: (1) the extent to which the source code and any of its modifications can be subsequently embodied in commercial software and (2) whether modifications to the source code have to remain open source, i.e., the binary source code must remain open and accessible". This is the case up to a certain point; the more restrictive the licence (i.e., the more subsequent derivatives must remain open source), the more subsequent derivatives will become open to other parties.

Therefore, in the minds of OSS scholars, openness is not achieved only by outbound openness, i.e., by revealing or selling privately owned technology and innovation, but also by setting rules to restrict how others can engage with the technology. Up to this point, all previous openness between the individual and organizational levels follows the logic that openness is achieved by removing restrictions; openness under OSS follows a different logic. In that context, removing restrictions is still important, but it is equally important to apply restrictions. In other words, while the content of the technology is opened, the procedure for opening it is fixed. In the context of OSS, the procedure involves the acceptance of OSS licences. The interpretation of openness and closure from

the perspective of content and procedure is more explicitly addressed in the open strategy literature, which will be shown in the next section.

Stream 6: Open strategy

While there might be an overlap between open strategy and TMT openness, because the essential participants are managers of firms, TMT openness emphasizes the impact of TMT characteristics (a group-level phenomenon) on employee behaviour, while open strategy emphasizes how an organization opens up its strategic decision-making process (an organizational-level phenomenon) to parties inside and outside of the organization.

The inbound and outbound information flows summarized in the open innovation literature are reflected in the definition of open strategy by Whittington, Cailluet and Yakis-Douglas (2011). The authors defined open strategy as "an openness in terms of inclusiveness, in other words the range of people involved in making strategy; and an openness in terms of transparency, both in the strategy formulation stage and, more commonly, in the communication of strategies once they are formulated". It is clear that inbound openness in open innovation has similar characteristics of inclusiveness as open strategy, and outbound openness has similar characteristics of transparency. The key characteristic is the direction of information flow.

Perhaps one of the earliest forms of open strategy is in the collaboration between social scientists and their clients for strategic issues. However, the term open strategy had not been invented when that work was being done. Cherns (1976) created a taxonomy that disentangled clients' openness into three dimensions: 1. If the nature of a client's problem is predetermined, 2. If the type of solution is predetermined and 3. If the method of obtaining the solution is predetermined. The combination of these three dimensions gives the social scientist different degrees of freedom, and it requires the client to show different degrees of openness. In this case, inclusiveness is represented by the firm's including social scientists in strategic decision-making, and transparency is represented by the firm's providing as much information as possible and making as few assumptions as possible. Chisholm and Elden (1993) also studied the interaction between researchers and firms, which is labelled action research. According to them, action research is closed when the process is predetermined, and it is open when the process is invented and discovered. Therefore, at an abstract level, openness is about the minimization of assumptions about how things should be done.

Dobusch, Dobusch and Muller-Seitz (2019) analysed the open-strategy process of Wikimedia (the managing organization for Wikipedia). The case study revealed several important dimensions of openness. First, the authors followed the openness argument of Popper (1945) and argued that "[o]penness does not connote absence of rules, instructions and prescribed procedures but rather requires such bureaucratic – albeit transparent, reliable and modifiable – forms of organizing to enable openness". As a result, they differentiated between substance openness and procedural openness. They challenged the often held assumption that openness is the opposite of closedness and argue that closedness at the procedural level is a precondition for content openness or substance openness. "In a nutshell, procedural openness requires predetermined and transparent procedures in order to restrict opportunities for individual actors or informal groups to change 'the rules' flexibly – ad hoc". This theory-driven procedural restrictiveness echoes the phenomenon-driven licence restrictiveness in the OSS stream.

Second, the authors adopted a relational framework that not only assesses the inclusion dimension of openness, as does most of the openness literature, but they also assess the exclusion dimension. Knowing what or who is excluded from the opening process allows for a fuller picture of the relevant phenomena to be obtained.

Third, the authors disentangled the whole strategizing process into four phases based on themes and time sequences, and each phase had its own characteristics in the categories of inclusion, exclusion, content openness and procedural openness.

Last, the authors modified the dimensions of openness identified by Whittington et al. (2011). Inclusiveness is identified as involving modes of participation, and transparency is identified as involving access to sensitive information. An additional dimension was added, namely, the mode of decision-making, e.g., what decisions are made and not made and by whom. This in-depth analysis of Wikimedia led to the discovery of new dimensions of openness that could be helpful for future theoretical and empirical research.

Other scholars in open strategy assessed openness through modelling or quantitative techniques. Alexy, West, Klapper and Reitzig (2018) defined strategic openness as the firm voluntarily forfeiting

control over resources. They suggested that openness can increase profitability through cost reduction or capturing more value from complementarity with other resources controlled by the firm. Walter, Lechner and. Kellermanns (2008) found that strategic decision-making openness (inclusiveness) positively influences alliance performance when politicality is low and negatively influences alliance performance when politicality is high.

Stream 7: Open government

Although there are only two articles in the review that explicitly mentioned open government, they can still enhance our understanding of openness. Kornberger, Meyer, Brandtner and Hollerer (2017) referenced a speech given by Barack Obama (2013) to explain the ideal of open government. In the speech, Obama states, "[w]e will work together to ensure the public trust and establish a system of transparency, public participation, and collaboration". The three dimensions of Obama's ideal of open government, transparency, participation and collaboration are consistent with the transparency and inclusiveness in open strategy and information inflow and outflow in open innovation.

Open government is a lot like open strategy, the greatest difference being the former emphasis on openness in government agencies and the greatest similarity tending to emphasize openness in profit-making companies. Through this literature review, I find that with the second difference, whereby open government initiatives tend to be reactive practices to fulfil the needs of the public, the motivation of the reaction is considered less important in the open strategy research. As a result, the two articles in open strategy emphasize the "decoupling" between ideal openness and actual openness practice.

Kornberger et al. (2017) used a case study of open government initiatives by the city of Vienna to show how bureaucracy within the government agency is able to translate openness into the "accessibility" of government data. Thus, the open government becomes open government data. Moreover, these open government data are readable only by machines and not average citizens. Hence, even the degree of data openness is questionable.

Arellano-Gault and Lepore (2011) reported a similar phenomenon from a different perspective. They found that to follow the open government trend, Mexico introduced a "federal transparency law", which also only emphasized granting data access to citizens. The authors noted that when federal agencies are not subject to the legal transparency requirement, they will also adopt transparency practices if there are internal drivers. In that scenario, the most significant driver is a group of information users asking for access.

The open government literature is thus important to show that there might be a difference between the theoretical dimensions of openness and the actual openness dimensions that are empirically observable. Complicated contextual reasons, e.g., bureaucracy, might limit the number of observable openness dimensions.

Stream 8: Openness in research

Three articles discussed the openness of journals or academic disciplines. Whitley (1988) briefly explained openness in management science as a discipline. He mentioned two dimensions: openness to new ideas and to standards from other disciplines, which is consistent with the inclusiveness dimension. The other dimension involves facilitating an understanding of journal articles for nonacademics, which is part of transparency. However, there is a divergence, where the transparency and the inclusiveness are for two different groups of users: readers and authors, respectively. In previous cases, i.e., open strategy or open innovation, both dimensions of openness are towards the same group, i.e., external parties. Hence, Whitley (1988) is one of the first articles to conceptually distinguish openness between different user groups.

In a similar vein, Davis (2014) contrasted traditional journals and open access journals. He argued that open access journals reduced the difficulty for authors to publish. Hence, there is an increase in the inclusiveness of such journals towards authors. Additionally, open access reduces the cost of reading articles to zero, thereby increasing transparency to readers. Davis (2014) made another very important point, stating that despite a higher degree of openness exhibited by open access journals, they are unlikely to outcompete traditional journals. He argued that "the core technology of journals is not their distribution but their review process".

Meyer and Boxenbaum (2010) took a very specific approach in accessing journal openness. They measured journal openness by the degree to which a journal is inclusive of authors from another continent. An example of journal openness would be an EU journal that includes U.S. authors, and vice versa. This is a specific application of inclusive openness.

Perhaps because academic research is merely a setting where openness emerges, the reviewed articles provide limited new insights regarding openness. However, from a platform perspective, it is interesting to note a connection between journals in Davis (2014) and crowdsourcing platforms in open innovation. In that situation, the journal and the platform act as a gateway between two separate customer groups. If the key value of traditional journals is the review process instead of distribution, is there a similar value in crowdsourcing platforms? How important is the review process of crowdsourcing platforms for their own survival and prosperity?

Stream 9: Other organizational studies

Two articles consider the role of openness in learning organizations. Snell (2002) studied the transition of a Hong Kong utility company in becoming a learning organization. The author found that even though promoting openness is a necessary step towards becoming a learning organization, openness cannot be achieved when there is an established cognitive frame among members of the organization. Flores, Zheng, Rau and Thomas (2012) found that openness can positively influence the organizational learning process. They found that "openness encompasses open communication and sharing of information, exposure outside the company, continuous training, intellectual honesty, expectation and acceptance of conflict, and willingness to consult others".

Two articles address firms' reactions to social movements and the role of openness. In Bryer (2019), openness is a substitute for inclusiveness. Gupta and Briscoe (2019) took a political view and assessed openness in organizational political ideology. They found that firms with more liberal organizational members are more open to activists' demands and may readily concede upon experiencing protests. Therefore, according to these authors, liberalism is more open than conservatism. The behaviour of accepting and changing according to protests can also be considered to be inclusive.

Thomas, Autio and Gann (2014) reviewed openness for the platform literature. In their review, openness refers to the degree of participation. A platform is closed when it does not allow participation. A platform is moderately open when it allows the participation of supply-side external parties, and it is most open when it allows the participation of both supply- and demand-side external parties. Differentiating between demand-side participants and supply-side participants seemed to be important in the platform literature. This was also reflected in the openness research stream when authors distinguished between readers and authors. However, Thomas et al. (2014) only considered the inclusiveness dimension of openness as being reflected by an emphasis on participation.

3.4 Societal level

Eighteen articles discussed openness across organizational boundaries. I identify them as openness at the societal level. There are two streams of articles that discuss openness at the societal level (apart from when social network theory is applied to cluster-level analysis). The first small stream consists of two articles on standard creation and diffusion. The second stream consists of multiple articles that adopted an economics perspective where openness means an economy's dependency and integration into international trade. The more an economy is dependent on trade, the more open the economy is. However, from an economics perspective, openness tends to appear as a control variable. Thus scholars do not provide an explicit definition of openness in such articles. The meaning of openness can only be inferred from measurement. Figure 2-6 below summarizes the key characteristics of each research stream at the societal level. The "what's new" column summarizes new concepts about openness in the current literature stream that have not discussed by previous streams.

Figure 2-6. Key features of societal level openness

Stream	Representative definition	Key characteristics	Key findings	What's new?
10. Standard	A standard is open when multiple participants are involved in standard formation (Funk and Methe, 2001). A standard is open when it is principle-based, which allows for adaption and challenges (Christensen et al., 2017).	N/A (insufficient number of articles to make comment).	High degree of openness is a necessary condition for emergence of a globally adopted standard (Funk and Methe, 2001).	Principle-based (open) standards lead towards a future-oriented firm, whereas rule-based standards lead toward a past-oriented firm.
11. Economics	The economic openness of a country or economy is typically measured by the importance of foreign trade compared to domestic production. It is usually measured by (Export+Import)/GDP (Aguilera and Cuervo-Cazurra, 2004); Export/GDP (Drori et al., 2006; Woerter and Ropter, 2010; Bodas Freitas and Iizuka, 2012) or FDI/GDP (Bodas Freitas and Iizuka, 2012).	1. Mostly an exogenous variable. It is given by taking a predesigned measurement. 2. Consensus on meaning and small variation in measurement. 3. Difference in openness varies	N/A (openness tends to be used as a control variable and is not important for analysis)	1. Explicit reference to system theory.

Stream	Representative definition	Key characteristics	Key findings	What's new?
		greatly across countries, but economic openness is rather stable for a specific country.		

Stream 10: Standard

Although only two articles discussed standards, they deserve separate attention. Funk and Methe (2001) defined openness in standards as the number of participants in the process of standard setting. The authors studied standard formation in a telecommunication system and found that a high degree of openness is a necessary condition for the emergence of a globally adopted standard. This view of openness fits with the inclusiveness dimension of openness discussed above.

Christensen, Morsing, and Thyssen (2017) took a very different approach. Their understanding of the openness of CSR standards emphasize open-endedness. They consider a standard to be open when it is flexible, principle-based, not restrictive, and adaptable. The purpose of open standards is to inspire and not to steer CSR practices. The authors argued that an open CSR standard could lead

firms to be future-oriented, while a closed CSR standard would make firms past-oriented because they need to ensure that their current actions meet with their past statements. The authors also briefly stated that openness and closure may supplement each other in practice; however, they did not provide a detailed discussion on this issue.

Stream 11: Economics

Many scholars have assessed the openness of a country or an industry in using economic measurements. However, openness tends not to be a key variable in these articles, and the authors tend to provide a limited explanation of the theory behind openness and merely provide a measurement for openness.

Typically, these measurements involve the computation of imports (M), exports (X), foreign direct investment (FDI) and GDP. Leoncini (1998) measured the degree of openness by (X-M)/(X+M). He analysed technological systems as open systems that consists of three characteristics: the inner environment, the outer environment and a series of linkages. These three characteristics are consistent with the conceptualization of openness of interaction between two parties. The author also used openness as a distinguishing characteristic for evolutionary economics compared to neo-classical economics. Referencing Foss (1994), evolutionary economics posits that economic agents live in an open-ended economic universe. This open-ended aspect is analogous to Popper's (1982) "open universe". Armbruster and Gebert (2002) also wrote a theoretical article based on Popper's concept of an open society. In this article, openness is defined as a "pattern of thinking" with specific emphasis on the degree to which people in society take social norms for granted.

Aguilera and Cuervo-Cazurra (2004) defined a country's economic openness as the degree of a country's economic integration into the world economy. It is measured by (X+M)/GDP. Drori, Jang, and Meyer (2006) defined economic openness as the degree of importance of international trade to a country's economy. The authors presented the alternative measurement of X/GDP; however, they did not report the measurement they used in the regression. In Woerter and Roper (2010), openness was measured by both M/GDP and X/GDP. Bodas Freitas and Iizuka (2010) measured openness as FDI/GDP and X/GDP. They also measured firm-level openness as the importance of exports to the firm and the number of international markets. These authors found that the impact of openness differs across levels. At the industry and country levels, the certification of ISO standards is

improved due to higher openness. However, the relationship is insignificant at the firm level. Hammadou, Paty and Savona (2014) measured the trade openness index as (X+M)/GDP and found that it positively influences public R&D in European countries. Kafouros, Wang, Piperopoulos and Zhang (2015) measured international openness as FDI/GDP and found it to be positively related to the effects of academic collaboration on innovation performance. Fassio, Montobbio and Venturini (2019) measured the international openness of an industry by the log of (X+M)Value added of the industry and found that skilled immigrants contribute to innovation more in high openness industries.

Other scholars within the economics stream consider and measure openness differently. Allen considered the openness of stock markets in different nations. He posited that the U.S. stock market is more open than the stock markets of Germany and Japan because it has far more companies analysed and thus has a superior amount of information and diversity of opinion. Varsakelis (2001) measured the openness of the economy by using the "black market exchange rate premium". The author thinks that "A high BMP is, according to Sachs and Warner, evidence of the rationing of foreign exchange, and could be considered as a form of import control". However, the impact of openness on R&D intensity is not significant in this paper.

Findings

The previous section presents my categorization of openness articles and briefly summarizes key openness concepts in each literature stream. The focus of the previous section is to show differences between streams and articles that addressed openness. These differences can be caused by various degrees of importance of openness in the articles, the context of the openness phenomenon, the method of research, the theoretical discipline and the authors' ontology. The above summary provides a collection of pieces of the whole openness jigsaw puzzle. The key question would then be, what can we learn from reviewing the above articles? In the present section, I aim to outline and clarify three key concepts that are fundamental to all openness articles. These three concepts are explicitly or implicitly referred to in most openness articles. They act as a common foundation for the articles reviewed. These three concepts are 1. The meaning of openness, 2. The persistency of openness, and 3. The cross-level interaction of openness.

The meaning of openness

Determining the meaning of openness is one of the fundamental drivers in writing this review. Through reading and analysing articles related to openness, I find it impossible to provide an explicit and definitive explanation of openness. The definitions of openness listed in the previous sections make sense within their respective context and focus, and a generic definition for openness that is applicable to all the contexts might make the concept so "open" as to lose its meaning. Therefore, I will analyse the meaning of openness in management from two overarching perspectives that I have identified, which may transcend context and level of analysis. These two perspectives are not mutually exclusive. They represent two different ways of viewing the openness phenomenon. They interact and complement each other to provide a fuller picture of openness. These two perspectives outward openness and inward openness. Their key characteristics are summarized in Figure 7 below.

Figure 2-7 Key features of outward and inward openness

Characteristics	Outward openness	Inward openness
Root	Open system	Open society
Boundary	It is necessary to have a boundary between the inner and outer	A boundary is not a focus.

Characteristics	Outward openness	Inward openness
	environments (Leoncini, 1998; Dahlander and Gann, 2010).	
Extreme of openness	Total openness would not exist because it would blur the boundary between the inner and outer environments. When the inner and outer environments merge, openness does not exist.	A certain degree of closure is necessary at the procedural level. The procedure can be planned.
Dimensions	Inflow and outflow	Content and procedure (Popper, 1945)
Dynamics	Screening - Selecting - (Signalling)	N/A
Point of view	Openness is seen from the perspective of the inner environment.	Openness is seen in any entity that is influenced by openness.
Knowledge distribution	The outer environment poses new and key knowledge.	Distributed knowledge among individuals

Outward Openness, as exchange

I refer to the first perspective as outward openness. It emphasizes the exchange property of openness. This perspective is rooted in general system theory (Bertalanffy, 1950). Two extensions of GST are particularly relevant in the current context. Miller (1978) is important because it addressed the existence of a "system" from the unit analysis of the cell and the organ to society and the supranational system. Thus, the system concept transcends levels of analysis. Scott (1981) is important because he not only introduced the system perspective into the management research but also coined the term "open system".

Implicitly or explicitly, most of the reviewed articles discussed openness from a system perspective. This was more explicit at the organizational level and above and less explicit at the individual level. The essence of an open system is that a system's survival and prosperity depend on factors outside

the system - labelled the outer environment (Scott, 1981). As a result, "[a]n open system, e.g., a social system. is thus defined on the basis of three characteristics: its inner environment, the outer environment and a series of linkages" (Leoncini, 1998). Thus, the openness of an open system rests upon the exchange between the inner and the outer. Exchange implies bilateral transactions. Hence, the exchange perspective has two subdimensions: inflow and outflow. There is no limitation on what is exchanged. It could be information, assets, human resources, technology, etc.

It is evident in the current literature review that most openness streams and articles focus on the inflow and outflow between the entity and its environment. It is also evident that the emphasis on inflow and outflow is not always equal. At the individual level, with respect to personality traits, inflow vs. outflow can be traced to openness to experience vs. extraversion. At the organizational level, in open innovation, early and dominant emphasis was placed on information inflow, i.e., firms' search activities, and only recently have scholars begun to investigate information outflow, i.e., selectively revealing the relationship between inflow and outflow. In the definition of open strategy, the two dimensions of transparency and inclusiveness are clearly related to outflow and inflow, respectively. Even in economic openness, most measurements are made of imports, exports and GDP to capture the dependency of a country on its outer environment.

If openness resembles the characteristics of exchange, not only are there inflows and outflows, but the inflows and outflows are also dependent. The metaphor of exchange implies that when something is given out, something else is taken in, and vice versa. The current literature has limited studies regarding the relationship between inflow openness and outflow openness of the same entity. In Fontana et al. (2006), a selective revealing of technology signalled a firm's openness; thus, the firm could have more potential partners with whom to work. In TMT openness, if managers show their interest in employees' opinions, i.e., gender equality issues, they are more likely to receive employee feedback regarding those opinions. This evidence hints at the dependency of inflow and outflow. Questions such as, "Would government transparency encourage public participation", and vice versa, might be interesting for open government scholars.

Scholars have also argued that openness should be viewed as a process. The process here not only means that the degree of openness can change but also emphasizes shifts in functions of openness in phases. Fontana et al. (2006) proposed that openness should be viewed in three stages: searching,

screening and signalling. Davis (2014) mentioned that "the core technology of journals is not their distribution but their review process", emphasizing the importance of screening in traditional journals compared to open-access journals.

These articles inform us that the initial openness phase addresses problems such as "who can participate?" "who can we learn from?" and "who can submit to our journal?" - from the inflow dimension - and "what can we share?" and "what can be published?" - from the outflow dimension. The emphasis on this phase is on laying out options. The broader the range of options, the higher the degree of openness. The second openness phase addresses problems such as "who actually participates?" "who do we actually learn from?" and "which article should be accepted?" - from the inflow dimension - and "which technology or licence is open sourced?" and "what is the degree of open source?" - from the outflow dimension. The emphasis on this phase is on selecting from the previously identified options. It is not clear how openness is measured at this stage because discussion on this dimension is scarce. In addition, these issues may not necessarily be thought of in terms of openness. Signalling might be a phase that connects outflow openness with inflow openness.

In many situations, the distinction between searching and screening is not clear. For example, when a search results in one option, there is not much room for screening. Alternatively, when all searched results can be accepted, there is no need for screening. However, in other situations, this distinction could be crucial and impactful. For example, in a search engine, a user can find billions of results that are related to the user's keyword. The user must rely on the search engine's screening capability, i.e., recommendations about finding the information that he or she is looking for. This discussion about the searching phase vs. the screening phase of openness is very preliminary and is intended to inspire and provoke further discussion in this area. In my current literature review, only work on open innovation began to explore the distinction and relationship between phases of openness.

Therefore, within the exchange perspective, I have identified two sets of dimensions. One is set along the lines of inflow and outflow, which is captured by current openness articles. The other is set along the lines of phases of openness, i.e., screening and selection, which is still relatively new. Nonetheless, from this perspective, the existence of an outer environment compared to the entity

is fundamental. Therefore, I labelled this openness outward openness. This openness captures the interaction between the entity and outside of the entity. However, one might find an inherent paradox within the outward openness perspective. This is because the exchange concept is only valid when there is a boundary between the entity and its environment. When an entity becomes extremely open, and the boundary between itself and the environment thus disappears, there will be no distinction between the entity and the environment; hence, outward openness would no longer exist. In other words, a certain degree of closure becomes fundamental and necessary for the existence of outward openness. Therefore, as rightly pointed out by Dobusch et al. (2019), openness does not mean the absence of rules. On the contrary, openness requires defined rules and a certain degree of closure. As a result, Dobusch et al. (2019) showed that some open strategy practices not only enhance the inclusiveness and transparency of strategic decision-making but also create new inequalities and perhaps new boundaries between different groups of participants.

Another distinction between outward openness and inward openness, which will be discussed next, is the assumption of power dynamics. For articles that adopt an outward openness perspective, the implicit focal entity is the inner environment. Thus, the degree of openness is assumed to be primarily defined and decided by this focal entity or the inner environment, which is especially true at the organizational level. Therefore, although there are three components in an open system, most scholars take the perspective of the inner environment, i.e., the organization, instead of taking an overview of the entire open system. For example, governments decide on their degree of openness, and companies develop openness policies for open innovation and openness strategies.

Inward openness: boundlessness

I label the second openness perspective inward openness, which can be interpreted as boundless. Here, the term "boundless" does not mean chaos or a lack of rules. It means a spirit whereby things are not taken for granted. This perspective is rooted in social science and political science. Contrary to the necessity of an outer environment in the outward openness perspective, in the context of society, social science scholars have found openness by looking inward, i.e., the relationship between social norms and people within society.

The foundation of inward openness originates with The Open Society and Its Enemies (Popper, 1945). Armbruster and Gebert (2002), which is included in this review, introduced Popper's

openness concept from social science to the management field. Open society in Popper (1945) is established as the opposite of a totalitarian society. Openness is defined as a "pattern of thinking" and thus emphasizes what people think. When people in a society think that their future is fixed, predetermined or bounded, the society is considered to be closed, and when people in a society think their future is open-ended and filled with possibilities, the society is considered to be open. For example, in ancient China, around 700 BC, when GuanZhong managed Qi, he proposed that "[s]cholars should be sons of scholars, artisans should be sons of artisans, businessmen should be sons of businessmen, and farmers should be sons of farmers". In the Ming dynasty, the profession of "soldier" had to be inherited by a soldier's son. Therefore, an individual's future profession, and therefore his destination, was determined when he was born. Gebert and Boerner (1995) identified three dimensions of openness, a social dimension in which openness means the degree to which people do not have a predetermined social slot/position, an epistemological dimension means the degree to which human knowledge can be free from error and can be questioned, and an anthropological dimension means the degree to which social norms can be predetermined.

Like outward openness, a certain degree of certainty or closure is also thought to be necessary for inward openness, but from a different angle. In Popper (1945), although the author believed that current social norms or "institutions" should be challenged, he proposed a planned procedure for the challenge: "piecemeal social engineering". Popper (1945) wrote that "institutions can be planned; and they are being planned. Only by planning, step by step, for institutions to safeguard freedom, especially freedom from exploitation, can we hope to achieve a better world". Therefore, Bunge (1996), who was a friend and a critic of Popper, suggested that "[b]y advocating planned social engineering, not laissez-fairism, Popper incurs in contradiction. But, since he has no positive moral philosophy, his advocacy of social engineering is procedural rather than substantive". Without getting into a philosophical debate, what is important for the openness literature is the distinction between substance openness -, i.e., what is opened, and procedural openness -, i.e., how to decide what is opened. In the open society framework of Popper (1945), closure at the procedural level seems to be a necessary condition for openness at the content/substance level.

In addition, although, unlike outward openness, inward openness does not require the existence of an outer environment, it does not mean that inward openness will disappear in the presence of an outer environment. An example of this is if a previously proprietary software of a firm is developed

to be open-source. The degree of the software's openness is increased because it now encourages more possibilities via future modifications. These modifications could be achieved both internally and externally. Thus, inward openness does not distinguish between the inter and outer environment. However, most open innovation work focuses on outward openness because scholars are interested in what the firm and the software can gain from communities and people outside the firm. Thus, the impact of open source access to those who previously had access to the software is neglected.

An early application of inward openness can be found in scholar-firm cooperation. Chrisholm and Elden (1993) argue that action research is closed when the process is predetermined and open when the process is invented and discovered by both the firm and the researcher.

One recent example of inward openness is represented in the open vs. closure standard literature. In their theoretical article, Christensen et al. (2017) proposed a concept called "licence to critique", which they defined as follows: "licence to critique means that critique is recognized as an important and necessary dimension of organizational development and that ongoing assessments of organizational practices therefore are welcomed, indeed encouraged, from all corners of the organization". In addition, they state that "licence to critique, thus, is a managerial philosophy designed to involve managers and employees, draw on their insights, and stimulate their critical thinking while avoiding a premature closing down of discussions along with a potential to improve organizational practices". This "licence to critique" approach is aimed at shifting organizations' and employees' "patterns of thinking" regarding standards to challenge the existing standards and to not take them for granted. Although the authors did not cite Popper, their idea that open standards should be challenged by users of standards resembles Popper's concept that norms in open society should be challenged by users of the social norms. In the current example, there is no distinction between inner and outer environments. Standards are created by organizations whose members are, in turn, users of the standards. Thus, openness here does not emphasize exchange but rather boundlessness.

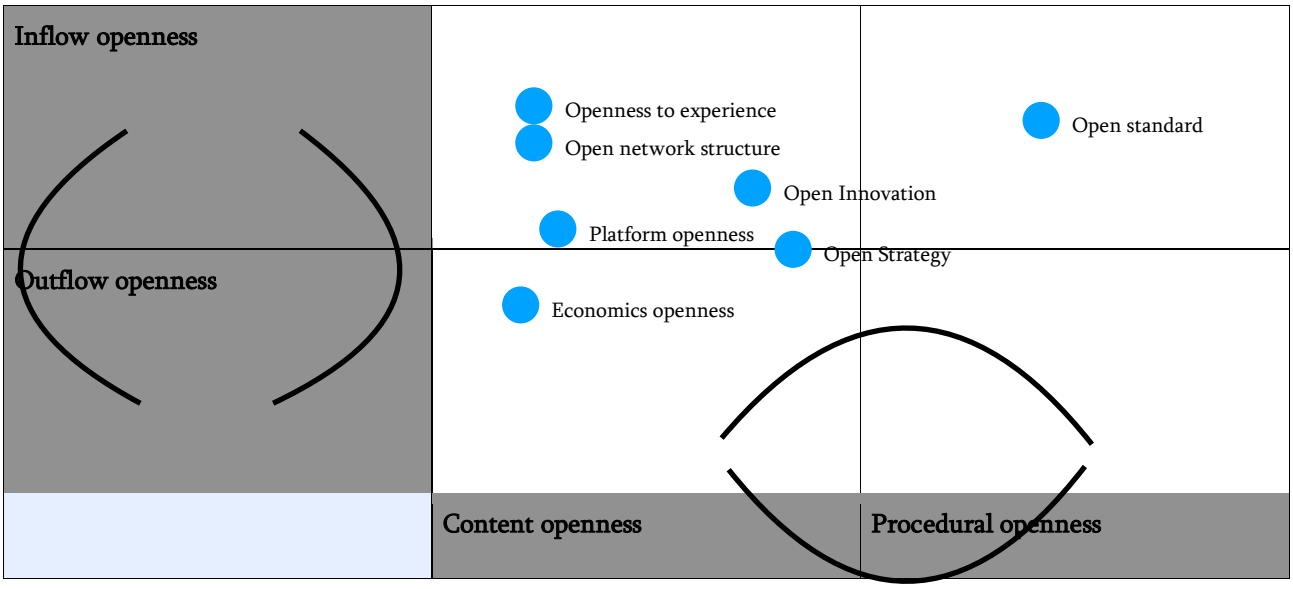
Connection between inward and outward openness

The two perspectives I have identified are two distinctive ways of studying an openness-related phenomenon. The distinction of the perspectives may not have existed within the minds of the authors when they wrote about openness. I only summarized and differentiated these two perspectives after reviewing management openness articles. One exception was Dobusch et al. (2019), who were able to combine both perspectives explicitly when analysing Wikipedia's open strategizing processes.

Dobusch et al. (2019) assessed openness via three dimensions: "access to sensitive information", representing the outflow of exchange; "modes of participation", representing the inflow of exchange; and "modes of decision-making", representing a boundless procedure. They found that openness in the three dimensions differs within and across each identified strategizing phase. They also evaluated these three dimensions via content openness and procedural openness. They found that in all openness dimensions, the degree of content openness was relatively high, while the degree of procedural openness was relatively low. Therefore, they concluded that procedural closure might be a necessary condition for content openness.

Inspired by Dobusch et al. (2019), in an effort to help scholars be more precise concerning the meaning of openness, I combine the defining feature of outward and inward openness. For outward openness, the defining feature is inflow vs. outflow, and for inward openness, the defining feature is content vs. procedure. Combining these two features, we can obtain a framework that helps scholars map their perspectives on openness, not based on level of analysis or context but on the foundations of openness. Figure 2-8 below presents the four types of openness and exemplary relative positions of some openness concepts.

Figure 2-8, four types of openness



This framework could allow scholars to be more specific in addressing what openness means in the specific openness context. It can also remind scholars that there can be different types of openness hidden within the phenomena that can be discovered. For example, the relative central position of open strategy suggests that, in my understanding, it is the most balanced concept. It treats inflow and outflow as equally important while it emphasizes content openness, and it begins to acknowledge procedural openness. Although openness to experience and open network structure are at different levels of analysis, they are positioned closely to each other. Both of them present a sole interest in inflow and content openness.

In addition, the curves connecting inflow and outflow and content and procedure indicate that these variables are dependent. However, more empirical works are required to study the exact relationship and dependency.

Persistency of openness

The above literature review also shows that the openness concept varies in its persistency. I define openness persistency as 1. the amount of time the degree of openness will last once openness is achieved, i.e., perishability and 2. the degree to which the level of openness is applied to multiple

situations, i.e., consistency/concurrency. I found that in my review, although there are four possible combinations with the two dimensions of persistency, i.e., perishable + concurrent; perishable + non concurrent; endurance + concurrent; endurance + non concurrent, they tend to go hand-in-hand. In other words, in the reviewed articles, long-lasting openness constructs are likely to be useful in various situations, and situational or contingent openness constructs are likely to change in the future. Therefore, there are two broad categories of openness constructs, one with high persistency and one with low persistency. Moreover, I will also explain that persistent and nonpersistent openness can be affective for the same entity and at the same time, and they might reinforce each other. That is, for an entity that continuously deploys nonpersistent openness choices, these choices might form a general tendency of being open. This open tendency might become a persistent openness, i.e., a teenager who is trained to be open to new ideas might form high openness to experience personality traits. Figure 2-9 below summarizes key features of openness persistency.

Figure 2-9: Key features of openness persistency

	Persistent Openness	Non Persistent Openness
Dimension 1: Perishability	Enduring	Perishable
Dimension 2: Consistency	Consistent	Contingent
Representative openness concepts	Openness to experience, open network structure, open economy.	Open source software, open improvisation.
Characteristic	Tendency and exogenous	Choice and endogenous
Dynamics	Difficult to create and difficult to change once formed	Can be trained and is created ad hoc

The most representative example of persistent openness, which is both enduring and concurrent, is openness to experience in personality traits. It is static because the personality literature has

suggested that once personality traits are formed, mostly due to genetic features and complemented by nurturing experience, it is difficult for them to change in adulthood. It is concurrent/consistent because openness to experience influences an individual's preferences, decision-making and behaviours in various situations, including but not limited to innovation, self-employment, job turnover, and CEO change initiatives (Patel and Thatcher, 2014; Woo et al., 2016; Stock et al., 2016; Homan et al., 2006).

A less representative example but also a relatively persistent form of openness, is openness in social network theory. It is assumed by the articles in my review that once an organization has an open network structure—this position is frequently taken for granted—it is unlikely to lose such a position. No articles in my review indicate the dynamics of network structure or the need to maintain the current open structure. Perhaps in social network theory in general, there is analysis of its dynamics, but it is missing in the management setting. The management literature could therefore benefit from future studies identifying the static feature of network positions, i.e., how hard it is to lose an open network position once it is achieved. The consistency of network structure openness is also high because of its direct connection with information acquisition. All organizational decisions and subsequent behaviours are based on the information obtained by the organization. An open network structure will influence a range of organizational activities including new business ideas, product innovation, and the mobilization of current resources.

Economic openness, which is defined as the degree of a country's international integration, could also be seen as a form of persistent openness. On the one hand, it is difficult to quickly change the degree of international integration. Countries are unable to influence imports and exports by telling citizens and companies what to sell and what to buy. However, they can indirectly influence international trade by adjusting the exchange rate and implementing tariffs and other nationalist measures. Such measures tend to provoke international reactions, i.e., the U.S.-China trade war in 2019; thus, they are rarely used or, when they are, they are used with careful consideration. When China decided to implement economic reform in 1978, it took the country 23 years to join the WTO, and today, its degree of international integration is still limited. Hence, the degree of economic openness tends to be long lasting. On the other hand, the impact of international integration is concurrent and consistent. It can influence decision-making in a range of areas from businesses to charities, from agriculture to medicine and from individuals to the state.

Another type of openness, which is not persistent, is typically contingent, incidental and situational. Once a level of openness is reached, it is typically specific to one event, and it is likely to change in terms of both decisions and behaviours in the future. At the individual level, the counter party of a personality trait is typically labelled the "state of mind". Although not labelled as state of mind in the articles in Stream 2, many of the reviewed articles related to self-expression fit the definition of state of mind. For example, in Kaplan (1978) individuals required the right environmental conditions to openly express self-opinions . This implies that when the conditions are removed, the individuals will not be as "naked" as they would have been. Openness in McGinn and Kenos (2002) is viewed as an improvisation. This implies that the decision to be open by a specific individual is particular to the specific exchange event. When the next exchange event occurs, the individual may or may not continue to engage in open improvisation.

Open innovation, specifically OSS, is also a good representative of nonpersistent openness at the organizational level. Companies can have different policies for different technologies that they have developed. Each technology can have a different OSS licence. For a particular technology, the degree of openness can change according to the development stages. For instance, Love et al. (2011) found a pattern in which firms are more likely to be open externally in the initial stages of innovation than in the later stages. In addition, the inconsistency of openness is also evident in that the open terms are applied to different user groups differently. Henkel (2006) suggested that firms have different revealing techniques. Some are open only to end users, some are open only to businesses, and some are open only after a certain delay.

Other literature streams and openness concepts are less representative. Perhaps because they are the evidence suggesting that although there are distinctions between persistent and nonpersistent openness, they may not be mutually exclusive. That is, an openness construct may actually have a persistent component as well as a nonpersistent component for the same entity at the same time. At the individual level, some scholars have pointed out the possibility that traits may influence state and vice versa. Kiken, Carland, Bluth, Palsson and Gaylord (2015) suggested that a mindfulness state may enhance the mindfulness trait, and Uzun, Vural, Uzun and Yokusoglu (2008) suggested that the anxiety trait may influence the anxiety state. In these two examples, both mindfulness and anxiety have a persistent component and a nonpersistent component. Therefore, it is salient to

determine whether openness to experience also has a state-level counterpart. The study of state means a lot for managerial scholars, because unlike traits, states can be trained, taught and learned. Therefore, companies do not have to hire people with high openness to experience to benefit from the trait. Companies could then implement policies and structures to train employees and managers to benefit from openness to experience.

The duality of openness in persistence is also evident at the organizational level. In the open strategy stream, Dobusch et al. (2019) carefully documented the steps of decision-making for Wikimedia. They showed that each decision on openness was incidental and situational. Some processes were open, and some were not. Meanwhile, they also documented that there is an overarching "culture" in Wikimedia of being inclusive and transparent (the two dimensions of open strategy). This culture is carried into how they make decisions during open strategy because this is how Wikipedia works. Wikipedia encourages everybody with access to the internet to participate, and all editions and previous versions of the Wikipedia page are viewable. The managers have borrowed these open characteristics of Wikipedia into the strategizing process of Wikimedia. Moreover, if a strategy is defined as "a pattern in a stream of decisions" (Mintzberg, 1985) and open strategy can be defined as a firm's strategy, then this pattern tends to be persistent. Therefore, it might be useful for open strategy scholars to consider the relationship between the persistent and nonpersistent dimensions of open strategy.

Perhaps the open innovation literature can also benefit from understanding the existence and distinction between persistent and nonpersistent openness. On the one hand, open innovation addresses companies' decisions regarding the openness of a specific technology at a specific time. On the other hand, open innovation can be about a firm's general tendency of being open, a "trait" or a "culture" of the firm that, once established, will be persistent. The performance implications of openness might be better understood by separating these two types of openness and integrating the interactions between them.

This duality can also be found in the open government literature. While ideally, open government means a government system that allows citizens to collaborate with and participate in government decision-making, Kornberger et al. (2017) showed that in practice, when the ideal is mixed with the existing bureaucracy, the ideal is reduced to a practice of providing selected government data.

This suggests the coexistence of an overarching openness ideal and an incidental openness practice. My current review does not provide a clear explanation for the distinction and interaction between persistent and nonpersistent openness. However, the distinction and relationship are indicated by the articles reviewed.

Cross-level interaction of openness

One theme that occurs at multiple levels of analysis is the cross-level interaction. By cross-level interaction, I mean how factors in one level of analysis, i.e., individual-, group-, organizational- and social-level influencing factors at another level of analysis. This section will focus on investigating the impact of openness on one level on openness at another level. My review obtains evidence regarding three cross-level interactions. Figures 2-10 summarize these interactions and the representative articles.

Figure 2-10: Key concepts of the cross-level interaction of openness

Interactions	Key findings
Individual - Group	1. Tendency of aggregating individual-level openness to measure group-level openness (Neilsen and Daniels, 2012; Mitchell et al., 2014) 2. Influence is bilateral, that group openness encourages individual openness (Kaplan, 1989) 3. Motivator of individual behaviour is individual's perception of TMT openness (Premeaux and Bedeian, 2003)
Individual - Organizational	1. Organizations with employees with liberal political ideologies are open organizations that are more responsive to social movements (Gupta, and Briscoe, 2019) 2. Crowdsourcing platforms mediated the openness of individual solvers and the openness of organisational seekers (Foege et al., 2019) 3. Possible impact of individual openness on organizational openness is suggested by the literature (Rhyne, 1985; Daves and Holland, 1989; Flores et al., 2012), and we might take a capability perspective to view the issue to consider individual openness as a microfoundation for capability openness, i.e., absorptive capacity (Foss et al., 2012)

Interactions	Key findings
Organizational - Societal	1. Influence of positive externality of organizational openness on its industry (Roper et al., 2013) so that there is greater social return on firm openness 2. Public policies that favour openness, e.g., legalization of medical marijuana can enhance firm openness and industry openness (Vakili and Zhang, 2018)

Individual- and group-level interaction

A situation that is rather unique in the measurement of group-level openness is the tendency to use individual-level openness as a proxy or indicator. This measurement implies a connection between individual openness and group openness.

When measuring followers' openness to change as a type of group-level openness, Neilsen and Daniels (2012) first measured individual openness to change and aggregated the result. Mitchell, Boyle, Parker, Giles, Joyce and Chiang (2014) measured team openness to diversity by asking individual members about the beliefs of the team. Although the questions were phased as "The team believes ……", they measured the individual's perceptions of the team beliefs. Therefore, they used the individual-level perception of team openness to measure openness. Using individual perception to measure team/group-level openness is a dominant method at group-level openness. There is also evidence on reversed interaction, i.e., group openness influences individual openness. Kaplan (1989) showed that a shared psychological contract within the group that openness is preferred is a necessary condition for individual openness.

The situation becomes more complicated in the context of a TMT. In previous examples, cross-level interactions of openness occur within the same entity, i.e., the group and members within the group. The TMT setting offers a different cross-level interaction, i.e., the group and members outside the group. In TMT openness, scholars have found it is important to ask whose perception is being represented. Employees' perceptions of TMT openness might differ from the TMTs'

perception of TMT openness. Scholars who study the impact of TMT openness on firm behaviour now choose to use employees' perceptions of TMT openness instead of the TMT's own perceptions. This measurement trend at the group level indicates that group-level openness is influenced by individual-level perceptions of openness. Using this measurement for TMT openness, Premeaux and Bedeian (2003) found that TMT openness can positively influence employee openness (in terms of speaking up) when employees have low self-monitoring and negatively when employees have low self-monitoring.

Individual- and organizational-level interaction

Direct connections between the individual- and organizational-level openness are very limited. One article that made such a connection is Foege et al. (2019). That article connected solver openness (individual-level openness defined as the willingness to share solutions) and seeker openness (organizational-level openness defined as the willingness to accept outside solutions). The authors first highlighted that current research on open innovation's emphasis on inbound- and organizational-level openness. Hence, the lack of individual-organizational interaction is consistent with my review. More importantly, the authors adopted the solvers' perspective. On the one hand, solvers want to provide sufficient information regarding their solutions so that solutions can be accepted by other solvers. On the other hand, if too much information is released, seekers can "steal" the solution and continue without the solver's participation. The main contribution of the authors was to present 7 value appropriation strategies of solvers. Hence, there is limited discussion on the interaction between solver- and seeker openness. Nonetheless, that article pointed out a potential relationship between the two.

The other article that indicates individual and organizational openness connection, which is also very recent, is Gupta and Briscoe (2019). The authors view an open organization as "a function of their members' political ideologies" and find that an organization with more liberal employees is more open because they will be more sensitive to activists' protests and more likely to respond to such protests than in an organization with more conservative employees.

If, temporarily, I am allowed to look outside my reviewed articles on openness, there is literature on routines and capabilities that suggest a relationship between individual level- and

organizational-level constructs. Openness is likely to be one such construct where cross-level interaction can be explained by routines and capabilities.

The literature on routines and capabilities has indicated the existence of a relationship between the individual level and the organizational level. Nelson and Winter (1982) used individual genes for individuals as a metaphor for organizational routines for organizations. Since personality traits are formed largely by individual genes and complemented by childhood experience, would there be an equivalent of personality traits at the organizational level? I propose that one possible equivalent of such a trait at the organizational level is capability. Winter (2000) defined capability as follows: "An organizational capability is a high-level routine (or collection of routines) that, together with its implementing input flows, confers upon an organization's management a set of decision options for producing significant outputs of a particular type". Some identified capabilities have connections with openness. For example, absorptive capacity is related to the inclusiveness dimension of openness, while descriptive capacity is related to the transparency dimension of openness. Although these two capabilities are contained within firm R&D activities, openness can span across organizational activities. Nonetheless, the purpose of this discussion is to demonstrate the possibility of investigating organizational openness from a capability perspective. In addition, Felin, Foss, Heimeriks and Madsen (2012) discussed that "[t]he study of big five personality characteristics has a long history in organizational behaviour; opportunities exist for bridging this work with work on aggregate, interactional, and emergent organizational behaviour. Routines and capabilities, in other words, might crucially depend on the characteristics of the individuals involved". However, in the current literature review of openness, no direct and explicit connection is made between individual-level openness and organizational openness. It has been shown that individual-level openness can influence managerial decision-making and behaviour. (Rhyne, 1985; Daves and Holland, 1989; Flores et al., 2012). Thus, if future research could make a connection between managerial behaviour and organizational openness, then a connection between individual-level openness and organizational-level openness could be made, e.g., how the openness to experience of R&D employees can influence absorptive capacity.

Organizational- and social-level interaction

Scholars have also suggested a relationship between organizational-level openness and societal-level openness. One mechanism for the openness interaction to occur is through spillover. Roper

et al. (2013) found that the social return of firms being open exceeds the private return of being open. Put differently, the innovation quality of a factory is positively associated not only with its own openness but also with the externality of openness. In this article, openness is measured at the plant/factory level regarding the number of types of external partners with which the plant has collaborated, from 0 to 8. The externality of openness in innovation is measured as a sectoral proxy by calculating the "average breadth of innovation linkages among each plants' peers in its industry (within 2-digit sectors)" (Roper et al., 2013). However, in a model testing the impact of externalities on firm-level openness, the result is insignificant, suggesting spillover does not enhance firm-level openness practice adoption. The authors claimed that their work is still preliminary and that their results may not be conclusive. Authors interested in this line of inquiry may learn from the cross-level interaction in TMT openness (Premeaux and Bedeian, 2003), where the cross-level openness interaction is moderated by individual-level factors. Therefore, there may be moderators or conditions under which spillover can influence firm-level openness positively or negatively.

Vakili and Zhang (2018) considered the impact of 2 liberalization policies and 1 anti-liberalization policy on innovation. The policies are as follows: 1. Legalization of same-sex civil unions, 2. Legalization of medical marijuana and 3. Abortion restriction. The authors found a positive and significant connection of liberalization-enhancing policies with an individual-level openness proxy (time gap between patents and cited prior arts to capture knowledge diffusion speed), organizational-level openness proxy (incumbents' new collaborative ties and collaborators' knowledge diversity), and state-level openness proxy (share of local citations). Although this article does not articulate the cross-level interaction directly, it identifies a confounding possibility, where openness at different levels of analysis could be influenced by the same factor, e.g., liberalization policies.

Armbruster and Gebert (2002) translated Popper's (1945) thinking from the social level to the organizational level. With regard to cross-level interactions, the authors hinted at two possibilities. First, they mentioned that in some cases (without specifying the conditions), an open organization could influence the preferences of individuals within the organization towards higher openness. Since these individuals are also part of society, their openness preferences could influence their social-level preference for openness. Second, they noted that in some other cases (without specifying the conditions), individuals' need for closeness might be fulfilled by a closed

organization, and thus openness at the social level could be more stable. One premise for the second argument is that organizations are inherently more closed than society because organizations tend to have a predefined purpose or objective that does not exist for a society. Connections made by Armbruster and Gebert (2002) are very abstract. However, they give an idea of how organizational and social level openness might interact.

Overall, the above discussion on cross-level interaction shows different possibilities where openness at different levels could interact. There could be a direct influence, both positive and negative, where openness at one level directly influences openness at another level; moderated or mediated influence, where the direction or size of influence is influenced by a third factor; or confounded influence, where the same factor could influence openness across levels. Nonetheless, both theoretical and empirical research on cross-level openness interaction is scarce. This area could be potentially important for organizational researchers who are interested in understanding the microfoundations of organizational-level constructs.

Conclusion and discussion

One conclusion I can draw from reviewing the articles related to openness is that there is no such thing as an openness literature. There is no common foundation upon which all papers are based. Even though I identified two key perspectives of openness, they do not exist a priori for most of the articles that used openness. These two perspectives are merely the findings of my review. Therefore, there is no top-down structure or organization for all articles that referenced openness. Rather, because of the diversity of the meaning of openness as well as the pervasiveness of phenomena related to openness, openness streams arise independently from different sets of contexts and phenomena. Within the same stream, as I sought to show in the above review, there has been some progression and development of the openness concept over time. However, due to the various contexts and theoretical backgrounds, these streams tend not to communicate with each other, especially when they are not on the same level of analysis.

Therefore, after listing and summarizing 11 openness streams, (I admit the limitation that the boundary of each literature stream is not as solid as I had hoped it would be) I sought to synthesize these articles and streams in the analysis section. In the process of synthesis, I discovered two

perspectives of openness that may connect diverse ideas underlying openness in different contexts: most of the articles implicitly adopted either an outward openness perspective or an inward openness perspective. I also found that the persistency of openness might be an important openness characteristic that can guide future research. Last, although openness is found at various levels of analysis, the influence of openness seems to transcend levels. Therefore, it would be useful for scholars interested in organizational level openness, i.e., open strategy, to examine how openness as a trait differs from openness as a state because the latter can be trained and people are key components of organizations. I hope that readers of this article will be better informed or even inspired to consider different aspects of openness.

Inspired by my review of openness in management, I observe that many areas of openness are still unclear and require future research. I will outline some areas that I feel are underdeveloped and can produce interesting results.

Openness as in a two-party interaction

As I have suggested through the review, in most literature streams excluding open network structure, platform openness and crowdsourcing platforms, openness is viewed from the outward openness perspective and under a two-party interaction context. The two parties are typically entity A and its environment, e.g., and individual and other people or entity A and another entity in the environment, e.g., a firm and its partner firm. When the entity is interacting with multiple other parties, the situation is treated as multiple two-party interactions, so that there is no categorical difference. Therefore, the most common basic analysis context for openness is two-party interaction. Figure 2-11 below illustrates the two-party interaction.

Figure 2-11: Two-party openness interaction under an outward openness perspective

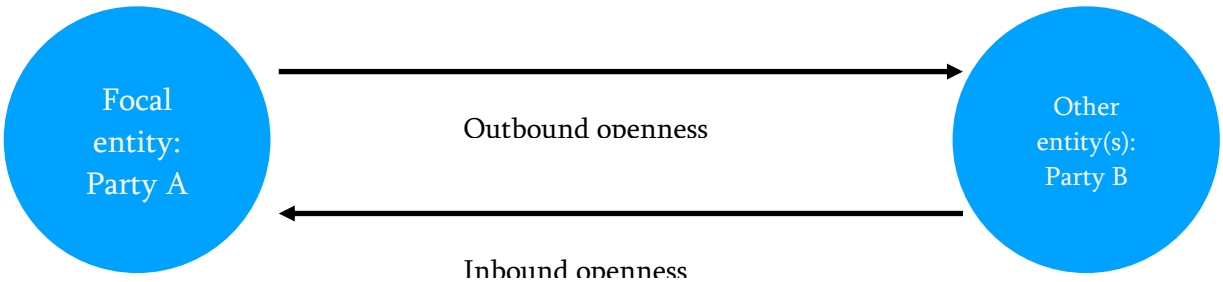
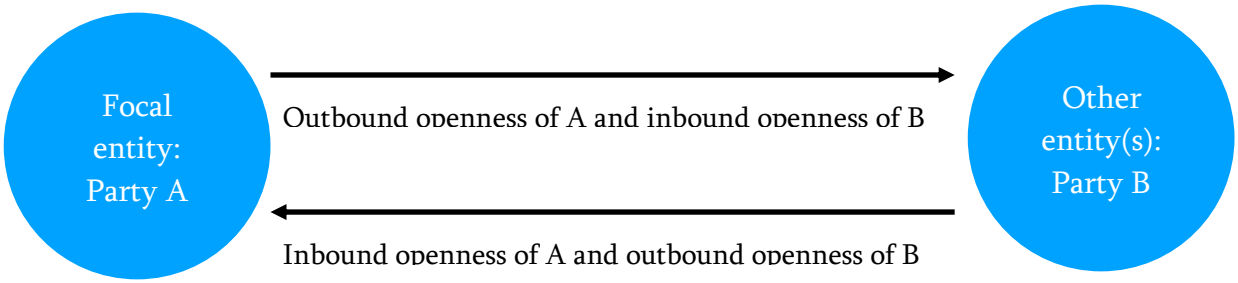


Figure 2-11 represents an interaction between party A and party B. The inbound openness of party A determines what it will get from party B or inclusiveness, and the outbound openness of party A determines what it will give to party B or transparency or revealing. This whole narrative is based on the viewpoint of Party A. This is what I mean when I say that scholars in the outward openness stream tend to take the perspective of the focal entity. If we can take a step back and remove ourselves from the perspective of party A, we will be able to see that the arrow representing the outbound openness of party A also represents the inbound openness of party B, and the arrow representing the inbound openness of party A also represents the outbound openness of party B. Thus, an equal emphasis on party A and party B can be represented by Figure 2-12 below:

Figure 2-12: Two-party openness interaction under an outward openness perspective (modified)

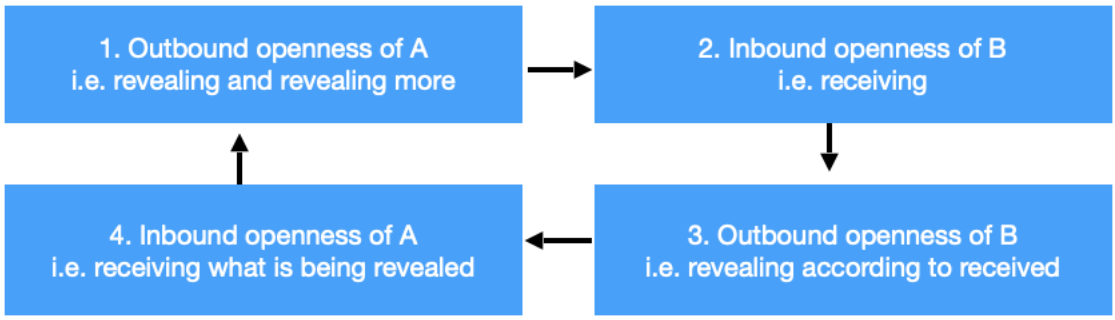


The value of including the inbound openness of B when thinking about and studying the outbound openness of A can be critical in understanding the consequences of openness in open strategy, open innovation and open government. For example, in open innovation, one set of the most representative studies is Laursen and Salter (2006) and Laursen and Salter (2014), who look for a relationship between search breadth and innovation performance. In these cases, search breadth is a measurement of inbound openness. The search breadth variable can be complemented by a "revealing breadth" variable from the perspective of "knowledge sources" to determine how open these sources behave when revealing information and knowledge to organizations. There are three possible variations: 1. When the inbound openness of A equals the outbound openness of B, 2. When the inbound openness of A is higher than the outbound openness of B, and when the inbound openness of A is lower than the outbound openness of B. It is not the objective of this review to estimate how these variances can influence open innovation results. I merely want to point out a

relationship that exists in these two-party interactions between the inbound openness of the focal entity and the outbound openness of the environmental entities. Therefore, in an open strategy, it is probably equally important to have policies to ensure the firm's willingness to listen to external sources as well as policies to ensure external sources' willingness to share.

Moreover, as noted, in TMT openness and perceived openness and in the signalling function of openness in open innovation (Fontana et al., 2006), the outbound openness of the focal entity can positively influence the outbound openness of the other entity, which is likely to benefit the inbound openness of the focal entity. These interactions can be easily extended to a feedback loop, as shown in Figures 2-13 below.

Figure 2-13: Exemplary feedback loop of openness in two-party interaction



In other words, for companies that are interested in gaining external information and resources, they probably will need to think about what to give first; and for companies that are interested in giving away information and resources to others, they probably need to think about what to gain first.

Openness as in a three-party interaction

By three-party interaction, I am referring to platform context. Although platforms themselves may not be a new topic or phenomenon, technologically or economically, the success of the world's largest companies has drawn scholarly attention to modern platforms such as digital platforms. These platforms tend to combine both technological features and economic features (Gawer, 2014). They facilitate both innovation and transaction. Because of the technological nature of platforms, openness has been considered a core characteristic of platforms. As reported by Thomas et al. (2014), 52% of their reviewed platform articles mentioned openness. Therefore, they developed a framework for platform (architecture) openness along the dimension of openness to participation. According to them, the openness of a platform is defined by whether the supply side participation is closed and whether the demand side participation is closed. Therefore, Thomas et al. (2014) created three categories of openness: closed, many(supply)-to-one(demand), and many(supply)-to-many(demand).

However, because of the unique characteristic of platforms, openness to participation in the platform context differs from openness to participation in, for example, an open strategy. I think the fundamental difference is that in a two-party interaction, the purpose of party B is to interact with party A, whereas in a platform context, when party A connects party B and party C, e.g., an app store, with developers and users, respectively, the purpose of the user is to use the app store and not to interact with the app store but to interact with developers and their apps. Figure 2-14 below demonstrates openness in a three-party interaction.

Figure 2-14: Three-party openness interaction

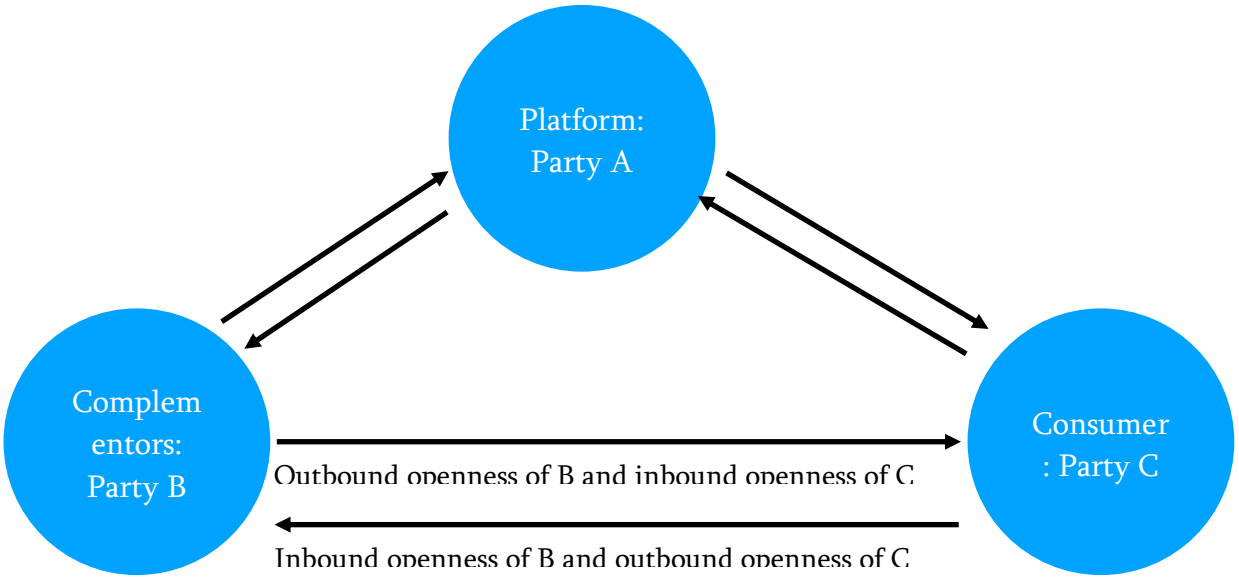


Figure 2-14 could complement the current understanding of platform openness in a number of ways. First, current platform openness views openness from that platform's perspective, while Figure 14 considers platforms, complementors and consumers to be equally important. Second, the current focus of "participation" only considers the inflow of outward openness. Would the disclosure of ranking mechanisms also be considered a part of openness? For example, the difference between Google's disclosing of its search engine ranking mechanisms completely so that participants can maximize SEO and Google's withholding of all information regarding SEO so that participants are forced to guess at the rules behind Google's ranking system. Another example would be if Apple were clear about what apps can be sold via its app store and what apps cannot be sold so that developers would not have to waste time developing not-allowed apps only to discover that a particular app is not allowed after development. I think that these choices are also considered to be part of the openness concept. I further propose that these openness choices would influence not only outflow but also inflow. Perhaps a certain degree of transparency can encourage participation. The types of mechanisms I present in the context of a two-party interaction might be applicable for a three-party openness interaction.

In addition, there is inward openness, i.e., how the rules that govern what can be sold on Apple's app are determined. According to Eaton et al. (2015), the initial rules of Apple's app store are co-constructed by Apple, developers and other stakeholders on a continuous negotiation basis. Then, at that stage, the procedural openness would be high. According to my review, high procedural openness is likely to cause instability and thus reduce content openness. At the present time, could developers challenge these rules at the Apple Store and at the Android Store, and how would they go about it? These questions may have implications for the openness of these platforms. However, to date, the majority of the understanding of platform openness remains at the distinction among closed, many-to-one, and many-to-many. Even though there are exceptions that discuss openness from other angles, e.g., Benlian, Hikert and Hess (2015) measured platform openness from the complementor perspective regarding both transparency and accessibility. However, no article has

comprehensively discussed platform openness and made connections between dimensions such as the relationship between transparency and accessibility.

Additionally, in a platform setting, the distinction between different phases of openness, specifically, screening and searching, becomes apparent. In match-making platforms, an extremely open policy on screening for complementors could cause trouble for end-users if the selection process is as open. Imagine if the search results on Google were shown to users in a random order instead of in order of relevance. I would suggest the ordering system of a search engine as a screening practice. This complicated relationship among platform, complementor, end user and the platform's openness choice regarding searching and screening has yet to be unpacked. I suggest the by differentiating screening and selecting, we can identify another source of competitive advantage of platforms. As suggested by Davis (2014), "the core technology of journals is not their distribution but their review process". Perhaps the core technology of the platform is not only what can be found on it but also how it is presented to end users.

Chapter 3: Business model choice and platform performance in the UK p2p lending industry.

Introduction

A core question in the field of strategy concerns the key steps that firms can take to survive and prosper. Strategists have taken careful considerations about many key steps, such as capturing key resources (Barney, 1991), managing routines and capabilities (Winter, 2000), examining the dynamics of capabilities (Winter, 2003), and positioning in the preferred market or industry (Porter, 1980). However, the rise of platform businesses may suggest that another equally important step also requires careful consideration—interdependency, which is particularly important for enhancing our understanding of the emergence of digital platforms (Lanzolla and Markides, 2021).

One of the key features of digital platforms is the existence of multiple related user groups. How the platform can manage relationships between these user groups can be seen as a key element of interdependency. In this essay, I intend to use the business model perspective to closely examine how digital platforms, particularly intermediary firms, manage such relationships and the impact and dynamics of different business models.

Thus, the overarching research question is as follows: How does business model choice influence the performance of digital platforms?

My reading of platform literature informs me that different scholars have used different labels to categorise platform business models. However, at the theoretical level, two contrasting business models for digital platforms are particularly important and relevant: a marketplace model and a reseller model.

Hagiu and Wright (2015) explicitly compared the marketplace model and reseller model in an intermediary platform setting. For them, the key differentiating factor is the distribution of residual control rights between platforms and their suppliers. From a different perspective, Van Alstyne, Parker and Choudary (2016) contrasted the “platform” strategy and the “pipeline” strategy. The authors concluded that platform firms emphasise resource orchestration, external interaction, and

ecosystem value, while pipeline firms emphasise resource control, internal optimisation and customer value.

In the business model literature, Baden-Fuller, Giudici, Haefliger, and Morgan (2017) identified business models in "dyadic arrangements" and "triadic arrangements". The central distinction between dyadic business models and triadic business models is whether the relationship between business actors can be reduced to a set of dyadic relationships. If the reduction is possible, then the business model is "dyadic"; otherwise, the business model is "triadic".

In my understanding, the three sets of concepts share strong similarities. They all describe similar phenomena—the business model of firms for a purpose. Hagiu and Wright 's (2015) article stands on the perspective of a product and answers whether a product should be sold under a matchmaker or reseller. Based on this product-business model fit, companies should then choose the corresponding business model. Van Alstyne et al. (2016) emphasise the competition between different kinds of business models. In their understanding, platforms will outcompete pipelines in most situations through mechanisms such as platform envelopment. Therefore, they describe in detail what a pipeline firm should do to transform itself to a platform firm. In Baden-Fuller et al. (2017), the distinction is made for the purpose of creating different mental templates or cognitive models so that researchers and practitioners can manipulate different business models imaginatively and then possibly adjust real-life businesses.

Knowing the distinction of the two business model types, namely, marketplace and reseller, I also found an empirical setting—UK p2p lending—where platforms have adopted the use of different business models and compete directly in the same industry. Some platforms decided to operate as a marketplace, and others operated as a reseller. Moreover, my initial research also finds that these platforms may change their business model over time.

Thus, I unpacked my overarching research question into three parts:
Why do some platforms start as marketplaces, while others start as resellers?
How does the initial business model choice impact the performance of these platforms?
How do platforms change their business models?

The data that I collected could only answer the first question indirectly via two answers. Quantitatively, I find a positive and significant relationship between the reseller model and firm financial resources (measured in total assets, debtors, and creditors). Assuming that business model decisions are made prior to actual platform operation, I would suggest that running a reseller business model requires more financial resources than running a matchmaker business model in the specific context. Therefore, most platforms start from marketplace business models.

Qualitatively, by collecting and analysing the platform's historical website, I found that platforms tend to use two types of analogical reasoning: being different from banks and being eBay for the loan market. Knowing that the business model for bank loan/deposits is more consistent with a reseller model and that the eBay business model is more consistent with a marketplace model, it is reasonable to argue that when the founders designed their business models, they tended to use these two types of analogical reasoning, which led to the preference of marketplace business models.

For the second question, I have some very interesting findings. I have operationalised "performance" to "survival" because almost all of the platforms are not making a positive profit and they are usually extinct after a couple of years. The usual performance indicators would not make sense if they were applied to this specific sample.

Using binary logistics, as anticipated, platforms with more financial resources survive longer. In addition, we know already that resellers tend to have more financial resources than matchmakers. However, when both factors are considered, including other control variables, I found that starting as a reseller has a positive relationship with extinction ($p=0.056$). This result holds under both linear regression ($p=0.039$) and Cox regression ($p=0.024$), which examine the length of survival.

The direct and usual interpretation of the finding would be that in the p2p lending market, marketplace platforms outperform reseller platforms; therefore, they survive longer. However, if we move the focus from the funding business model of the platforms to the current business model of p2p lending platforms, according to FCA CP18/20, the discretionary model (reseller) comprises 60% of p2p platforms and 88% of the market share. This means that between 2005 and 2018, a significant change in the p2p platform's business model occurred. What we now observe from the data is that, although when entering the p2p lending market the reseller is likely to become extinct

faster, after 13 years of development in the industry the reseller has become the dominant business model in the market.

For the last question, I sampled 22 platforms with sufficient financial resources and that had survived for a sufficient length of time such that a change in their business model could happen. Among the 22 platforms, 10 of them started as reseller business models. I found that nonreseller platforms do change to reseller platforms, while the reverse change did not happen. More importantly, nonreseller platforms are more likely to change to resellers when the originated loans are unsecured individual loans (compared to secured loans and business loans). I collected more refined data on each of the 22 platforms and found the following: 1. The change process is continuously manifested by many practices that gradually change the balance of residual control rights. 2. Perceived differentiation rather than product differentiation may determine the "right" business model choice. 3. A change to the reseller model may also be induced by the learning differential, where platforms can learn faster about loan pricing than investors and borrowers.

This chapter mainly contributes to the platform literature. First, I have attempted to clearly indicate the difference between a platform using a platform strategy and a firm that uses a platform. All of the p2p lending platforms are architectural platforms, but not all of them use platform business models.

Second, while previous literature discusses the two different types of business models cross-sectionally, this chapter illustrates the value of considering the two business models longitudinally, showing the conditions under which nonreseller models are changed to reseller business models. In the p2p lending context, the matchmaker can be a great business model when entering a new market; however, as the market matures, the reseller model is a better business model to capture value from the market.

Last, the chapter makes a connection between the conceptual level—the cognitive model—in which entrepreneurs and scholars think about businesses, and the real activity level, at which the platforms actually operate and implement their policies and practices. Although the distinction between business models is clear at the conceptual level, real platforms tend to include features or activities at both levels. Platforms change some activities over time.

Literature background

Platform as architecture - structural view

In the managerial world, a digital platform as a construct is commonly used by firms to present themselves to stakeholders. There is no clear and unified definition of what constitutes a digital platform. However, many of the most valuable firms in the world, Alphabet, Apple, Amazon, Facebook, and Alibaba, identify themselves as digital platforms. "Unicorn" start-up companies, such as Tiktok, Ant-finance, Stripe, and Discord, also consider themselves digital platforms. This self-identification is also recognised and used by stakeholders.

In the management literature, it could be argued that the usage of a "platform" is decentralised at the beginning. Many different (but related) research streams have attempted to use the term "platform" in different contexts and in different meanings. Figure 3-1 below illustrates selective platform-related definitions.

Figure 3-1: Representative platform definitions

Authors and platform	Definitions
Ciborra (1996): platform organisation	"A platform is a meta-organisation, a formative context that moulds structures and routines, shaping them into well-known forms, such as the hierarchy, the matrix and even the network, but on a highly volatile basis"
Bresnahan and Trajtenberg (1995): general purpose technology as a platform	(General Purpose Technologies) are characterised by the potential for pervasive use in a wide range of sectors and by their technological dynamism"
Robertson and Ulrich (1998): platform product	"(Platform is a) collection of assets that are shared by a set of products."

Authors and platform	Definitions
Gawer and Henderson (2007): product platform	"We define a product as a "platform" when it is one component or subsystem of an evolving technological system, when it is strongly functionally interdependent with most of the other components of this system, and when end-user demand is for the overall system
Rochet and Tirole (2006): two-sided platform	"A two-sided market is one in which the volume of transactions between end-users depends on the structure and not only on the overall level of fees charged by the platform."
Armstrong (2006): platform companies	"Many markets involve two groups of agents who interact via "platforms," where one group's benefit from joining a platform depends on the size of the other group that joins the platform."

It was not until Baldwin and Woodard (2009) that the literature started to bridge the different perspectives on platforms by using an architecture view or a structure view. There were three waves of literature in management that discussed platforms: product development (i.e., Wheelwright and Clark, 1992; Kogut and Kulatilaka, 1994; Meyer and Lehnerd, 1997), technology strategy (i.e., Bresnahan and Greenstein, 1999; Gawer and Cusumano, 2002), and industrial economics (i.e., Rochet and Tirole, 2003 & 2006; Parker and Van Alstyne, 2005; Economides and Katsamakas, 2006). Baldwin and Woodard argue that there is a common architecture for the platforms that are discussed in the three different streams. This platform architecture has three parts: a set of stable and low-variety components that forms the core; a set of less stable and high-variety components

that complements the core; and a set of potentially more stable interfaces that governs the relationship between the core and the complements. They argue that platform architecture tends to evolve via frequent improvement in the complements and much less frequent improvement in the core and that the interface tends to be more stable. From here, the consensus in platform literature starts to form, enabling scholars to distinguish platforms from other organisational formats by using the architecture feature of platforms.

Building on Baldwin and Woodard's (2009) notion of a stable core, flexible periphery and interface, Gawer (2014) proposed viewing platforms as meta-organisations that "(1) federate and coordinate constitutive agents who can innovate and compete; (2) create value by generating and harnessing economies of scope in supply or/and in demand; and (3) entail a modular technological architecture composed of a core and a periphery".

The literature on platform structure has clarified not only platform architecture or key and unique components of platforms but also the logics behind such structures. For instance, Gawer (2014) identified two main themes in the platform literature: one that considers platforms from the supply side or a technological view, emphasising the synergy effect via economies of scope and innovation, and the second one that considers the demand side or an economics view, emphasising the synergy effect via economies of scope in demand. By reviewing 183 platform-related articles, Thomas, Autio and Gann (2014) identified three logics of leverage—the ways that platforms could generate an impact that is disproportionately larger than the input: 1. production leverage that focuses on the shared use of a set of assets repeatedly to achieve economies of scale and scope; 2. innovation leverage that focuses on the shared use of a set of assets repeatedly to achieve innovation; and 3. transaction leverage that is "based on the manipulation of the market pricing mechanism and market access, which drives transaction efficiency and reduces search costs in the exchange of goods and services" (Thomas et al., 2014). These logics are compatible with those identified by Gawer (2014).

Based on the architecture foundation, Cusumano, Gawer and Yoffie (2019) identified three kinds of platform companies. An innovation platform "serves as a technological foundation upon which other firms develop complementary innovation", exemplified by Wechat, Amazon AWS and Andriod; a transaction platform can "serve as an intermediary for direct exchange or transactions,

subject to network effect", exemplified by Snapchat, Airbnb and app stores; and, last, there are hybrid companies or platforms that integrate both kinds of platforms, exemplified by Amazon.com, Google's search engine and Valve. By this understanding, Gawer (2021) noted that "digital platform firms use digital technologies and connectivity to exploit and control digitized resources that reside beyond the scope of the firm, creating value by facilitating connections across multiple sides, subject to cross-side network effects."

In addition, from the information system literature, de Reuver, Sorensen and Basole (2018) specifically discussed features of digital platforms. They argued that a digital platform is quite different from a nondigital platform and defined a digital platform from a technical view as "an extensible codebase to which complementary third-party modules can be added" and from a sociotechnical view as "technical elements (of software and hardware) and associated organisational processes and standards". Although different, the structure of the digital platform is still consistent with the architectural view of Baldwin and Woodard (2009) and the later platform literature that builds on it.

Following this line of thought, this thesis defines a digital platform company as a firm that controls and depends on an innovation platform, a transaction platform, and/or a hybrid platform.

An inspection of the above platform literature from a strategy or, more precisely, a business model perspective reveals that scholars have set up a solid foundation for platforms from a structural view. The structural view is very helpful in enhancing our understanding of whether a firm is a platform firm and what kind of platform firm it is—the leveraging logics. However, it is difficult to assess the performance of digital platforms. How could a digital platform survive and prosper? More importantly, what are the key factors that are unique to platform businesses that should be considered to develop a successful platform?

Platform as strategy - behaviour view.

Developed from the concept of a two-sided market and a two-sided platform (Rochet and Tirole 2003; 2006; and Evans, 2003), strategists started to investigate the behaviours of platform companies. In other words, they started to work on key strategic practices that a platform firm should consider and that may influence its success or failure. Around this central topic scholars

have asked questions, such as the following: How do platforms compete with each other (Rochet and Tirole 2003, 2006; Cennamo and Santalo, 2013)? How do platform companies compete with nonplatform companies (Eisenmann, Parker and Van Alstyne, 2011)? How do platforms compete and work with platform participants (Zhu and Liu, 2018)? Then, scholars began to consider the formation of platform companies, such as the leadership role of platform companies (Gawer and Cusumano 2002; Boudreau, 2010) and consequently the formation of an ecosystem (Parker, Van Alstyne and Jiang 2017; Jacobides, Cennamo and Gawer, 2018).

However, instead of separating platforms from nonplatforms by analysing their structure, i.e., whether it has a stable core or a set of peripherals and linkages and/or multiple user groups and indirect network effects, strategy scholars distinguished between firms using a platform strategy and those not using a platform strategy. One advantage of doing so is that in certain types of businesses, i.e., market intermediaries, firms are all platform companies from the structural point of view, but they might not be using a platform strategy.

Hagiu (2007) contrasted between the two strategies (in his words, modes) in market intermediaries. He argued that "the main difference between the classic form of market intermediaries—which we will call **merchants** from now on—and **two-sided platforms** is that pure merchants, by taking possession of sellers 'goods, take full control over their sale to consumers. By contrast, pure two-sided platforms leave that control entirely to sellers and simply determine buyer and seller access to (or affiliation with) a common marketplace." In Hagiu's opinion, although iPod/iTunes exhibit indirect network effects, have multiple user groups (music owner and buyer), and fit with the platform architecture, "the extent of control over pricing and distribution that Apple maintains makes iTunes more similar to a merchant such as Walmart, rather than a pure two-sided platform, such as eBay." He also proposed that when the chicken-egg problem is difficult to overcome, when strong complementarity and substitutability between sellers' products exist, when buyers and sellers can conduct off-platform trade, and when the quality of offerings are stable and certain, merchant modes are preferred over two-sided platforms.

Hagiu and Wright (2015) further developed the concept and labelled the two modes as "**reseller**" and "**marketplace**". They articulated that the key differentiating factor is that if the platform company holds the residual rights over goods sold on it, it is a reseller; otherwise, it is a marketplace.

The contrast between the two different modes of operating a business is echoed by Van Alstyne, Parker and Choudary (2016). Van Alstyne et al. (2016) distinguished between a "**pipeline strategy**" and "**platform strategy**". In their conceptualisation, the key differentiating factor between the two strategies is that pipeline strategies " create value by controlling a linear series of activities" and platform strategies "bring together producers and consumers in high-value exchanges". The difference between the argument of Hagiu and Wright (2015) and that of Van Alstyne et al. (2016) is that the former limits the scope of the modes to intermediaries, but the latter's strategy is applied to all kinds of firms. In other words, there is little difference when we talk about intermediary firms.

Baden-Fuller, Giudici, Haefliger and Morgan (2017), according to the business model literature, also argued that based on the boundary of the firm-customer relationship, all business models can be categorised as "**dyadic arrangements**" and "**triadic arrangements**". Triadic arrangements indicate that the firm is connecting more than 2 customer groups. In other words, the relationship between the firm and its customers cannot be reduced into a set of dyadic relationships. The authors consider triadic arrangements to be platforms and dyadic arrangements to be nonplatforms. Within the triadic arrangements, they defined triadic matchmaking as "a platform that connects consumers with suppliers, saving search effort" and triadic multisided as "a platform that supplies a good or service that contains additional benefits from 3rd parties—that typically pay for the whole package."

Figure 3-2 below illustrates the key features of these two modes/strategies/forms of intermediary firms. Note that as Hagiu (2007) argued, these two modes are polar types of intermediaries. Real-world intermediaries are likely to be in between the polar cases.

Figure 3-2: Contrasting between the two models

	Merchants/reseller/pipeline/ dyadic	Two-sided platforms/marketplace/platform /triadic
Indirect network effect	Possible	Necessary
Different user groups	Subjective to interpretation of "user group"	Necessary
Relationship between user groups	Indirect contact	Direct contact
Platform architecture	Possible	Necessary
Inventory	Holds/Owns	Controls
Rights over intermediated offering, i.e., price	Decides	Allows participants to negotiate

Thus far, from the architecture view, we are able to distinguish between platforms and nonplatforms. From the behaviour view, we are able to distinguish between intermediaries that use a reseller mode or a marketplace mode. More importantly, these two views tend to be intertwined by referencing similar literature and studying similar contexts. Thus, it is convenient to think that all platform companies adopt a platform strategy, such as Apple and the app Store, Valve and Steam, Amazon and Amazon Shopping, Google and Google search.

However, it is possible that a "platform company" may not be using a "platform strategy". For example, in the online grocery market, Walmart's online shopping site can be considered a digital

platform, and thus, Walmart's online shopping can be considered a platform business. However, Walmart uses a pipeline strategy to manage its online shopping site because it orders groceries from suppliers, holds stock, and then sells to shoppers. Similarly, Spotify in the digital music industry is considered a platform company; however, it uses a pipeline strategy or acts as a reseller, who buys licences from music owners and redistributes them to music licences. Netflix in digital content, Made.com in furniture, and Justfab in apparel and bags all exhibit such patterns; they are digital platform companies that do not use platform strategies.

To avoid further confusion caused by the similarity between a "platform strategy" and a "platform company", I adopt the terms of Hagiu and Wright (2015) to describe the two strategy modes as marketplace and reseller. Figure 3-3 illustrates the relationship between the structural view and the behaviour view of platforms.

Figure 3-3: Behaviour and structural view of platforms

Behaviour\Structure	Platform	Not a platform (not possible as a market intermediary)
Marketplace	Valve's Steam, Amazon's marketplace, Apple's app store.	N/A
Reseller	Walmart's online shopping, Netflix's subscription, made.com.	N/A

The business model perspective

Although I tried to unite the above concepts in intermediary businesses and present their similarities, these concepts have been developed separately with different purposes. Hagiu and Wright's (2015) article stands on the perspective of a product and answers the question of whether a product should be sold under a matchmaker or reseller. Based on this product-business model fit, companies should then choose the corresponding business model; i.e., Amazon should sell product A as a reseller and product B as a marketplace. Van Alstyne et al. (2016) emphasise the competition between different kinds of strategies. In their understanding, platforms will outcompete pipelines

in most situations through mechanisms such as platform envelopment. Therefore, they describe in detail what a pipeline firm should do to transform itself to a platform firm. In Baden-Fuller et al. (2017), the distinction is made for the purpose of creating different mental templates or cognitive models so that researchers and practitioners can manipulate different business models imaginatively and then possibly adjust real-life businesses.

In this essay, I intend to frame the marketplace and the reseller as business models. I propose that there are several advantages to using the business model perspective.

Most importantly, the business model perspective emphasises the "interdependencies within firms" (Bigelow and Barney, 2021) as well as "external interdependencies" (Lanzolla and Markides (2021). The interdependency lens asks how different activities within/outside the firm are connected. The distinction of marketplace and reseller lies in the distinction on interdependency. The way that the platform manages the buyer-supplier relationship (relationship between different users) is completely different in the two models.

Second, the business model perspective "highlights the centrality of the manager or entrepreneur as the decision-maker" (Bigelow and Barney, 2021). As a result, business model choice can happen prior to the actual operation of the business. Thus, the business model perspective allows us to make causal inferences between initial business model choice and firm performance.

Third, according to Casadesus-Masanell and Ricart (2010), a "business model refers to the logic of the firm, the way it operates and how it creates value for its stakeholders. Strategy refers to the choice of business model through which the firm will compete in the marketplace." Thus, marketplace and resellers are two business models, and the choice between the two is at the level of strategy.

Last, the business model has advantages in abstraction and in the incorporation of cognitive thinking. According to Seddon and Lewis (2003), "strategies would be treated as grounded firmly in the real world, whereas business models would be treated as abstractions of firms 'real-world strategies". Baden-Fuller and Morgan (2010) proposed considering business models as "ideal types"—where "ideal refers here not to the notion of perfection, but to the adjectival form of 'idea '

- and type refers not to a classificatory kind we meet in the world, but to a 'mental construct'." This conceptualisation of ideal type is consistent with the "polar type" in Hagiu (2007). As ideal types, the business model concept would allow us to analyse not only a particular firm but also a group of firms that share similar or distinctive business models. Thus, the business model allows us to understand the interaction between the first platform in the industry and its "model" platform from other industries and how the subsequent platforms used the platform firm as a "model" and adjusted based on it.

Research Questions and literature

After establishing that there are two general business models in intermediary businesses, namely, marketplace and reseller, the first question to ask is how could a platform company choose between the business models? Each of the above studies provides some incomplete answers to the question.

Hagiu and Wright (2015) and subsequent studies consider the choice between reseller and marketplace "as a decision between whether control rights over a noncontractible decision variable (the choice of some marketing activity) are better held by suppliers (in the marketplace mode) or by the intermediary (in the reseller mode)". Using econometrics, they argue "intermediaries should choose the marketplace (respectively, reseller) mode for the following types of products: (1) products for which suppliers have a significant (respectively, a small) information advantage about the best way to market products relative to the intermediary; (2) products whose prices and marketing activities have limited (respectively, large) spillovers on other products; (3) long-tail (respectively, short-tail) products when the marketplace mode has a marginal cost disadvantage (respectively, advantage); and (4) products provided by late stage (respectively, early stage) ventures."

My current study attempts to build on the work of Hagiu and Wright (2015) and to enhance our understanding of business model choice in two ways. First, there has been a negligence on the buyer side. Buyers are often considered homogenous and unimportant. Differentiation arises from the supply side. This chapter puts buyers at the centre stage and mainly investigates the residual control rights between platforms and buyers. Second, current empirical work on business model choice tends to study static impacts. This chapter has a unique advantage in showing the dynamics of business model choice.

Van Alstyne et al. (2016) suggest that traditional manufacturing firms are more likely to use a pipeline strategy, and newer firms mostly with digital connections are more likely to use a platform strategy. In addition, the authors suggest that in most situations, the platform strategy would outcompete the pipeline strategy. Thus, for them, the platform strategy is almost always superior to the pipeline strategy. Thus, industries dominated by pipeline firms may experience a change from a pipeline-dominated to a platform-dominated industry.

Although the marketplace model in intermediary business is one of the simplest forms of a "platform strategy", my research shows that in a particular setting, resellers outcompete the marketplace in a 15-year period. The superiority of the "platform strategy" does not hold in all conditions.

According to Baden-Fuller et al. (2017), dyadic and triadic business arrangements may not necessarily compete with each other. These authors argue that the "matchmaking triadic" arrangement is complementary to the dyadic arrangement.

This perspective suggests that even in the same industry, platforms with different business models may compete and cooperate at the same time. This is especially true when large platforms such as Amazon, Google and Apple are entering into their complementors' product space via dyadic arrangements. However, the authors only discussed differences between different arrangements at a theoretical level through some basic modelling. Empirical research could contribute greatly to their arguments.

My second question asks about the influence of business model choices on platforms' performance. To answer the question I reviewed the key platform literature with empirical elements on platform performance. As Sriram, Manchanda, Bravo, Chu, Song, Shriver and Subramanian (2015) noted, "Most of the extant work on platforms is theoretical and operationalized in stylized analytic models. While there has been some empirical research in this area, the field is relatively nascent."
I found that authors rarely use platform performance in general as a dependent variable and that survival is not studied in the context of platform firms. When performance-related factors are discussed, they are often not the main focus of the studies. More importantly, most empirical work studies few successful platforms, so there is a gap in studying the counter factorials—the less successful platforms. The figure below illustrates some empirical articles on platform performance.

Figure 3-4: Key platform performance articles with empirical evidence.

Authors	Context	Method	Determinants of platform success/failure
Evans (2003)	Multiple industries	Illustrative examples of platforms in different industries	Market conditions - density of similar platforms and complementary platforms may influence platform success. Entry challenge – chicken-and egg-problem – Having both sides on board (1. By critical mass of users on one side, 2. By lower cost for one participating side, 3. By providing benefit for one participating side). Mature challenge - pricing strategies - price level and structure. Scaling strategies - test and modify platform with minimal investment and then scale up.
West (2003)	3 computer system platforms	Comparative case study	Facing the pressure of open source, proprietary platforms reject both complete proprietary and open source and choose either "opening parts" by "waving control of commodity layer(s) of the platform, while retaining full control of other layers that presumably provide greater opportunities for differentiation" to achieve high adoption or to "partly open" by "disclosing technology under such restrictions that it provides value to customers while making it difficult for it to be directly employed by competitors."
Wright (2004)	Nightclub	Illustrative example	Platform price structure may be dependent on cost, surplus (externality), and market structure.
Venkatraman and Lee (2004)	U.S. video game market (8 consoles)	Statistical analysis	Developer prefers to release titles on consoles with less density overlap (amount of similar games on the platform), less platform embeddedness (tightly coupled developer-platform relationship), dominant market position, and younger age.

Authors	Context	Method	Determinants of platform success/failure
Clements and Ohashi (2005)	U.S. video game market (8 consoles)	Statistical analysis	Penetration pricing (low introductory fee for the console hardware) at the early stage and increasing software variety at the middle stage of the product life cycle to achieve better adoption rate.
Suarez (2005)	2G wireless communication	Statistical analysis	Strong-tie network can be more important than total network size in influencing users' adoption decision to a platform.
Stremersch, Tellis, Franses and Binken (2007)	Nine consumer electronic markets	Statistical analysis	Impact of indirect network effect is weaker than expected. "Hardware sales takeoff leads or coincides with software availability takeoff", but not vice versa.
Hagiu (2007)	Digital platforms	Illustrative example	"The merchant mode yields higher profits than the two-sided platform mode when the chicken-and-egg problem due to indirect network effects for the two-sided platform mode is more severe and when the degree of complementarity/substitutability among sellers' products is higher. Conversely, the platform mode is preferred when seller in- vestment incentives are important or when there is asymmetric information regarding seller product quality."
Boudreau, K. (2010)	21 Handheld computing systems	Statistical analysis	Innovation has a strong inverted U shape relationship with "granting access", and moderately significant positive relationship with "giving up control".

Authors	Context	Method	Determinants of platform success/failure
Ordanini, Miceli, Pizzetti and Parasuraman (2011)	Crowdfunding	Grounded theory of three representative crowdfunding platforms.	Motivating consumers (funding contributors); "With varying emphases depending on the type of crowd-funding initiative, consumers screen and evaluate potential projects, then choose the ones to support financially, and finally disseminate information about them in online communities to generate further support for the projects"
Zhu and Iansiti (2012)	U.S. Video game market (Xbox and PlayStation)	Statistical analysis	Platform quality (vaguely defined), customers' discounted expectation on future applications and strength of the indirect network effect are all important factors for successful entry.
Ghazawneh and Henfridsson (2013)	Apple	Single case study	Platform owner can mobilise boundary resources to cultivate the platform ecosystem through third-party development through 4 mechanisms: design of the boundary resource, usage of the boundary resource, resourcing ("the process by which the scope and diversity of a platform is enhanced") and securing ("the process by which the control of a platform and its related services are increased")
West and Wood (2013)	Symbian	Single case study	"Creation of a technical standards architecture and managing an ecosystem of third-party suppliers of complementary products." "First, Symbian created a computing ecosystem of unprecedented organisational and technical complexity. Second, the asymmetric dependencies of the various ecosystem members meant some stakeholders flourished while others struggled. Third, the divided leadership of the ecosystem limited

Authors	Context	Method	Determinants of platform success/failure
			the ability of Symbian and its ecosystem to respond to the new dominant design created by the iPhone."
Cennamo and Santalo (2013)	14 video game consoles	Statistical analysis	Firms using both strategies of enhancing availability of complements and exclusive contracts (complements) may diminish the value of each strategy.
Kapoor and Lee (2013)	U.S. health care industry	Statistical analysis	Among different types of hospital-physician relationships (arm's length, alliances, and fully integrated), hospitals using alliances are more likely to invest in a new medical imaging technology than are hospitals using the other types.
Bresnahan, T., and S. Greenstein. (2014)	Mobile platform	Illustrative example	"A platform's hierarchy can help at one moment but then get in the way at a later time. Hierarchical organisation helps coordinate supply and the invention of complements, avoids postinvention holdup through contracting and other forms of commitment, and helps balance the interests of users and developers. However, hierarchy comes with drawbacks as well. It can limit the scope of developer innovation, reduce the breadth of experimentation, and make a platform inflexible in response to new market circumstances in a sense we will describe."

Authors	Context	Method	Determinants of platform success/failure
Eaton, Elaluf-Calderwood, Sorensen and Yoo (2015)	Apple	Single case study	Platform owner and complementors "tuning" boundary resource. "Changes in boundary resources in service systems must be understood not as a matter of creation by the firm that owns the infrastructure and the adoption by many independent developers, but rather how they evolve and collide with artifacts within and across multiple organizational and technological contexts."
Sriram, Manchanda, Bravo, Chu, Song, Shriver and Subramanian (2015)	Review for future empirical platform research	Review	Key factors studied for successful platforms are the following: 1. Critical mass for both side s2. Subsidized price according to externalities. 3. Semicolusion between platforms,
Boudreau and Jeppesen (2015)	85 Multiplayer games	Statistical analysis	Among unpaid complementors, the "direct same-side negative effect of added complementors is sufficient to outweigh the indirect cross-platform effect created by interactions between complementors and usage." Platforms can leverage unpaid complementors when the platform is small and implement practices to reduce negative direct network effect of unpaid complementors.
Dushnitsky, G., M. Guerini, E. Piva, and C. Rossi-Lamastra. (2016)	600 active Crowdfunding platforms in 15 European countries by 2014	Statistical analysis	Population, entrepreneurial rates and presence on platform by incumbents positively associated with platform creation. However, the latter two factors do not impact lending platforms. Lending platform creation is also positively related to the salience of crowdfunding phenomenon, reduction in competition and feminine values.

Authors	Context	Method	Determinants of platform success/failure
Dreyer, Ludeke-Freund, hamann and Faccer (2017)	Collaborative consumption platform in cleaning and taxi in South Africa	Comparative case study	Adapt to South Africa's local context by "providing access to smartphones and corresponding smartphone literacy training."
Tauscher and Laudien (2018)	Entrepreneurial marketplaces	Mixed method	Novel and innovative business model can lead to better firm performance (no detail).
Li and Mu (2021)	Sharing accommodation	Modelling without data	Reduction/elimination of offline trading.
Boudreau, Jeppesen, Reichstein and Rullani (2021)	Crowdfunding	Mixed method analysis on a single crowdfunding project between	"Main project outputs generally play a limited direct role in motivating contributions and thus provide negligible leverage for stimulating funding……major improvements of the product are unlikely to produce this effect. ……private gifts given only to funders may influence funding, ……entrepreneurs pursuing funding through crowdfunding without private claims must somehow evoke non-pecuniary motivations."

Authors	Context	Method	Determinants of platform success/failure
		2002 and 2008	

As illustrated above, there are very few empirical articles targeted directly at the strategic factors that could determine platform success and failure. In summary, the following factors were studied:

1. Pricing. At the theoretical level, a nonneutral price structure is one of the defining features of two-sided platforms. Thus, economists and strategists have devoted much attention to investigating the optimal price structure of two-sided platforms. Evans, 2003; and Wright, 2004). However, most of the work on this topic has been conducted through modelling and simulation. Moreover, there is no empirical article that clearly shows the impact of platform(s) following the optimal price structure. Perhaps this is because models of optimal price structure are based on many implicit and explicit assumptions that may not be totally accurate in the real world. Empirical works show the existence and prevalent usage of nonneutral price structures (e.g., Jin and Rysman, 2015) but not of the "optimal" price structure.
2. Indirect network effects and the chicken-and-egg challenge. Another defining feature of two-sided platforms is the existence and significance of the indirect network effect "whereby different "sides" of a network can mutually benefit from the size and characteristics of the other side" (Mcintyre and Srinivasan, 2017). The associated chicken-and-egg challenge is that "to attract buyers, an intermediary should have a large base of registered sellers, but these will be willing to register only if they expect many buyers to show up" (Caillaud and Jullien, 2003). Scholars are able to demonstrate the strength of the indirect network effect in different contexts (Suarez, 2005; Stremersch et al., 2007), creating an indirect network effect (West and Wood, 2013; Zhu and Iansiti, 2012), profiting from it (Cennamo and Santalo, 2013, Boudreau and Jeppesen, 2015), and overcoming the chicken-and-egg challenge (Clements and Ohashi, 2005;

Ordanini et al., 2011, Dreyer et al., 2017, Boudreau et al., 2021), which are all important, if not uniquely important, for a platform's success.

3. Boundary resource and openness. Scholars have also provoked a specific view of the relationship between platforms and innovative complementors. Ghazawneh and Henfridsson (2013) and Eaton et al. (2015) used Apple as a case to illustrate how the "agreements" between Apple and its 3D party developers coevolved over time. Platforms should view these agreements as boundary resources instead of as the firm's private assets. Without using the boundary resource label, Boudreau (2010) identified two ways of "opening" platforms to developers, and each has a different relationship with innovation outcomes.
4. Off-platform transactions. Buyers and sellers of intermediary platforms may trade with each other off the platform to avoid intermediary fees. Platforms need to try to reduce and prevent off-platform transactions from happening. (Li and Mu, 2021)
5. Other factors. Scholars have also studied other factors that could determine the success and failure of platforms and that are not unique to platforms, i.e., factors that are also important in influencing nonplatform performance. These factors include market conditions, i.e., the concentration of similar platforms and the number of incumbent platforms (Evans, 2003; Dushnitsky, 2016), and adaptation to the local environment (Dreyer et al., 2017). Surely, in the wider strategic analysis of the determinants of firms' success, I could identify many more factors that can be applied to platforms. However, I want to limit my search to factors that are particularly relevant to platform firms.

Among the empirical studies on the determinants of platform success, the majority of studies have taken platform creation for granted, and thus studied strategic manoeuvres of established platforms. However, in the real world, many new industries are occupied by new entrants or start-up firms. For instance, in the EU-15 countries, by 2014, 79.2% of crowdfunding platforms were operated by startups. (Dushnitsky et al., 2016). Therefore, there is a gap in understanding the key strategic factors that can determine the performance of start-ups and new entrants in the platform market. Therefore, I argue that the study of business model choice is important not only because it is new and not studied empirically but also because it is an important factor to consider for start-ups and entrepreneurs.

Industry choice and methodology

A particularly relevant industry to study the above complexity of business model choice and digital platforms is the UK peer-2-peer lending (p2p lending) industry.

There are several advantages to using the UK p2p lending industry. First, the industry is recent but has existed long enough to enable the observance of the dynamics of the business model. Second, all firms participating in the industry are digital platform intermediary companies. Each of them operates a platform themselves. Third, there are differences in firms' initial business model choice; i.e., some are marketplace, and some are resellers. Fourth, there are dynamic business models in the industry; i.e., the business models of some companies have changed. Last, the analysis is limited to the UK because the UK has one of the most developed p2p lending industries and Companies House maintains the financial records of the majority of the p2p lending firms. Thus, I was able to collect data on the whole population of UK p2p lending firms across a 15-year period—the whole population approach allowed me to study both successful and failed companies. A more detailed analysis of this industry will be presented in the data analysis section.

Research Method

To unpack the relationship between business model and platform performance, I constructed a panel database of all p2p lending firms between 2005 and 2018 that operated in the UK. The population started with 133 companies and was first reduced to 97 to eliminate firms that are based in other countries. Then, 15 companies were eliminated due to incomplete data, i.e., lack of archived historical website information and Companies House financial information. Therefore, the final sample size was 82. I collected data on the independent variable—funding business model, the dependent variable—survival, and some control variables, such as variables for financial resources, year of establishment, location, determination of whether loan is secured, and SIC code. In addition, I performed a statistical analysis to investigate if there was suggestive evidence between platform survival and its initial business model.

During the initial data collection, I noticed that many platforms had changed business models mainly from marketplace models to reseller models. To further investigate the business model change process and the rationale behind the change, from the 82 sample firms, I selected companies that had lasted for more than 6 years and had initial total assets of more than 15,0000 GBP. This

left me with 22 companies that had operated long enough and had sufficient financial resources such that a business model change might have happened and that such change could be captured. Then, I used news reports, investor forum discussions and internet archives to capture relevant business model changes in the companies. However, due to differences in their influence, I captured more detailed information for successful companies and less information for less successful companies. I document these changes on a time sheet.

Such a research method responds to the call of de Reuver et al. (2018) on methodology issues and on the risks and recommendations of current empirical research on digital platforms. Figure 3-5 below shows how this essay responds to methodological challenges (adapted from de Reuver et al., 2018).

Figure 3-5 Methodological challenges of digital platform research

Issue	Risk	Recommendation	Current essay
"Difficult to isolate unit of analysis"	"Lack of comparability between studies"	"Conduct embedded case study approaches to compare platforms within the same larger ecosystem"	Studies 82 UK p2p lending companies within the same ecosystem, under similar external conditions.
"Digital platform and ecosystem dynamics have long time horizon"	"Snapshot research methods do not provide understanding of causalities"	"Conduct longitudinal studies on platform dynamics"	Documents business model changes and platform performance between 2005 and 2018
"Bias towards successful cases, studied ex-post"	"Lack of design knowledge on digital platforms"	"Study failure cases Employ a design science approach to digital platform research"	Starts from the full population of p2p lending companies and analyses both successful and failed platforms. Determinants of failure are essential to this study.

“Digital platforms are large, complex, and dynamic”	“Small-scale methods do not lead to holistic understanding”	"Conduct data-driven approaches, including network analysis. Visualise structure and dynamics of digital ecosystems. Conduct computational modelling of ecosystem behaviour”	N/A

Data Collection

Panel data - constructs identification and method

I started data collection by reviewing the FCA register, where all firms in the UK performing finance-related businesses should register. Then, I attempted to identify p2p lending companies by identifying the permissions granted by the FCA. However, the FCA dataset (http://www.sdm.co.uk/) was not available publicly, and the FCA was unable to provide a set of permissions that could help me to identify p2p lending platforms. The alternative root I used was an individual-made website called www.p2pmoney.co.uk, which included a personally generated list of 133 p2p lending platforms that operated in the UK between 2005 and 2018. I contacted the owner for access to his method of data collection but failed to obtain a response.

Despite the lack of clarity in data collection, I noticed that the list of 133 p2p lending platforms resembled the population of UK p2p lending platforms up to 2018 based on the following: 1. The list included all major players in the p2p lending industry (identified by both transaction volumes and by members of p2pfa, a self-regulation body in which key UK p2p lending platforms participated). 2. The list emphasized platform creation and thus contained both surviving and ceased companies, which provided an opportunity to study both successes and failures. 3. The number of platforms on the list tended to be more inclusive than those in other studies. For example, Dushnitsky et al. (2016) identified approximately 38 lending-based crowdfunding platforms in the UK between 2008 and 2014, while my refined sample included 55 platforms. Therefore, even if it is difficult to argue that 133 companies are the complete population, it is reasonable to argue that it is a representative sample of p2p lending platforms in the UK.

Starting from the 133 companies, I focused on 97 UK-based companies and eliminated companies that originated in other countries and entered the UK markets. This was done for the following reasons: First, none of these foreign companies had significant market share. Second, I wanted to reduce variances in the companies' backgrounds so that the impact of entry business model choices could become more apparent. During data collection, I further eliminated 15 companies due to a lack of archived websites or current websites for the retrieval of information. The total effective sample is 82 platforms.

Key independent variable:

As discussed in the literature background section, there are two broad business model types: marketplace and reseller. These two business models could be identified in the 82 sample platforms. However, as previously discussed, the two business models are ideal types or polar cases. Real platforms may not necessarily perfectly fit with either of the types. The table below illustrates the key differences of the two models in the context of UK p2p lending if the ideal models are projected in real life.

Figure 3-6 Distinction between the reseller and marketplace model

	Reseller	Marketplace
Loan assessment	Platform verifies the borrowers and assesses credibility and risk	Lenders verify borrowers and assess credibility and risk
Loan price	Platform decides	Borrowers and lenders negotiate
Loan repayment	Platform pays lenders	Borrowers pay lenders
Contractual relationship	Borrowers sell loans to the reseller; then, reseller sells loans to lenders.	Borrowers sell loans to lenders.
Possibility of off-platform trading	Low	High

When attempting to regulate the p2p lending industry or loan-based crowdfunding industry, the regulatory agency in the UK—CFA—also attempted to categorise the platforms in 2018 in its paper CP18/20. The CFA identified three business models: conduit platforms, pricing platforms, and discretionary platforms. Figure 3-7 below displays how FCA describes platforms.

Figure 3-7 P2p lending categorisation by FCA

Platform model	Description
Conduit platforms	The investor picks the investment opportunities, and the platform administers the loan or investment arrangements
Pricing platforms	The platform sets the price, but the investor picks the underlying loan or investment
Discretionary platforms	The platform sets the price and chooses the investor's portfolio of loans to generate a target rate—this is only seen in the P2P sector

There are strong similarities between the categorisation of FCA and our theoretical categorisation. A close inspection reveals that there are 2 key operationalised variables that separate the business models: 1. Lenders can identify and pick a specific loan opportunity or a predetermined pool of loans decided by platform. 2. Lenders can directly contribute to the pricing of the loan.

When both variables are present, the platform is likely to be a marketplace, where lenders and borrowers hold more residual rights. In other words, the loan contract is effectively between lenders and borrowers. The default risk is held by lenders directly. The platform would not own the loan during the process. When both variables are not present, the platform is likely to be a reseller, where the platform holds more residual rights. In other words, the platform, not the borrower, owns the loan before it is sold to lenders. Thus, lenders effectively purchase the loan from the platform. Before the loan is sold to lenders, the platform needs to use its own money to buy the loan. Thus, for one period, the loan should appear on the platform's balance sheet as a part of the platform's assets. During this period, the platform holds the default risk.

Moving back to the categorisation of FCA, their conduit platform is very consistent with the ideal model of the marketplace. The platform's primary job is listing loans to investors. Thus, investors and borrowers can negotiate terms themselves. Although FCA (2018) shows that this model is the

least used model in 2018, my own analysis shows that most p2p platforms used this model prior to 2012.

The discretionary platform is very consistent with the ideal model of the reseller. When investors cannot pick borrowers, it is very likely that the platform will lend its own money to borrowers first (buy the loan from borrowers) and then sell the loans to other investors. Therefore, the platform would have pricing rights and control of most residual rights. The sale communication is between the platform and the investor, and it is likely that the platform will hold some inventory—loans that are bought from borrowers and haven't been sold to lenders. This business model is similar to that of a traditional bank, where the bank takes deposits and lends them out. Depositors have no idea who borrowed their money, and mortgage takers have no idea whose money they are using.

The pricing platforms are a category between marketplace and reseller. The only difference with the conduit platform is that the price (interest rate) is predetermined by the platform so that lenders cannot influence the loan price directly. They could, however, influence loan price indirectly by not purchasing the loan.

Coincidentally, when I attempted to operationalise business model categorisation using the concept of marketplace and reseller, I also settled on two dummy variables for pricing rights and borrower identification via an iterative process between the literature and the data. One dummy variable denotes that lenders can select the borrower (compared to lenders participate in a pool), and the second denotes that lenders can influence the interest rate of the loan (compared to lenders are subject to a predetermined interest rate). If a platform conforms to these two variables, it is categorised as a marketplace. If it conforms to neither of the variables, it is categorised as a reseller.

Therefore, in the data, a marketplace p2p lending company would be the case in which lenders can select which loan they want to invest into and can negotiate an interest rate with the borrower directly. A representative example is "Lendinvest", where the platform would put borrowers and interested lenders into a virtual "deal room", i.e., a forum-like interface where lenders can post questions and borrowers can answer so that they could discuss the specific investment projects, duration, interest rate and other factors.

A reseller p2p lending company would be the case in which lenders cannot choose the borrower or negotiate an interest rate. A representative example is "Easymoney", where investors have no idea who is taking their money. They lend with a target return presented by the platform, and the platform automatically assigns their money to anonymous borrowers. Alternatively, like "Bankwithdave", the platform lends money with its own balance sheet before receiving the lender's money. Lenders may have a vague idea of who the borrowers are (because the platform operates within a small community), but the lender cannot choose who will receive the invested money.

As rightly pointed out by FCA (2018), it is common for a platform to adopt a combination of these business models. I record a platform's business model as marketplace as long as the marketplace model exists and as a reseller when there is only a reseller model.

Among the 82 companies, when they were funded, 24 of them were matchmakers, 28 of them were resellers and 30 of them were in between (allowing investors to pick borrowers but the interest rate is predetermined by platform).

Key dependent Variable: Survival and Survival time

The dependent variable is captured in two formats: how long the platform survived and if the platform survived. We focus on the survival time first.

Two variables are needed to determine the survival time: when the platform started and when it ended (or did not end). I used three methods to determine the start time. The first is inherited in the dataset. However, I have no knowledge of how the original dataset is constructed. The second is by checking when the website first appeared in archive.org. This website keeps track of historical versions of popular web pages. It currently has 552 billion pages archived (Dec, 2021). I found that the starting date in the original dataset is fairly consistent with the first appearance of the platform on archive.org. The third way is by checking the Companies House registration information. All UK companies are required to register with Companies House and to provide annual updates. I collected data on when the company was established and when its first meaningful account (nondormant) was published. I found that the dataset platform starting date is usually included in the period of the first meaningful published account. In rare occasions, there are mismatches. This is because the platform firm has its own history of operating other businesses and adding a new p2p

lending business into its existing business portfolio. Therefore, both the results of the archive.org method and Companies House method conform with the dataset data.

The dataset also contains information up to 2018 on when the p2p lending company stopped operating. This is used in combination with both archived webpages and current webpages to determine when and if the platform has stopped operating. Signals that indicate nonoperation include the following: a website's links have expired; a website redirects to another business; a company is in administration; and a company is no longer processing new loans (permanent). The Companies House information provides two additional ways of collaborating the termination time. One is company status, i.e., if the company is active or not. I found this to be not very helpful because many p2p lending sites that are no longer active are still registered as operating companies. The other way is the account status. I recorded the first date when the company experienced the following conditions in their accounts: hired an administrator; stopped updating accounts; became a dormant company; and demonstrated no further change in profit. For companies that stopped operating, the extinction date that I collected via Companies House was consistent with the date indicated in the website information in terms of whether the website had stopped operating. However, the Companies House extinction date was usually later than the website extinction date by up to 4 years. I think that the website extinction date is a more accurate description of firm extinction because it indicates the date for inactivity of business operations, while the Companies House extinction date indicates the date for inactivity of financial operations.

Other (control) independent variables.

Other variables were also collected as independent variables.

1. Starting year. I think this is important because, in survival analysis, firms that start early may have an advantage, i.e., be able to survive longer than firms that started late, because late-starting firms may not be given enough time to fail.
2. Firm financial resources. I recorded these firms' initial 2-year financial resources, including debtors, creditors, total assets, initial shareholder funding, and retained earnings.
3. Location of headquarters. This has been reported as an important variable in firm survival studies.
4. Self-reported SIC codes.
5. Identification of whether the platform is lending to individuals or businesses.

6. Indication of whether the company had reported some complicated relationship with other companies, i.e., being a subsidiary of another firm or in partnership with another firm.

There are obvious limitations in my data collection of control variables. Due to limited data availability, I could not explicitly collect data on variables that were identified as crucial for determining platforms' success in the literature background section. However, I would argue that my industry choice and sampling can eliminate the impact of most of these factors.

1. Pricing. It is not possible to retrospectively collect data on the price level and price structure of the platforms. Because the pricing mechanisms can change very frequently, archive.org is likely to not capture all or even most of the changes. In addition, most platforms adopt various promotional activities to attract both borrowers and lenders, such as the reduction and elimination of membership fees and transaction fees and investment vouchers for lenders. Promotions dramatically increase the complexity of calculating price levels in a standardised method. In terms of price structure, most firms subsidize lenders by refraining from charging them a membership fee and charge borrowers both membership fees and transaction fees. I will illustrate this price structure in the subset of the 22 platforms.
2. Indirect network effects. Because I am comparing different platforms within the same industry, the differences in the strength of indirect network effects on platforms are relatively small. In addition, it is very common in this industry to multihome among platforms, i.e., lend money at different platforms simultaneously. Such multihoming indicates a relatively low switching cost. This further reduces the platforms' reliance on the direct network effect; i.e., it is more difficult for a platform to lock in a lender. However, each platform may still have its own strategies in profiting from indirect network effects, and I will discuss this in detail during my qualitative analysis of the subset of 22 platforms. I could not construct control variables for all of the samples.
3. Chicken-and-egg challenge. How platforms overcome the chicken-and-egg challenge is also important for determining their success. As Hagiu (2007) pointed out, if the challenge is severe, platforms may choose the reseller business model over the marketplace model. Thus, how platforms deal with the chicken-and-egg problem can be partly seen from their initial business model choice.
4. Boundary resource and openness. The most important boundary resource and openness construct in the p2p lending setting is who can borrow and who can lend. My data collection

includes variables to capture whether the platform allows individuals and/or institutions to lend and/or borrow. This partly captures this boundary resource and platform openness. However, during my deeper analysis of the data, I notice that for those platforms that allow individuals to borrow, they may differentiate based on acceptable credit scores of borrowers. For example, Zopa would not lend to borrowers with very low credit scores, while JustUS would accept applicants with low credit scores. This kind of differentiation can also happen on the business borrower side and the lenders side. Moreover, some of these differentiation practices may be hidden in the application process, which can be difficult to uncover if platforms decide not to publicise the information. I will try to discuss this in the qualitative analysis of the data.

5. Off-platform transactions. Although off-platform transactions are possible in theory, i.e., the situation in which lenders can identify a specific loan opportunity and contact the borrower off-platform, this situation is naturally limited by two practices. I will also address this in my qualitative analysis.

Brief description of 22 samples

As mentioned in the research method, after I collected the panel data for survival and the associated variables, I noticed that many variables were dynamic—they change over time. Most importantly, many platforms changed their funding business model, specifically changing from the marketplace to the reseller business model over time. This shift is surprising because both Hagiu (2007) and Van Alstyne et al. (2015) predicted that business model change is likely to happen from the reseller business model to the marketplace one.

In Hagiu (2007), Walmart, Amazon and Bright.com are used as examples to illustrate the transition (platform-wise and industry-wise) to a marketplace business model. The author noted: "It is interesting to ask what would need to change in order for these sites to move closer to a two-sided platform mode. An obvious part of the answer is the transfer of control over pricing from the intermediary to the content providers. Presumably, this will happen over time as consumers become more accustomed to such services, so that there is less value created by uniform and centralized pricing. In fact, the trend towards decentralization of control and therefore towards more two-sided platform-like intermediation models has already started taking place in the Internet video market." In Eisenmann, Parker and Van Alstyne (2011) and Van Alstyne et al.,

(2015), marketplaces are supposed to outcompete resellers via an envelopment strategy by simple product bundling.

Thus, the business model changes as well as the unusual direction of the changes "forced" me to investigate the dynamics of change. What kind of platforms change their business model? Why did they change? How did they change? How effective are the changes? To uncover the open-ended question on the dynamics of business model change, I decided to take a qualitative approach and to use comparative case studies. As discussed, I sampled a subset of the 82 platforms for two conditions: a sufficient period of survival (6 years) such that changes could be observed and a sufficient amount of financial resources such that intended changes were feasible (15,0000 GBP in total assets when funded).

My main information source is the archived websites of each platform. Using archive.org, I was able to find at least one homepage capture per platform per year. I also visited related pages, such as "Investors", "How do we work", and "About". I did not capture the exact number of pages I visited, but I estimate that it was more than 150 homepages and 700 related pages. I also relied on all news reported on altfi.com and p2p-banking.com by searching platform names. The former is a well-known news site for alternative finance, and the latter is a discussion forum for p2p lending. These sources are supplemented by p2pfa, the Financial Times, and YouTube videos.

By looking at these sources, I document observable changes, such as policies on matching between lenders and borrowers, investment product expansion or subtraction, and homepage changes. For each platform, I wrote a time-based mini-story to summarise my observations. There is strong bias in this data collection process, as larger platforms are more likely to receive more media coverage, and hence, I could find more information about them, and smaller platforms tend to be captured less frequently by archive.org and reported less frequently in the media. Thus, the longest story is approximately 800 words, and the shortest story is approximately 200 words. The mini-stories are attached in the appendix.

Data analysis

Before jumping into the business models of current p2p lending platforms, let me start the data analysis by more carefully explaining what p2p lending is, what it originated from and what external conditions made these platforms possible.

Defining p2p lending and p2p lending platforms:

According to the Oxford English Dictionary, p2p stands for peer-to-peer, which is an adjective meaning "taking place directly between people of the same age, status, ability, etc." In the setting of computing, it is a term used for "designating a computer network or mode of networking in which each user can initiate a direct connection with other computers on the same network, as opposed to communicating or interacting via a centralized server; of, relating to, or involving a network of this kind. Frequently contrasted with client–server adj. at client n. Compounds 3. Abbreviated *P2P*." Thus, strictly defined, p2p lending would mean lending between people directly without a centralised organisation. A representative example would be lending some money to a friend with agreed terms and conditions—typically, the amount, time frame, and interest rate. Therefore, this strictly defined p2p lending has existed for thousands of years.

However, our primary interest is not p2p lending—the activity, but the p2p lending platform—the organisation that orchestrates or intermediates such p2p lending activity. In Western culture, the initiation of p2p lending platforms may be traced back to "friendly societies" in the UK in the 18th century, where "clubs helped their members pool resources and risk. The friendly societies allowed members to make deposits and receive loans and assisted member families in the case of negative shocks such as illness. With the Friendly Societies Act of 1793, the British Parliament formally recognized and regulated the burgeoning industry." Everett (2019). This organisation for loans fits with the initial definition of p2p lending: individuals lend to individuals directly.

However, what we call p2p lending today has two key characteristics that are different from the 18th century "friendly societies". First, today, p2p lending is digitally enabled and usually transacted via a digital platform: a website or an application. Second, today, p2p lending requires no prior relationships between lenders and borrowers. Moreover, p2p lending platforms facilitate stranger-lenders and stranger-borrowers. Most platform users do not know each other prior to lending agreements, nor do they know each other after lending agreements. Due to these two factors, the

scale of a single p2p platform in the 21st century can be much larger than that of a single "friendly society" in the 18th century. Knowing these differences, the first p2p lending platform that was well recognised in the world and is recognised by this chapter is Zopa, funded in 2005 in the UK.

Thus, the p2p lending activity orchestrated/intermediated by platforms differs from previous p2p lending in the following ways.

a. Who the participants are. Lenders and borrowers are ideally individuals but not necessarily. This means that borrowers can borrow for personal reasons, i.e., refurnishing a home, refinancing car, or borrowing for business reasons, e.g., refurnishing a home to sell it or refinancing a car that is used in transportation companies. In practice, the boundary between personal reasons and business reasons is very thin, especially when the business is a sole trader instead of an LLP. For lenders, the motivation is almost exclusively risk-adjusted interest. The lenders can be individuals with extra cash for investment or institutions that manage a portfolio for their clients.
b. How lenders lend to borrowers less directly. In the example of me lending to my friend, an implicit assumption is that I know who I am lending to prior to the lending (how well I know them is irrelevant). However, how do I lend money to people who I don't know, and how do I know that some other people need the money? These problems are solved by p2p lending platforms that create and maintain the relationship between lenders and borrowers. In the social network sense, there is now a triadic relationship in p2p lending (lender, platforms, and borrowers) compared to the previous dyadic relationship in p2p lending (lenders and borrowers). Thus, lending is not happening as directly. Different platforms mediate the relationship between lenders and borrowers differently, and thus, the distinction is made between resellers and matchmakers, and the degree of "direct" in the lending is different.

Knowing this context, the Oxford English Dictionary defined p2p lending as "the borrowing and lending of money between individuals or businesses, usually through the medium of online services, without a bank or other official financial institution acting as an intermediary."

Describing the meaning of p2p lending is as important as explaining its difference from other lending methods and the differences in p2p lending among p2p lending platforms. The most significant one is the banking industry, including the services of overdraft, credit cards, mortgage and loans. Other comparable services include pawnshops and consumer credit (shops give consumers some credit for making purchases).

With regard to the banking industry, although at an abstract level, as the money lent to borrowers via different financial products is money deposited by depositors and the depositors can be treated as lenders, it is possible to argue that banks create and maintain relationships between borrowers and depositors. In real life, we know that there is no matching between banks ' loans and their deposits. Outstanding loans tend to be higher than deposits (i.e., Barclays loan to deposit ratio is 118%, and for HSBC, it is 90%; it is uncommon to have a lower than 100% ratio). Depositors do not know who is using their money, and borrowers do not know who's money they are using. Therefore, in the banking industry, from the borrowers' perspective, they borrow money from the bank, not from depositors. If there is default, the bank holds the responsibility, not the depositors. From the banks' perspective, they are lending money to the borrowers directly, and this is reflected on their balance sheet. Therefore, this procedure is often called balance sheet lending. This suggests that at the micro level, the relationship between depositors, banks and borrowers can be seen as two sets of dyadic relationships (depositor-bank and bank-borrower) instead of the triadic relationship we observe in p2p lending. At the macro level, it could be seen as a triadic relationship, but depositors are lending to borrowers extremely indirectly, where the original p2p lending concept emphasises direct lending between lenders and borrowers.

With regard to pawnshops or other forms of consumer credit, there is only one dyadic relationship, often between a firm and its customers. Thus, the logic is different from p2p lending.

There is also a strong overlap between p2p lending and crowdfunding, and people often label p2p lending loan-based crowdfunding. The main difference between p2p lending and the crowdfunding industry is the type of contract signed between lenders and borrowers. Crowdfunding proceeds are typically donations, and crowdfunding can be reward based or equity based. Studying the entire crowdfunding industry could be too complicated, as participants engage in it for very different

motivations. A clear emphasis on p2p lending narrows the complexity, while the answers to some key questions about openness and industry formation remain.

Dynamics in the definition of p2p lending

Although in my above introduction, I attempted to communicate a clear message on what current p2p lending is (started from Zopa 2005) and how it differs from historical p2p lending and other current financial intermediaries, the ways in which these platforms performed have deviated from the original p2p lending ideal.

The original (between 2005 and 2010) ideal p2p lending platform was one that acted as a facilitator between borrowers and lenders, i.e., introduced them, enabled them to know each other and created a community so that communication could happen within and between borrowers and lenders. These p2p lending platforms tended to position themselves as different from banks and added the missing human element back. Below in Figure 3-8 are quotes from all early entrants (before Jan 2010) into the industry, which are used to describe their main value proposition.

Figure 3-8 Representative self-description of p2p lending platforms

Platform	Quotes
Zopa	What we do is very simple: we put people who want to lend in touch with creditworthy people who want to borrow
Bigcarrots	Cutting out the banks so ordinary people can lend to British businesses
Yes-secure	Having reviewed Zopa, I felt that a social networking-based person-to-person lending marketplace site could become a successful alternative to Zopa
Quakle	Peer-to-peer lending for community-minded people
Ratesetter	Instead of lending your money to your bank, with RateSetter, you lend it directly to other people (to get a better return on your money)
Thincats	BLN allows individuals, companies, pension funds and portfolio managers to lend directly to companies, bypassing the banks

It is clear in the above quotes that the main value proposition is about giving the investment choice to lenders. In other words, this is about a comparison between two kinds of platforms—banks and these p2p lending firms. Unlike in the bank model, in the p2p lending model, the p2p lending firms surrendered residual control rights to investors/lenders. The emphasis on "community" and "directly" were terms used to compare a bank's loan operation with that for a p2p loan. Thus, the ideal p2p lending business model would be a marketplace one. In the real world, this is also true; as I will show later, the majority of early entrants used the marketplace model. In other words, the p2p lending ideal and the actual business model in the industry are coherent.

However, as I will show later, platforms' actual business operations and thus their business models have changed in two major elements: 1. Retail investors (general public individuals) have been replaced by institutional investors. 2. The lending process is less "direct", and platforms have adopted balance sheet lending. These two changes have made the business model incoherent from the initial p2p lending ideal.

External conditions

The formation of the p2p lending platforms and the industry are not independent from external conditions. In fact, there were many necessary conditions for p2p lending to occur in the UK and globally. This section briefly discusses these conditions.

1. Adoption of internet and of online financial services.

The infrastructure of the internet is an indispensable component for a p2p lending platform. Therefore, users having access to the internet is a necessary condition for the success of p2p lending platforms. In the UK, by the end of 2005, approximately 55% of households or 60% of adults had internet access (Prescott, 2014; Kupp and Anderson, 2006). In the USA, the approximate internet penetration rate among adults was approximately 68% (Perrin and Duggan, 2015). In South Korea, the figure was 73.5% in 2005, which was even higher than that in the UK and the USA. In comparison, the figure for Russia was only 15% in 2005; global average internet access was 17% and was 8.1% among developing countries (World Bank). Therefore, globally, early p2p lending

platforms were established in countries with high internet penetration, e.g., the UK, the USA, and South Korea.

Not only is it necessary for people to have internet access, but it is also important for people to have confidence in online financial services. According to Kupp and Anderson (2006), approximately 45% of UK internet users had a financial account that was accessible online. This indicates that lending or borrowing online may not have been strange to early users of p2p lending platforms.

2. Shift of consumer needs in the loan market

Prior to p2p lending, individual borrowers had other methods of borrowing money, which were mortgages, overdrafts (11% of UK adults), credit cards (32%), personal loans (9%), car finance (6%), and student loans (4%). According to Shepherd (2005), while convenience was the priority for borrowers and depositors, consumers were becoming increasingly price sensitive, and the interest rate of loans became the top priority. Consumers had more access to information so that they were more likely to compare different offerings.

This shift of consumer needs indicated an opportunity for the p2p lending industry. Platforms such as Zopa facilitate loans at a lower cost than retail banks—due to the cost reduction in risk management (p2p lent money is not protected by deposit protection scheme), human resource cost (p2p lending platforms tend to hire fewer people per amount of facilitated loan), and off-line office cost. Thus, platforms can offer cheaper loans to borrowers and higher returns to lenders.

3. Emergence of an underserved customer group

According to Kupp and Anderson (2006), Zopa realised that there was an expanding group of underserved borrowers —"freeformers defined as self-employed, project based or freelance workers who were not in standard "full-time" employment", such as consultants and entrepreneurs. They were underserved by retail banks because they did not have a reliable, consistent, and reliable source of income. On the other hand, they needed to borrow money occasionally and had the ability to repay. Unfortunately, there is no data on the significance of "freeformers" to Zopa and other p2p lending platforms.

One interesting point to make is that although there was a new customer group identified and served by Zopa on the borrowers' side of customers, there was no new customer group for the lenders side. Lenders to Zopa and other p2p lending platforms do have access to alternative methods of investment, i.e., deposits and financial investment products. However, they invest in p2p lending platforms because they sense other advantages of p2p lending, such as convenience, attractive returns, and helping people out of problem.

4. Technology advancement

P2p lending would not be possible without an advancement in technology. Despite the necessary advancements in general purpose technologies, such as the internet, WiFi and cable connections, some specific technologies have largely contributed to the creation and operation of p2p lending platforms.

Cloud computing can be one representative example. While banks and traditional financial institutions tend to store customer data on local servers, most p2p lending platforms tend to rely on cloud servers, such as Amazon Web Services. The Amazon web service became commercially available in 2005, and Google's and Microsoft's respective services became available in 2008. The cloud server largely reduced the requirement for initial investment (Julian Cork, COO of Landbay 2017 cited by Fintech Futures 2017).

Another key aspect of p2p lending that is enabled by technology is credit scoring. This is an index by which the platform decides if the borrower's application is acceptable. The accepted borrower's request will then either wait to be matched with other lenders or be lent by the platform directly. The credit score has two major elements: data sources and computation of the score. P2p lending platforms are only made possible because of the digitalisation and verification of borrower data, such as income, workplaces, previous borrowing records, credit scores from other credit agencies, and underlying assets (if the loan is secured). If these data are not available digitally, the cost of accessing these data could be too high for p2p lending to operate. Access to these data is not enough; platforms need to make use of these data to assess the riskiness of the loan and profitability of the loan. Under certain conditions, platforms do this manually. For example, Funding Secured has an auction house valuation capability, and most of the loans that it processes are secured by antique assets. Thus, it manually values the loan opportunity, gives it a credit score, advises on the interest

rate, and determines the value of the asset. Under some other conditions, platforms do so by using machine learning and algorithms. For example, Lendables, who mainly facilitates unsecured personal loans, heavily relies on automatic decision-making so that borrower applicants can receive results instantly. This instant decision-making time differentiates the platform from others.

5. Economic conditions

The majority of the above conditions were already available in 2005, when Zopa was established. However, as I will show later, followers started to enter the market after 2008. Many p2p lending founders claimed that the 2008 economic recession motivated them to start p2p lending platforms. It is argued that banks became risk aversive during and after recession. Thus, it was extremely difficult for SMEs and individuals to apply for loans that would have been granted prior to the recession. The effect was long lasting, such that the rejection rate of first-time SME loan applicants increased by approximately 15%, going from 40% in 2010 to 55% in 2012 (Riley, Rosazza-Bondibene and Young 2014). This condition made an additional borrower-customer group available for p2p lending platforms, in addition to previously underserved freeformers.

6. Institutions in the UK and London.

Apart from the formation of friendly societies in the 18th century, the UK and especially London have a unique position in modern financial activities. London was the world financial centre and is trying to be the technology centre. For a long time, London had been the world financial centre and has only recently been overtaken by New York in financial centre index ratings, i.e., GFCI and IFCD. Additionally, London is known for its ambition to develop itself to a global technology centre by offering policies that welcome foreign companies as well as incubating local technology companies. The current p2p lending platforms are often categorised as fintech (finance + technology) companies. In my dataset of 82 UK p2p lending platforms, 45 of them are London based.

Compared with its largest counterpart in the finance industry or specifically the p2p lending industry, the USA, the UK is different in terms of legal institutions. In general, the legal institutions in the UK are more open (in terms of possibilities) than those in the US. Open institutions can be first reflected in the usage of more principle(goal)-based regulatory compliance in the business context in the UK than in the US, which uses more rule-based regulatory compliance. (There is

legal literature that articulates the usages of principle-based regulations and rule-based regulations, i.e., Cunningham 2007; this paper does not argue which one is better but argues that there are more possibilities or flexibilities with principle-based regulations, and thus, they are more open from the dimension of possibility).

Figure 3-9 The key difference between principle-based regulations and rule-based regulations (Decker, 2018)

Factor	Goals-based regulation	Rules-based regulation
Degree of particularity or precision	Directives are generally imprecise and open-textured, leaving scope for interpretation	Specific and precise prescriptions for behaviour
Who decides on content of provision	Regulatees interpret the goal and make judgments as to how best to comply with the goal	Those drafting the rule, such as a regulator
When is content determined	At the time the regulatee interprets the goal and takes action	At the time of the drafting of the rule
Congruence with a regulatory objective	Encourages regulatees to take actions and exercise judgements directly consistent with the regulatory objective	Assumed that the rule is congruent with the objective, and so if regulatees comply with the rule the objective will be achieved
Enforcement approach	Investigate whether the regulatee's actions are consistent with the goal	Investigate whether the regulatee has complied with the rule

For example, in the context of corporate governance, in 1992, the UK started its official research on corporate governance. In 1998, the first edition of the Code on Corporate Governance was published, and it has been continuously modified over the years. However, the UK's code is a principle-based regulation that listed companies do not need to follow. They only need to explain the areas that were not followed. In comparison, in the US, Sarbanes-Oxley Act 2002 was established as a rule-based regulation that applied to relevant listed companies. (Downey, 2005; Financial Reporting Council)

In the context of safety and security in international trade, the UK adopted the EU's principle-based AEO self-assessment, whereas the US adopted the rule-based C-TPAT. (Burgeeestre, Hulstijn and Tan, 2009)

In the context of accounting standards, the International Financial Reporting Standards (IFRS) identify as being more principle-based than the US General Accepted Accounting Standards (GAAP), which are more rule-based. The IFRS also recognized the following: "At the time of the IFRS adoption, this led English observers to comment that international standards were really rule-based compared to U.K. GAAP that were much more principle-based." (Forgeas, 2008)

More importantly, in the context of financial regulations, in 2007, the UK FSA (Financial Service Authority, now absorbed by the Financial Conduct Authority) identified its increasing emphasis on principle-based regulations. (FSA, 2007)

As a result of differences in legal institutions, when Zopa gained its success in the UK and tried to enter the US market in 2006 by using the same business model, they encountered problems. Zopa noticed that "what you do in the UK could be considered illegal [in the United States] unless you register with the securities and exchange commission (SEC)." Regarding Prosper's operation in the US, it was noted that the "SEC would not prevent an illegal business from launching but would eventually stop it from operating" (Piskorski, Fornandez-Mateo and Chen 2009).

Platform's entry business model

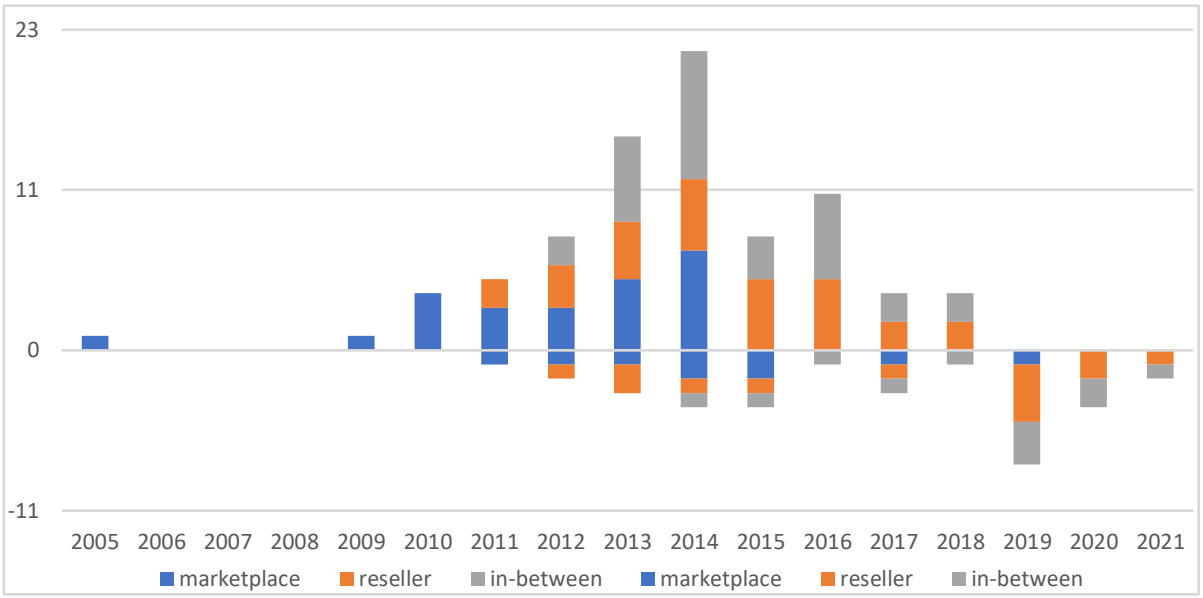
Using the taxonomy developed by the two variables, among the 82 companies, when they were initially funded, 24 were matchmakers, 28 were resellers, and 30 were in-between. Using the typology, where the 30 in-between platforms can be categorised as resellers, there were 24 matchmakers and 58 resellers. Figures 3-10 and 3-11 below illustrate the entries and exits of p2p lending platforms by business model type and year.

Figure 3-10 Entry and exit business models of UK p2p lending platforms

	Entry				Exit		
Year	Market place	Reseller	In-between	% Marketplace entry	Market place	Reseller	In-between
2005	1	0	0	100%			
2006	0	0	0				
2007	0	0	0				
2008	0	0	0				
2009	1	0	0	100%			
2010	4	0	0	100%			
2011	3	2	0	60%	-1	0	0
2012	3	3	2	38%	-1	-1	0
2013	5	4	6	33%	-1	-2	0
2014	7	5	9	33%	-2	-1	-1
2015	0	5	3	0%	-2	-1	-1
2016	0	5	6	0%	0	0	-1

2017	0	2	2	0%	-1	-1	-1
2018	0	2	2	0%	0	0	-1
2019					-1	-4	-3
2020					0	-2	-2
2021					0	-1	-1

Figure 3-11 Frequency of entry and exit of marketplace, reseller and in-between models



However, the above charts also clearly show a pattern in which the matchmaker used to be the dominant entry model until 2011. From 2015, no new platforms started as a marketplace model.

This empirical observation is counterintuitive and interesting to the current literature in two ways. First, it represents an industry-level business model change, aggregated by firm-level business model choice. Previous literature on platform changes primarily focused on single case studies or comparative case studies. The change or dynamic that I present here comes from the difference between early entrants and late entrants. (Note that the early entrants themselves also changed the business model from marketplace to reseller). Thus, there are two different kinds of change. One is at the firm level, as early entrants changed their business model from marketplace to reseller. One is at the industry level, as later entrants did not follow the early entrants' original business model; instead, later entrants adopted the "updated" business model of the early entrants. In other words, many early entrants experienced business model change and morphed from a marketplace to a reseller model, while later entrants did not experience the business model change process and started as a reseller.

A specific literature stream that shows some relevance to the p2p lending scenario is the study on platforms entering into a complementary market. Gawer and Henderson (2007) studied Intel's decision and process of entering a complementary market, i.e., from making chips to making mother boards. They carefully analysed the strategies that Intel used to gain leverage in a

complementary market, while not appearing too threatening such that complementors would leave. Zhu and Liu (2018) studied Amazon's entry into the complementor (sellers) market. They found that Amazon is likely to enter successful product spaces and less likely to enter product spaces that require effort. Compared with Intel's example, the Amazon example included complementors that had less platform-specific investment; thus, Amazon was more likely to compete with these complementors directly. Wen and Zhu (2019) examined the impact of Google's entry into the app market. They found that after Google's increased entry threat and its actual entry, the affected complementary app developers reduced innovation and increased app prices.

However, the above research on platforms' entry into the complementor's market is different from the current study of business model change of p2p lending platforms in the following ways. 1. The above examples investigate a particularly successful platform and how the platform enters a complementary market. In Amazon and Google's case, the platforms replaced (outcompeted) some sellers on the platforms. The current study on p2p lending discovered differences in business model choice between new entrants and early entrants. Therefore, the change was not only made by a single platform but also by the industry population. 2. It is clear from the above studies that the platform competed with complementors and replaced some of them. In the p2p lending industry, however, there is no competition between the platform and sellers. Instead, the platform ensures sellers' products (loans) are sold to the platform first (in the reseller model). From the perspective of lenders, platforms replaced original loan sellers. However, from the perspective of loan sellers, their money borrowing objective was achieved instead of replaced by the platform. 3. The example of Amazon and Google, in the eyes of Hagiu and Wright (2015), could be seen as a hybrid business model—simultaneously using the marketplace and reseller model for different products. I shall again emphasise that the hybrid model in Hagiu and Wright (2015) represents an intermediary platform using both a marketplace model and a reseller model. This hybridisation is different from the complete migration from marketplace model dominance to reseller model dominance. The hybrid model is different from the "in-between" category of platforms. The in-between category indicates one business model that is not a typical reseller or a typical marketplace model; it does not denote using two business models at the same time. The hybridisation or hybrid model also exists in p2p lending. Many platforms allow lenders to "hand-pick" borrowing opportunities, negotiate prices, and invest in an investment package. Note that in p2p lending, such hybridisation

tends to exist as a transformational stage so that a platform can transfer from a marketplace to a reseller.

The second counterintuitive aspect is that the direction of change is the opposite of the previous prediction. In Hagiu (2007), Walmart, Amazon and Bright.com were used as examples to illustrate the transition (platform-wise and industry-wise) to a marketplace. The author noted the following: "It is interesting to ask what would need to change in order for these sites to move closer to a two-sided platform mode. An obvious part of the answer is the transfer of control over pricing from the intermediary to the content providers. Presumably, this will happen over time as consumers become more accustomed to such services, so that there is less value created by uniform and centralized pricing. In fact, the trend towards decentralization of control and therefore towards more two-sided platform-like intermediation models has already started taking place in the Internet video market." In Eisenmann, Parker and Van Alstyne (2011) and Van Alstyne et al. (2015), marketplaces are supposed to outcompete resellers via an envelopment strategy by simple product bundling. This p2p lending context presents a unique situation where marketplaces have lost to resellers (in terms of the business model, not the business unit).

However, if we take a further step back from the p2p lending market and concentrate on lending, we can see that firms that lend money are neither intermediaries who lend out their own money, e.g., a firm that allows credit, nor intermediaries who lend out others' money, e.g., a bank via bank loans, overdraft, credit card, mortgages, etc. Within the intermediary model, the reseller was dominant, if not the only business model. Then, p2p lending challenged and contrasted with traditional bank lending by innovating a p2p lending marketplace model that was inspired by the retail marketplace eBay model. Thus, within the p2p lending market, marketplace was the dominant model before 2011. Then, the marketplace model's dominant position in p2p lending was overtaken by the reseller model.

This scenario raises many unanswered questions, including the following: What is the impact of choosing a marketplace over a reseller business model? Why was there a change in the business model from marketplace to reseller (both industry level and platform level)? How did early marketplace platforms change their business model (at the platform level)? How can the marketplace model emerge from a reseller-dominant industry? What is the advantage/disadvantage

of the marketplace over reseller business model? Under what conditions can the marketplace perform better/worse? Are the findings generalisable to other industries?

This chapter will concentrate on the question of the impact of business model choice on platform performance (RQ2) and point to some answers to the question of the advantages of the marketplace model over the reseller model when funding (RQ1) and the change process between reseller and marketplace (RQ3).

Quantitative Variables

To firmly answer the question of the impact of business model choice on firm performance, I conduct an analysis of them using quantitative data collected on the sample. The first step is to report the descriptive statistics and to eliminate any outliers using SPSS.

Figure 3-12 Dependent Variables:

	Mean	Range	Std.Dev	Skewness	Outliers(case number)
Survival Month (website)	63.85	6-192	34.84	0.472	1
Sqrt of survival month	7.64	2.45-13.86	2.37	-0.359	1
Log of survival month	1.71	0.78-2.28	0.32	-1.065	23; 32; 56
Survival Month (reports)	92.4	12-310	50.67	1.56	1; 37; 42; 57; 64; 79
Sqrt of survival month	9.27	3.46-17.6	2.58	0.27	2; 33; 42; 64; 79
Log of survival month	1.90	1.08-2.50	0.266	-0.978	2; 33; 23; 32; 13; 56; 42
Extinction dummy (web)	0.4				
Extinction dummy (reports)	0.34				

Figure 3-13 Independent Variables:

	Mean	Range	Std.Dev	Skewness	Outliers
Debtors	611244.70	0-	3107108.034	7.705	16 cases

		26577000			
Sqrt Debtors	330.291	0-5155.289	713.04	4.785	11 cases
Log Debtors	3.34	0-7.425	2.28	-0.474	0
Creditors	-684485.96	-32732000-0	3663329.075	-8.595	11 cases
Sqrt abs Creditors	432.185	0-5721.189	709.875	5.561	35; 57; 61; 64; 67
Log abs Creditors	4.460	0-1.626	1.626	-1.648	64 for extreme high; 8 cases for extreme low – but they are not outliers because low (=0) makes sense.
Total assets	1540764.53	0-84591000	9422525.099	8.780	12 cases
Sqrt total assets	597.049	0-1095.035	1095.035	6.386	9 cases
Log total assets	4.847	0-1.367	1.868	-1.610	64 for extreme high; 2; 23; 62; 32 for extreme low – makes sense because these four companies have almost 0 activities
Opening shareholder value	394024.93	0-6015464	1003810.302	3.984	10 cases

Sqrt open shareholder value	375.696	0-2452.644	506.002	2.185	6 cases
Log open shareholder value	3.716	0-6.779	2.178	-0.538	0
Retained earnings	336102.32	-2655451 - 43618000	4885428.381	8.906	9 cases for extremely low and 1 case for extremely high

By reviewing the core descriptive statistics, I decided to remove 6 companies from the quantitative analysis (they are kept for the qualitative analysis) for the following reasons. Case 1, which is Zopa, is excluded because its formation year is too early compared to those for the rest of the sample. Thus, when analysing survival, there is a large chance that Zopa can increase the positive impact of its business model on survival. Thus, it is removed. Case 64 is removed because p2p lending is a small business operation within its private funding business. When collecting financial data, it is not possible to isolate p2p lending information from the financial information of other businesses. Although it is common for a platform to operate more than the p2p lending business, in Case 64, its p2p lending business is too small compared to its private funding business. Thus, it is excluded. Regarding Case 2, 23, 32, and 62, these four firms have almost 0 financial activities on their first-year financial accounts, i.e., zero total assets. Zero total asset indicates that the platform is likely to lack financial resources to operate, and the impact of the business model is likely to be overshadowed by the lack of financial resources. Thus, these four cases are removed. After removing cases 1, 64, 2, 23, 32, and 62, the effective sample size was reduced to 76.

The descriptive statistics also suggest the necessity of using transformation. The original variables were not normally distributed. Using sqrt (square root) and log transformation significantly reduced the skewness of variables and better fit the assumption of the normal distribution that we needed for regression analysis.

After reviewing the descriptive statistics, my next step is analysing the correlations between the variables.

Correlations:

Here, I report the significant or important or interesting ones. The correlations for the sample of 82 and the sample of 76 are calculated. Since the correlation only hints at a possible relationship between variables, I present the sample with 82 firms. I shall report noticeable differences between the correlations of the sample with 82 firms and those of the sample with 76 firms.

Figure 3-13 BM (Business Model) and survival

		Survival month (web)	Sqrt of survival month (web)	Log survival month (web)	Survival month (reports)	Survival month (reports)	Log survival month (reports)	Extinction (web)	Extinction (reports)
Marketplace	Pearson Correlation	.282*	.242*	0.202	0.092	0.097	0.081	-0.036	-0.068
	Sig. (2-tailed)	0.010	0.029	0.069	0.413	0.388	0.467	0.748	0.547
	N	82	82	82	82	82	82	82	82
Reseller	Pearson Correlation	-0.137	-0.136	-0.139	0.030	0.028	0.030	0.091	0.024
	Sig. (2-tailed)	0.219	0.224	0.213	0.792	0.804	0.791	0.417	0.832
	N	82	82	82	82	82	82	82	82
In-between	Pearson Correlation	-0.131	-0.095	-0.054	-0.116	-0.119	-0.106	-0.055	0.040

	Sig. (2-tailed)	0.240	0.397	0.631	0.301	0.288	0.343	0.621	0.719
	N	82	82	82	82	82	82	82	82

Figure 3-13 above shows the correlation between the independent variable—entry business choice—and the dependent variable—survival—in various measurement formats. This indicates a positive relationship between a marketplace model and all survival length measurements and survival as a dummy variable. More importantly, the relationship between the marketplace model and the website-based survival measurement is significant. As discussed previously, I determine that the website-based survival length is a better indication of the duration of actual lending operations compared to the financial report-based survival length. This shows that compared to other models, the marketplace business model tends to survive longer. However, this finding is only significant on web-based survival length, not on other measurements on survival length.

Compared with the marketplace model, the reseller model and the in-between model have a nonsignificant negative relationship with survival length and survival.

In the sample with 76 firms, the marketplace model only has a significant and positive correlation with the web-based survival month and a nonsignificant relationship with the sqrt and log of survival month.

However, the correlation should be interpreted with care because as we know, the marketplace model tends to be used by early entrants, while the reseller and in-between models tend to be used by later entrants; thus, the marketplace model may exist longer because these firms exist earlier.

Figure 3-14 BM and debtors; BM and creditors

		Debtors	Sqrt debtors	Log debtor	2nd year debtors
Marketplace	Pearson Correlation	-0.114	-0.143	-0.083	-0.153
	Sig. (2-tailed)	0.307	0.199	0.460	0.170
	N	82	82	82	82
Reseller	Pearson Correlation	.220*	.311**	.341**	.286**
	Sig. (2-tailed)	0.047	0.004	0.002	0.009
	N	82	82	82	82
In-between	Pearson Correlation	-0.109	-0.171	-.258*	-0.137
	Sig. (2-tailed)	0.329	0.125	0.019	0.219
	N	82	82	82	82

2.

		Creditors(1year)	Sqrt abs creditors	Log abs creditors	2nd year creditors (1 year)
Marketplace	Pearson Correlation	0.103	-0.128	-0.028	0.132
	Sig. (2-tailed)	0.355	0.251	0.801	0.238
	N	82	82	82	82

Reseller	Pearson Correlation	-0.178	.229*	0.159	-0.194
	Sig. (2-tailed)	0.111	0.039	0.153	0.081
	N	82	82	82	82
In-between	Pearson Correlation	0.077	-0.104	-0.130	0.066
	Sig. (2-tailed)	0.492	0.352	0.244	0.555
	N	82	82	82	82

Debtors denote money owed to the platform by borrowers. There is a strong and positive relationship between the reseller model and debtors. One reasonable explanation for this positive relationship can be attributed to the accounting policy and BM choices. When the BM is the reseller model, the firm is more likely to exercise "balance sheet" lending; that is, the platform uses its own money to lend to borrowers. This money should be recognised as being related to debtors—money owed by borrowers to the platform. In contrast, in the marketplace model, the platform helps lenders lend money to borrowers. Thus, the lending should not be reflected on the balance sheet of the platform (but on that of the lender if the lender has one).

Creditors indicate how much money is owed by the platform. I specifically collected data for 1-year creditors—repayment required within 1 year—to eliminate the effect of long-term loans—loans that are used for the development of the company. Thus, short-term loans are likely to reflect financial relationships between platforms and lenders. The figure shows a significant negative relationship between resellers and creditors. This situation can also be explained by accounting policy and business models. In the reseller model, when the platform sold loans that it purchased from borrowers to lenders, a new contract between the platform and the lender was formed. This contract would increase both cash assets and creditors for the platform. Thus, the reseller had to recognise creditors on its financial reports. In contrast, the marketplace model does not form a

contract between itself and lenders. Thus, the marketplace model does not need to recognise creditors when a contract is formed between lenders and borrowers.

In the sample of 76 firms, the significant correlation between resellers and debtors remains, but the correlation between resellers and creditors is absent.

The significant correlation between resellers and debtors and between resellers and creditors indicates that to a large extent, my classification system is effective. It could capture the operation of "balance sheet lending" that in theory should be a reseller-exclusive operation.

Figure 3-15 BM and total assets

		Total assets(fixed + current)	Sqrt total assets	Log total assets	2nd year total assets
Marketplace	Pearson Correlation	-0.087	-0.112	-0.093	-0.110
	Sig. (2-tailed)	0.436	0.316	0.404	0.327
	N	82	82	82	82
Reseller	Pearson Correlation	0.173	.234*	.240*	0.200
	Sig. (2-tailed)	0.120	0.035	0.030	0.072
	N	82	82	82	82
In-between	Pearson Correlation	-0.088	-0.124	-0.148	-0.093
	Sig. (2-tailed)	0.433	0.267	0.183	0.406
	N	82	82	82	82

Figure 3-15 shows a strong and positive relationship between the reseller model and total assets. This relationship is consistent with the prediction that the reseller model is more capital intensive than other models, as a reseller needs to purchase inventory and hold inventory. In the case of p2p lending, there is no holding cost in terms of physically storing loan notes. However, the capital required to purchase loans from balance sheets is reflected in high total assets.

Figure 3-16 BM and nondebtor assets

		Nondebtor total assets	Sqrt Ndta	Log Ndta
Marketplace	Pearson Correlation	-0.71	-0.61	-0.4
	Sig. (2-tailed)	0.518	0.586	0.970
	N	82	82	82
Reseller	Pearson Correlation	0.147	0.144	0.118
	Sig. (2-tailed)	0.189	0.195	0.193
	N	82	82	82
In-between	Pearson Correlation	-0.076	-0.085	-0.112
	Sig. (2-tailed)	0.499	0.450	0.317
	N	82	82	82

Thus, by removing debtors from total assets, in Figures 3-16 above, the positive relationship between resellers and nondebtor total assets becomes insignificant (although still positive). This indicates that, although the reseller model requires more capital to operate than other models, capital is mainly used for purchasing inventory—loan notes in this case.

Figure 3-17 BM and opening shareholder equity.

		Opening shareholder equity (closing net assets - retained earnings)	Sqrt	Log	2nd year shareholder equity
Marketplace	Pearson Correlation	0.086	0.097	0.138	0.151
	Sig. (2-tailed)	0.442	0.388	0.217	0.176
	N	82	82	82	82
Reseller	Pearson Correlation	0.087	0.061	-0.054	0.020
	Sig. (2-tailed)	0.439	0.585	0.627	0.859
	N	82	82	82	82
In-between	Pearson Correlation	-0.167	-0.151	-0.077	-0.162
	Sig. (2-tailed)	0.135	0.174	0.494	0.145
	N	82	82	82	82

Opening shareholder equity indicates how much money the firm has at the beginning of trading that comes from shareholder investment. It is an indicator of a funder's financial commitment to

the platform. Funders have two ways of financing the firms themselves: one is by lending money to the firm, and the other is by investing as shares. This value captures the amount that is invested as shares, which has higher risks than loans.

There is no significant relationship. However, the in-between business model (neither the marketplace nor the reseller) seems to have a negative relationship with opening shareholder equity.

Figure 3-18 Starting year

		Starting year
Marketplace	Pearson Correlation	-.536**
	Sig. (2-tailed)	0.000
	N	82
Reseller	Pearson Correlation	.220*
	Sig. (2-tailed)	0.047
	N	82
In-between	Pearson Correlation	.290**
	Sig. (2-tailed)	0.008
	N	82

As previously noted, the marketplace business model is the dominant funding BM in the early period. The reseller model and in-between model are used by later entrants.

Figure 3-19 Survival and total assets

		Total assets 1st year (fixed + current)	Sqrt total assets	Log total assets	2nd year total assets
Survival month (website)	Pearson Correlation	0.008	0.126	.403**	0.029
	Sig. (2-tailed)	0.943	0.260	0.000	0.797
	N	82	82	82	82
Sqrt of survival month (website)	Pearson Correlation	0.026	0.144	.444**	0.049
	Sig. (2-tailed)	0.816	0.198	0.000	0.663
	N	82	82	82	82
Log survival month (website)	Pearson Correlation	0.044	0.160	.470**	0.067
	Sig. (2-tailed)	0.692	0.152	0.000	0.548
	N	82	82	82	82
Survival month (reports)	Pearson Correlation	.383**	.457**	.471**	.374**
	Sig. (2-tailed)	0.000	0.000	0.000	0.001
	N	82	82	82	82

Sqrt survival month (reports)	Pearson Correlation	.321**	.412**	.527**	.318**
	Sig. (2-tailed)	0.003	0.000	0.000	0.004
	N	82	82	82	82
Log survival month (reports)	Pearson Correlation	.245*	.347**	.563**	.248*
	Sig. (2-tailed)	0.027	0.001	0.000	0.025
	N	82	82	82	82
Extinction (website)	Pearson Correlation	-0.121	-0.190	-.328**	-0.133
	Sig. (2-tailed)	0.279	0.087	0.003	0.232
	N	82	82	82	82
Extinction (reports)	Pearson Correlation	-0.104	-0.161	-.330**	-0.114
	Sig. (2-tailed)	0.352	0.148	0.002	0.308
	N	82	82	82	82

The above Figure 3-19 suggests a positive and significant relationship between log total assets and all measurements of survival. Other asset measurements have a positive and significant relationship with report-based survival measurements. Even second-year total assets have a significant and positive relationship with report-based survival measurements.

This positive relationship between survival and total assets may be explained simply by the fact that more (financially) resourceful companies are more likely to survive longer. Therefore, we should take financial resourcefulness as a factor in the regression analysis.

Figure 3-20 Survival, debtors and creditors

		Debtors	Sqrt debtors	Log debtor	2nd year debtors
Survival month (website)	Pearson Correlation	0.018	0.146	.420**	0.064
	Sig. (2-tailed)	0.871	0.189	0.000	0.568
	N	82	82	82	82
Sqrt of survival month (website)	Pearson Correlation	0.039	0.161	.443**	0.083
	Sig. (2-tailed)	0.727	0.147	0.000	0.461
	N	82	82	82	82
Log survival month (website)	Pearson Correlation	0.060	0.173	.450**	0.098
	Sig. (2-tailed)	0.595	0.121	0.000	0.382
	N	82	82	82	82
Survival month (reports)	Pearson Correlation	.381**	.429**	.452**	.332**
	Sig. (2-tailed)	0.000	0.000	0.000	0.002
	N	82	82	82	82
Sqrt survival month (reports)	Pearson Correlation	.324**	.391**	.486**	.287**

	Sig. (2-tailed)	0.003	0.000	0.000	0.009
	N	82	82	82	82
Log survival month (reports)	Pearson Correlation	.253*	.333**	.496**	.231*
	Sig. (2-tailed)	0.022	0.002	0.000	0.036
	N	82	82	82	82
Extinction (website)	Pearson Correlation	-0.134	-0.194	-.329**	-0.135
	Sig. (2-tailed)	0.228	0.080	0.003	0.227
	N	82	82	82	82
Extinction (reports)	Pearson Correlation	-0.109	-0.138	-.305**	-0.103
	Sig. (2-tailed)	0.328	0.218	0.005	0.356
	N	82	82	82	82

		Creditors(1year)	Sqrt abs creditors	Log abs creditors	2nd year creditors (1 year)
Survival month (website)	Pearson Correlation	0.003	0.096	.309**	-0.028
	Sig. (2-tailed)	0.977	0.392	0.005	0.806
	N	82	82	82	82
Sqrt of survival month (website)	Pearson Correlation	-0.023	0.136	.362**	-0.058
	Sig. (2-tailed)	0.838	0.224	0.001	0.607
	N	82	82	82	82
Log survival month (website)	Pearson Correlation	-0.048	0.171	.412**	-0.084
	Sig. (2-tailed)	0.667	0.124	0.000	0.454
	N	82	82	82	82
Survival month (reports)	Pearson Correlation	-.385**	.427**	.407**	-.348**
	Sig. (2-tailed)	0.000	0.000	0.000	0.001
	N	82	82	82	82
Sqrt survival month (reports)	Pearson Correlation	-.325**	.394**	.464**	-.300**
	Sig. (2-tailed)	0.003	0.000	0.000	0.006
	N	82	82	82	82

Log survival month (reports)	Pearson Correlation	-.252*	.341**	.503**	-.239*
	Sig. (2-tailed)	0.023	0.002	0.000	0.031
	N	82	82	82	82
Extinction (website)	Pearson Correlation	0.116	-0.179	-.300**	0.091
	Sig. (2-tailed)	0.298	0.108	0.006	0.415
	N	82	82	82	82
Extinction (reports)	Pearson Correlation	0.096	-0.142	-.314**	0.070
	Sig. (2-tailed)	0.391	0.202	0.004	0.534
	N	82	82	82	82

4.

Similar to the relationship between survival and total assets, there is also a positive and significant relationship between survival and debtors and survival and creditors. Because debtors are a subclass of current assets, they are included in the calculation of total assets. Therefore, the positive relationship between survival and total assets might result from the positive relationship between survival and debtors. To examine this, it is important to see the relationship between survival and nondebtor assets.

In the sample of 76 firms, only log debtors and creditors (not other measurements of debtors and creditors) have a significant relationship with measurements of survival.

Figure 3-21 Survival and nondebtor assets

		Nondebtor assets	Sqrt non debtor assets	Log non debtor assets
Survival month (website)	Pearson Correlation	0.003	0.107	.267*
	Sig. (2-tailed)	0.98	0.341	0.015
	N	82	82	82
Sqrt of survival month (website)	Pearson Correlation	0.019	0.121	.294**
	Sig. (2-tailed)	0.864	0.277	0.007
	N	82	82	82
Log survival month (website)	Pearson Correlation	0.036	0.137	.317**
	Sig. (2-tailed)	0.746	0.221	0.004
	N	82	82	82
Survival month (reports)	Pearson Correlation	.377**	.451**	.406**
	Sig. (2-tailed)	0	0	0
	N	82	82	82
Sqrt survival month (reports)	Pearson Correlation	.313**	.402**	.442**
	Sig. (2-tailed)	0.004	0	0
	N	82	82	82

Log survival month (reports)	Pearson Correlation	.236*	.333**	.457**
	Sig. (2-tailed)	0.033	0.002	0
	N	82	82	82
Extinction (website)	Pearson Correlation	-0.112	-0.181	-.237*
	Sig. (2-tailed)	0.316	0.105	0.032
	N	82	82	82
Extinction (reports)	Pearson Correlation	-0.1	-0.182	-.357**
	Sig. (2-tailed)	0.373	0.102	0.001
	N	82	82	82

Note: when nondebtor assets are 0 or below, the log and sqrt value are recorded as 0.

There is also a significant positive relationship between log nondebtor assets and all survival measurements and between report-based survival measurements and all nondebtor measurements. This is because nondebtor assets capture financial resources that the platform can use to develop itself. The correlation is likely to show that more resourceful platforms are likely to survive longer.

However, in the sample of 76 firms, although the correlation is still positive, it is only significant when correlating sqrt nondebtor assets with reports-based survival month. Therefore, the connection between nondebtor assets and survival is much weaker in the sample of 76 firms.

Returning to the positive relationship between survival and debtors/creditors and combined with the previous relationship between BM and survival and BM and debtors/creditors, there is an interesting finding, as summarised below:

a. BM choice (marketplace) - positive - survival
b. BM choice (reseller) - positive - debtors/creditors

c. Debtors - positive - survival

These correlations hint that while there is a direct positive relationship between the marketplace model and survival, it is supposed that "opposite" business model—the reseller model— also has a mediated positive relationship with survival. This also hints that there may not be an "optimal" entry business model.

Figure 3-22 Survival and opening shareholder funds

		Opening shareholder equity (closing net assets - retained earnings)	Sqrt	Log	2nd year shareholder equity
Survival month (website)	Pearson Correlation	.288**	.254*	0.140	.409**
	Sig. (2-tailed)	0.009	0.021	0.210	0.000
	N	82	82	82	82
Sqrt of survival month (website)	Pearson Correlation	.237*	.227*	0.138	.346**
	Sig. (2-tailed)	0.032	0.040	0.218	0.001
	N	82	82	82	82
Log survival month (website)	Pearson Correlation	0.198	0.209	0.137	.293**
	Sig. (2-tailed)	0.074	0.060	0.218	0.008
	N	82	82	82	82
Survival month (reports)	Pearson Correlation	.417**	.432**	.297**	.464**
	Sig. (2-tailed)	0.000	0.000	0.007	0.000
	N	82	82	82	82

Sqrt survival month (reports)	Pearson Correlation	.381**	.411**	.312**	.438**
	Sig. (2-tailed)	0.000	0.000	0.004	0.000
	N	82	82	82	82
Log survival month (reports)	Pearson Correlation	.321**	.367**	.318**	.384**
	Sig. (2-tailed)	0.003	0.001	0.004	0.000
	N	82	82	82	82
Extinction (website)	Pearson Correlation	-.237*	-.260*	-0.207	-.314**
	Sig. (2-tailed)	0.032	0.018	0.062	0.004
	N	82	82	82	82
Extinction (reports)	Pearson Correlation	-.247*	-.316**	-.287**	-.311**
	Sig. (2-tailed)	0.025	0.004	0.009	0.004
	N	82	82	82	82

Strong evidence suggests that more resources make firms survive longer. Opening shareholder funds have a weak relationship with survival measurements. However, in the sample of 76 firms, there is no significant correlation between opening shareholder fund measurements and survival measurements.

Figure 3-23 Survival and starting year and complicated structure

		Complicated	Starting year

Survival month (website)	Pearson Correlation	-0.171	-.465**
	Sig. (2-tailed)	0.124	0.000
	N	82	82
Sqrt of survival month (website)	Pearson Correlation	-0.167	-.355**
	Sig. (2-tailed)	0.134	0.001
	N	82	82
Log survival month (website)	Pearson Correlation	-0.160	-.233*
	Sig. (2-tailed)	0.152	0.035
	N	82	82
Survival month (reports)	Pearson Correlation	-0.152	-0.089
	Sig. (2-tailed)	0.173	0.427
	N	82	82
Sqrt survival month (reports)	Pearson Correlation	-0.185	-0.073
	Sig. (2-tailed)	0.096	0.514
	N	82	82
Log survival month (reports)	Pearson Correlation	-.219*	-0.029
	Sig. (2-tailed)	0.049	0.796

	N	82	82
Extinction (website)	Pearson Correlation	-0.002	-0.042
	Sig. (2-tailed)	0.983	0.709
	N	82	82
Extinction (reports)	Pearson Correlation	-0.008	-0.171
	Sig. (2-tailed)	0.942	0.125
	N	82	82

This suggests that platforms with complicated structures (i.e., being a subsidiary of another firm and in partnership with another firm.) tend to survive for a shorter period. This is counterintuitive. I would imagine connected firms to be able to survive longer. In the sample of 76 firms, there was no significant relationship between the complicated association of platforms and survival. There was also a strong relationship between starting year and survival length, as expected. Although later starting year has a negative correlation with survival duration because later entrants are not given the chance to survive longer, there is also an expected negative correlation between later starting year and extinction (dummy) because later entrants were not given enough time to fail. However, this relationship is negative but insignificant in the above correlation table. Thus, I do not expect starting year to be influential in binary logistic regressions but to be influential in linear regressions.

Regressions:

After eliminating the 6 outliers identified, with a sample of 76 firms, I ran different models of binary logistics, as illustrated in Figure 3-24 below.

Figure 3-24: Regression models - binary logistics

Binary Logistics	B(M1)	B(M2)	B(M3)	B(M4)	B(M5)	B(M6)	B(M7)	B(M8)	B(M9)	B(M10)
Extinction (dummy)(website)	73.7%	69.7%	67.1%	67.1%	63.2%	63.2%	72.4%	69.7%	68.4%	73.7%
Marketplace	-0.828 (0.296)	-0.938 (0.157)	-0.533(0.381)	-0.708(0.264)	-0.328 (0.585)	-0.429 (0.472)	-0.871 (0.215)	-0.093(0.872)		
In-between	-1.269 (0.061)	-1.265 (0.057)	-0.793(0.181)	-0.835(0.161)	-0.580 (0.309)	-0.625 (0.272)	-1.399 (0.045)		-0.941(0.105)	
Reseller										1.152(0.059)
Log debtor	-0.373 (0.052)	-0.331 (0.01)					-0.296 (0.028)	-0.188(0.110)	-0.244(0.052)	-0.287(0.030)
Log abs creditors	-0.139		-0.313(0.095)							

	(0.606)									
Log total assets	0.363 (0.565)			-0.504(0.082)						
Log open shareholder fund	-0.145 (0.267)				-0.121 (0.279)					
Log non debtor assets	-0.139 (0.631)					-0.132 (0.444)				
2nd year shareholder equity							-0.000001(0.036)	-0.000001(0.036)	-0.000001(0.032)	-0.000001(0.038)
Starting year	-0.02(0.901)									
Complicated structure	-0.123 (0.861)									
If London	-0.137									

	(0.801)									
Nagelkerke R square	0.176	0.144	0.073	0.075	0.041	0.031	0.274	0.210		0.265
Cox & Snell R square	0.129	0.106	0.054	0.055	0.030	0.023	0.201	0.154		0.195

When no independent variables are entered, the overall prediction percentage is 61.8%; i.e., when predicting that 100% of platforms fail, the result is 61.8% correct (47 out of 76 platforms extinct).

Then, I run Model 1 by inserting relevant variables identified in the previous correlation analysis, and the overall prediction is 73.7%. Since there is no R square for a binary logistic regression, I used two pseudo measurements, namely, Nagelkerke R square and Cox & Snell R square. They both represent the amount of variance that Model 1 could explain. Their values are 0.176 and 0.126, respectively. Among the independent variables entered, the only significant variable is log debtors, which is negatively related to extinction and thus positively related to survival. The other log variables become insignificant. Compared to the reseller model, both the in-between model and marketplace model have a positive relationship with survival, although they are marginally significant. This finding hints that business model choice is likely to be a key factor in determining the survival of platforms. Further manipulation of the model is needed. It is also important to examine the impact of starting year.

There is a strong positive correlation between different measurements of financial assets: log debtors, log abs creditors, log total assets, log open shareholder funds, and log nondebtor assets. I run M2–M6 to test the influence of each of these variables on the dependent variable. As shown, each of the models reduces prediction accuracy, with log debtors having the most significant impact on survival. The other 4 variables are dropped.

Then, based on M2, I added the variable 2nd year shareholder equity, which is significantly related to survival in the correlation analysis, to formulate M7. This improved the prediction accuracy to 72.4% and improved both the Nagelkerke R square and Cox & Snell R square to 0.274 and 0.201, respectively.

Coming back to the key independent variable—business models—using resellers as the baseline, both marketplace and in-between models are more likely to survive. In Model 7, the difference between in-between and reseller is significant, and the magnitude is large. Surprisingly, the marketplace is more likely to survive than the reseller, even though compared to a reseller, a marketplace has a disadvantage in binary logistics (marketplace models are given a longer time to fail than reseller models). Additionally, it is surprising that the difference between the marketplace and reseller model is smaller than the difference between the in-between model and the reseller model in the ability to help platforms survive, even though the marketplace model and reseller model are supposed to be viewed as two polar cases. Hence, this empirical evidence suggests that in terms of survival, the three business models might need to be viewed as three distinct business models rather than three representations on a line of residual control rights.

To further evaluate the relationship between marketplace, reseller and in-between models, I created Models 8, 9 and 10 to see the impact of each business model on survival. Comparing M8, 9 and 10 with 7 in terms of the BM's impact on survival, the characteristics of the in-between model are more consistent with those of the marketplace model than with those of the reseller model. When resellers are compared with nonresellers, the significance level is 0.059. However, when a marketplace is compared with a nonmarketplace model and when an in-between model is compared with a nonin-between model, the significance is 0.872 and 0.105, respectively. Hence, there is a contrast between the statistical results that view the in-between business models are more similar to the marketplace models and the categorisation of business models that views that in-between models are more similar to reseller models.

Figure 3-25: Regression models - linear regression

Binary Logistics	B(M1)	B(M2)	B(M3)	B(M4)	B(M5)	B(M6)
Survival month (website)	25.614	35.942	35.797	47.881	45.886	48.706
Marketplace	12.564(0.193)	12.43(0.156)	12.084(0.162)		4.907(0.526)	
In-between	13.047(0.096)	13.152(0.084)	13.447(0.075)	1.362(0.871)		
Reseller				-12.084(0.162)		-12.941(0.058)
Log debtor	5.334(0.023)	5.889(0.000)	5.886(0.000)	5.886(0.000)	5.004(0.001)	5.877(0.000)
Log abs creditors	-0.162(0.958)					
Log total asset	2.104(0.784)					
Log open shareholder funds	0.302(0.849)					
Log non debtor assets	0.34(0.923)					

Starting year(Z score)	-12.218(0.003)	-12.180(0.001)	-12.597(0.001)	-12.597(0.001)	-12.353(0.001)	-12.329(0.000)
Complicated structure	-7.733(0.35)	-7.538(0.337)				
If London	1.714(0.794)	2.193(0.721)				
Adjusted R2	0.257	0.296	0.305	0.305	0.283	0.314

In the full linear regression Model (M1), again, log debtor is the more suitable variable to measure resourcefulness; thus, others are dropped one by one. Log debtor remains the most significant variable in the process, and thus, M2 is created. In M2, the adjusted R2 is improved from 0.257 to 0.296. The network structure and the location remain insignificant. These two variables are dropped to make M3. The adjusted R improves to 0.305.

Following the procedure in binary logistics, I further manipulated the model by using different BMs as the reference group. From M1 to M3, the reference group is the reseller model. For M4, the reference group is the marketplace model, and for M5, the reference group is the in-between model.

Comparing Models 3 and 4, similarly to the finding in binary logistics, it suggests that the difference between the explanatory power for survival month of the three BMs is large between the reseller model and marketplace/in-between models and is small between the marketplace business model and the in-between business model. Therefore, it might be reasonable to consider the in-between model and the marketplace model in the same group. Thus, I created Model 6. The overall model fit is improved (adjusted R2 to 0.314). The significance level of the reseller BM is improved to 0.058. The findings in the linear regression model with survival time as the dependent variable are consistent with the findings of the binary logistics model with extinction (dummy) as the

dependent variable. Thus, M6 informs that taking into account the difference in financial resources and establishment time, resellers survive 12 months less than nonreseller models.

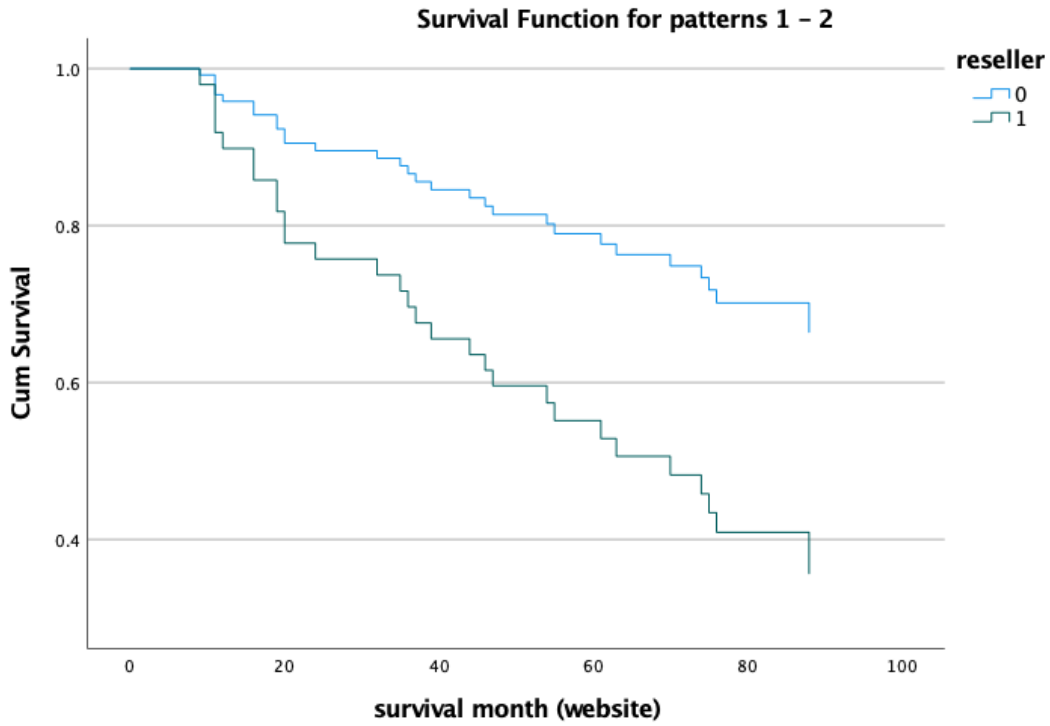
The Kaplan–Meier model is not helpful for 2 reasons. 1. It only allows 1 IV at a time. 2. It assumes that all platforms started at the same time.

Figure 3-26 Regression models - Cox regression

Binary Logistics	B(M1)	B(M2)	B(M3)	B(M4)
DV1= Extinction (dummy)				
DV2=survival time(month)				
Marketplace	-0.720(0.173)	-0.801(0.09)		
In-between	-1.048(0.030)	-1.043(0.031)	-0.242(0.625)	
Reseller			0.801(0.090)	0.924(0.024)
Log debtor	-0.289(0.001)	-0.290(0.001)	-0.290(0.001)	-0.283(0.001)
Starting year(z score)	0.090(0.732)			
Model fit significance	0.014	0.006	0.006	0.004

Using Cox regression in M1, starting year again becomes insignificant. Removing starting year, in M2, the model fit significance improved to 0.006. Consistent with previous models in binary logistic and linear regression, both the marketplace and in-between business models reduce the extinction possibility more than the reseller business model. In addition, in-between is significant at p<=0.05, and marketplace is significant at p<=0.1. To better understand the relationship between the three business models, I further created M3 and M4. M3 indicates that the difference between marketplace and in-between in determining platform survival probability is insignificant. Thus, by grouping marketplace and in-between together and comparing them with resellers, we find that resellers significantly reduce survival probability, as indicated in Figure 3-27 below.

Figure 3-27: Survival function for the reseller and nonreseller business models



One concern for using Cox regression is that covariates might be time dependent. Using SPSS Cox regression with time covariate interactive variables, the new model was not significantly better than M4; i.e, chi-square=3.001, and p=0.223.

In conclusion, statistical analysis shows that 1. the initial BM does influence the platform's survival; 2. resellers survive for shorter periods than nonresellers; and 3. in terms of determining survival, the in-between business model is significantly different from the reseller business model but not from the marketplace business model.

The finding that resellers reduce survival duration and are more likely to fail than nonresellers is very fascinating. The current (2019) distribution of business models for p2p lending platforms shows that resellers are the dominant business model. The majority of p2p lending platforms are

resellers, market-leading platforms use the reseller model, and most transactions are performed via the reseller model.

How could the reseller business model be the dominant model if platforms that entered the market with the reseller model survive shorter and are more likely to fail? One possible explanation is that firms change their business model. Thus, the following sections of the essay will address first whether there is a change in the business model. Then, it will address why and how did the change happen.

Qualitative analysis:

From the sample of 82 companies, I selected companies that had lasted for more than 6 years and had an initial total asset of more than 15,0000 GBP. This left me with 22 companies that had operated long enough and had enough financial resources such that a business model change can be captured. Then, I used news reports, investor forum discussions and internet archives to capture relevant business model changes in the companies. However, due to differences in the influence of successful companies and that of less successful companies, I was able to capture more detailed information for successful companies than for less successful companies.

By reviewing these 22 platforms, I have identified the following common practices. I consider these patterns important because these practices are different from the ideal marketplace model, although 12 of these platforms started as a nonreseller model.

a. Screening process. It is not a necessary practice for the platform to screen loan applications. It is possible to pass this burden to lenders because lenders are ultimately responsible for the lending decision. While certain firms in the p2p lending population do not screen loan applications, that is, allow applications to be automatically listed on the platform, all 22 companies screen loan applications, and only approved ones can be invested by lenders. However, the method of screening can be completely different. On the one hand, Lendable uses AI to achieve instant decision-making on a loan application. On the other hand, Lendy relies on manual screening, which could take days, because loans on Lendy are secured by properties and manual input is needed for housing valuation.
b. Money is transacted via platform. While it is possible for lenders to transfer money directly to borrowers' accounts and vice versa, all 22 platforms require lenders to transfer money to a designated account. Then, the platform is responsible for distributing money to borrowers, collecting interest and principal from borrowers and transferring money to lenders' accounts. By doing so, the platform reduces transaction costs for both lenders and borrowers. In many cases, one lender funds multiple loans in various terms, and one loan can be funded by multiple lenders.
c. Balance between lender and borrower orientation. While it is reasonable to assume that a p2p lending platform should attempt to acquire both lenders and borrowers, a few platforms have demonstrated a different orientation. Sixteen platforms had a balanced design that provided loan

information to both borrowers and investors. MarketInvoice, Lendable and Yesgrowth have borrower-oriented homepage designs. Their homepage emphasises how convenient and cheap it is for borrowers to borrow money. Investing opportunities and processes are not obvious on the website. Adlrate and Buy2letCars, in contrast, have an investor-oriented homepage, which advertises on return for investors. However, it is difficult to find information on how to apply for loans via platforms. This can be partly explained by the fact that Adlrate is a subsidiary of a manufacturing company. Thus, the platform receives loan applications from private channels. Buy2letcars is in partnership with another platform, Wheels4sure, which is responsible for renting cars to people. Thus, borrowers of Buy2letcars are essentially renters on Wheels4sure.

d. Tendency to use analogies to explain the platform to users. These platforms tend to use analogies to explain to users how the platform works. The analogies are used in two ways: first, to explain what the platform is similar to and second, to explain what the platform is different from.

Figure 3-28 Representative quotes platforms used to position themselves

	"Similar to" Quote	"Different from" Quote
Zopa	"Similar to eBay and online betting exchange, Betfair"	"The idea is to cut out the middleman"
Funding Circle		"Disintermediating banks and getting better rates for borrowers and lenders"
Rate Setter		"Instead of lending your money to your bank, with RateSetter …."
LendInvest	"eBay has shown that with transparency, it can be done. Why cannot you have an open market for loans?"	"The banking middle-men may in time become the surplus links in the chain. It has happened in the liberal arts, music and publishing, and there is no reason it shouldn't in finance."

	"Similar to" Quote	"Different from" Quote
Lendable		"Lendable is a peer-to-peer lending platform. When you borrow money, it comes straight from an investor. Unlike banks, who hand out loans from piles of cash they look after on behalf of savers."
MadistonLendloanInvest		"It is our mission to help you lend your money to real people (not banks) and get the best rates available!"
Crowdcube		"Just as we revolutionised equity investment, we are now turning the mini-bond market on its head by taking away the complexity and costs for businesses who want to raise growth capital and cut out the banks,"

By using analogies, these platforms attempt to communicate the core concept of p2p lending to users—allowing people to lend directly to other people, implying communication between lenders and borrowers and that lenders have control over the loan contract. The emphasis on lenders being in control is consistent with how Hagiu and Wright (2015) differentiated between a matchmaker and a retailer—the residual rights.

Figure 3-29: representative quotes platforms used to emphasise direct lending

	Emphasis on lenders lending directly to borrowers
Zopa	"pick your own rate of return"; "lend directly to real people at Zopa"; "You're in control - you choose the risk, you choose the term, you choose the rate"

	Emphasis on lenders lending directly to borrowers
Funding Circle	“lend directly”
Rate Setter	"lend directly to other people” and “borrow directly from other people”. “With us, you are always in the driving seat, having the ability as a lender to fully control the rate at which you lend your money to borrowers as peer-to-peer loans”
Relendex	"You lend directly to the borrower through the exchange and like banks, you get the lion's share of the interest”
Lendable	"Lendable is a peer-to-peer lending platform. When you borrow money, it comes straight from an investor. Unlike banks, who hand out loans from piles of cash they look after on behalf of savers.”
MadistonLendloanInvest	"It's our mission to help you lend your money to real people (not banks) and get the best rates available! You are also helping those people to whom you lend”
JustUS	“JustUs is democratic, by the people, for the people. Savers are uninspired by their humdrum returns. We can give them access to the higher returns by bringing them together with a broad mix of consumer, guarantor, and secured loans”
UKbondnetwork	"“Direct finance from lender to borrower, so both get a better deal”

Bank on Dave is the only exception, as it was meant to be a bank from the beginning. However, due to difficulty in applying for a bank licence, it had to use a p2p lending “cover”. Therefore, it does not emphasise the concept of p2p lending.

I further document the key characteristics of these platforms.

Figure 3-30: Key characteristics of 22 sampled platforms

	Entry Business Model Reseller	To Business Borrowers	Secured on Assets	Starting Year	Business Model Change from Nonreseller
Zopa	0	0	0	2005	To reseller
Funding Circle	0	1	0	2010	To reseller
Rate Setter	0	0	0	2010	To reseller
Market Invoice	0	1	1	2011	No
Bank on Dave	1	1	0	2011	Remained reseller
Buy2letcars	1	0	1	2012	Remained reseller
Abundance	0	1	0	2012	No
Lendy	0	0	1	2013	No
Lendinvest	0	0	0	2013	To reseller
Relendex	0	0	1	2013	Hybrid
JustUS	1	0	1	2013	Remained reseller
Wellesley&Co	1	0	1	2014	Remain reseller
Ukbondnetwork	0	1	1	2014	No
Lendable	1	0	0	2014	Remained reseller
Madison LendloanInvest	0	0	0	2014	To reseller
Invest&fund	0	1	1	2014	No
Landbay	1	0	1	2014	Remained reseller
Money&co	0	1	0	2014	No
Crowdcube	0	1	0	2014	No
Adlrate	0	1	1	2015	No
Crowd2fund	0	1	0	2015	Hybrid
Yesgrowth	1	0	0	2015	Remained reseller

The first row indicates the platform's entry business model. Among the 22 platforms, 10 of them started as reseller business models. For business model identification, I only coded reseller vs. nonreseller because the previous quantitative analysis has shown a significant difference between reseller and nonreseller but not between the in-between business model and the marketplace model. Thus, the nonreseller category contains both in-between models and marketplace models.

Ten of these platforms emphasise or exclusively deal with business borrowers. Eleven of these firms explicitly mention that their loans are secured by assets. These assets can be tangible assets, such as property and antiques, and can also be intangible assets, such as an invoice. The entry timing pattern of the 22 representative companies is consistent with the general entry pattern of 82 p2p lending firms, where the peak of entry frequency occurs in 2014. Among the 15 platforms that did not start as resellers, 5 of them changed their business model to resellers. Two of them changed to a hybrid model in which loans are sold via both the reseller and nonreseller models. Eight of them did not change their business model, so they remained nonresellers.

Therefore, it is clear from the above table that some nonreseller platforms changed to reseller platforms. It is also clear that platforms that started as resellers did not change their business model to nonresellers.

Using a comparative case analysis, I categorise platforms that started as nonresellers into a group that did change to resellers and a group that did not change to resellers.

Figure 3-31: Sample platforms that changed business models from nonresellers to resellers

	Entry Business Model Reseller	To Business Borrowers	Secured By Assets	Starting Year	Business Model Change from Nonreseller
Zopa	0	0	0	2005	To reseller
Funding Circle	0	1	0	2010	To reseller
RateSetter	0	0	0	2010	To reseller
Lendinvest	0	0	1	2013	To reseller
Madison LendloanInvest	0	0	0	2014	To reseller

Figure 3-32: Sample platforms that did not change business model from nonreseller to reseller

	Entry Business Model Reseller	To Business Borrowers	Secured By Assets	Starting Year	Business Model Change from Nonreseller
MarketInvoice	0	1	1	2011	No change
Abundance	0	1	0	2012	No change
Lendy	0	0	1	2013	No change
Relendex	0	0	1	2013	To hybrid
Ukbondnetwork	0	1	1	2014	No change
Invest&fund	0	1	1	2014	No change
Money&Co	0	1	0	2014	No change
Crowdcube	0	1	0	2014	No change
Adlrate	0	1	1	2015	No change
Crowd2fund	0	1	0	2015	To hybrid

A pattern emerges in some of the key characteristics of the platforms. For the change group, facilitated loans are unsecured on all platforms except for Lendinvest. Except for the Funding Circle, these platforms mainly deal with individual borrowers. For the unchanged group, except for Relendex and Lendy, these platforms mainly deal with business borrowers, and 6 of the 10 platforms require underlying assets to secure loans. For Money&Co, security is possible but not necessary. To some extent, both Lendy and Relendex could be argued as a platform for business borrowers because the platform's main borrowers are people who need money to buy properties and the target property is used as the underlying security. It is possible that these properties are to be bought and let; even though the borrowers are individuals, the loan can be seen as a part of a business operation. Unlike business models, which can be dynamic in the dataset, the positioning of the platforms, i.e., if the platform mainly originates business loans or individual loan, is rather persistent.

Thus, the above tables indicate that when platforms start as nonresellers, they are likely to change to the reseller model when they are lending unsecured loans to individuals and are likely to not change the business model when they are lending secured loans to business borrowers.

To further investigate the potential relationship between the platform's characteristics and the change in the business model from nonreseller to reseller, I focus primarily on the history of "changed" platforms, particularly why they changed and how they changed. By comparing and contrasting the change processes, I hope to form a general understanding and pattern of the change process.

Zopa history:

Funding period 2005-2006.

Zopa was funded in 2005. It offers unsecured loans to individuals. There is strong evidence to suggest that its funding business model is the nonreseller model. First, it describes itself as a marketplace business model. In a BBC interview, the platform claims that "similar to eBay and online betting exchange, Betfair, the idea is to cut out the middleman." On its website, Zopa advertises with claims such as, "pick your own rate of return", "lend directly to real people at Zopa" and "you're in control—you choose the risk, you choose the term, you choose the rate". These

claims suggest that the pricing rights of the loan along with other rights are likely to be controlled by lenders. Second, lenders know borrowers by their online username, location, age, and loan purpose, and they communicate directly with each other by online messaging.

However, unlike a typical marketplace, Zopa categorises borrowers into 2 pools and later into 4 pools based on their credit scores and other information. When lenders lend, they can pick the pool, not the individual. However, when lenders pick the pool, they can still decide on their preferred interest rate, and Zopa will facilitate a transaction when the preferred interest rate of lenders matches the preferred interest rate of the borrowers of the pool.

Hybridisation 2007-2008:

In 2007, Zopa separated its original business model and formed two contrasting business models. One "market" model resembled some features of the reseller model, such as strict credit checks, mandatory diversification and pooling of borrowers. It is certain that lenders could not pick borrowers via the Zopa “market” model; they could only lend to a pool; however, lenders could still decide the rate at which they were willing to lend to a specific pool and the length of the lending period. Zopa would advise on the likely success of the rate. It is not certain if lenders could still communicate with borrowers directly in the Zopa “market”. It is important to realise that, although the Zopa “market” resembled some features of the reseller model, it is not representative of a reseller model. The defining feature of a reseller would be that the platforms buy loans from borrowers and then sell loans to investors. Although this could have happened on the Zopa “market”, I did not find evidence that this did happen during this stage.

The other "listing" model resembled the more marketplace feature of Zopa lending, which allows borrowers to post their demand, including length, rate, and purpose. Lenders could negotiate with borrowers directly to fully fund the project, or lenders could bid directly amongst themselves. There was much less requirement for the creditworthiness of borrowers in this model compared to the “market” model. After the listing's establishment, Zopa reduced the length options on the “market” from 3 options (12, 24, 48 months) to 2 options (36 and 60 months) for two listed reasons: 1. increasing popularity for longer loans and 2. reducing lenders' complexity.

The separation between "listing" and "market" was partly triggered by Zopa's US competitor Prosper, who gained huge success by only using the “listing” model. At the same time, Zopa plans to expand in the US. When Zopa was launched in the US, it used the “listing” model, not the “market” model. In addition, it partnered with US credit unions.

Gradual transformation to reseller 2009-2019

Zopa “listing”. The model was suspended in 2011 due to high cost and low transaction volume. According to Zopa, the high cost came from a higher verification fee due to more complicated borrower-generated application information. Lenders who already used markets found it difficult to process individual information and make decisions. Additionally, the default risk was higher for the listing model than for the market model.

Zopa “market”. In 2009, the market model added a function termed “quick lend”. Previously, investors needed to manually select the investment pool, length and preferred interest rate. “Quick lend” enabled automatic lending based on preselected investors’ preferences and Zopa’s recommendations. Thus, interest and principal repayments could be automatically relent to other borrowers who met the criteria. In 2010, a secondary market was established so that unfinished Zopa loans could be transacted. In 2010, there were 4 pool options and 2 length options. In 2012, the front page of Zopa shifted from a lender orientation advertising how much lenders could earn to borrower orientation advertising how low the interest rate for borrowers could be. In 2013, Zopa started offering business loan. In 2014, Zopa updated the matchmaking algorithm. The front page became balanced, targeting both lenders and borrowers. However, the website no longer communicated that lenders can pick rate, and the options lenders had were reduced from 8 to 2. Zopa advertised the following: "Decide how much you want to lend; you can start with as little as £10 and there’s no maximum. You lend your money in small chunks to different borrowers. We group borrowers into longer (4-5 years) and shorter (2-3 years) loan terms. You choose which to lend to” (Zopa 2014). In 2015, Zopa partnered with the Metro bank to allow banks to lend via Zopa. In 2015, Zopa released a plan to become a bank. It temporally stopped accepting new individual lenders’ money. Zopa securitised its loans. It only had three product categories: Zopa classic, Zopa access, Zopa plus. Zopa labelled the three product categories as "investment products" rather than borrower pools. In 2018, Zopa received a banking licence.

Zopa Analysis:

I categorised Zopa's history into three periods. Its funding period comprises the period when the firm invented a new business model in the lending industry. At this stage, Zopa was drawing analogies from other industries, i.e., mainly eBay from e-commerce and Betfair from betting, and combining learning from these platforms with their understanding of the finance industry (Zopa's funders were pioneers in UK digital banking prior to funding Zopa) to form how Zopa worked in 2005. At that time, the initial business model was not reseller because the platform needed to wait for investors' money to fund borrowers' money instead of funding the loans by the platform's money. The model was not a typical marketplace, as lenders did not know the identity and purpose of borrowers before they made the loan. Other features of Zopa's funding model matched the marketplace model, such as price negotiation and discussion between borrowers and lenders post loan origination.

A hybridisation period, where Zopa simultaneously operated two distinctive business models, namely, a "listing" model that resembled key features of a marketplace model and a "market" model that resembled some features of reseller model and some other elements of a marketplace model. The "market" model of Zopa was the continuation of its original funding model. The "listing" model was partly triggered by its US competitor. This hybrid model—running two distinctive intermediary business models simultaneously, echoes how Hagiu and Wright (2015) illustrated the hybrid model with the Amazon case. In their argument, Amazon operated both the reseller model and marketplace model simultaneously for different products. Some products fit better with one model than the other.

Finally, there was a transformation period where the hybridisation collapsed and Zopa eventually changed to a full reseller model. There were two major steps taken by Zopa: closure of the marketplace model—the Zopa "listing" model—and the step-by-step removal of marketplace model features and the addition of reseller features to the Zopa "market" model.

The closure of the Zopa "listing" model in 2011 can be viewed as one succinct move: the platform declared that it would no longer accept new applications to the "listing" model, while the current customers on the "listing" model would be served until contracts were fulfilled. Zopa did provide reasons for the closure: 1. There were high costs. Because the "listing" model accepted borrowers

from a more diverse and complicated finance background, Zopa spent more resources on information verification or screening of the applications. 2. Higher risks were associated with the listing model. Due to the diversity and complication of these borrowers, the associated default risk increased. 3. There was low lender interest. The "listing" model was less attractive for the majority of existing Zopa investors in 2010 because these lenders did not want to process and analyse complicated individual information. In other words, lenders were willing to forfeit their rights and obligations of analysing individual loan information to Zopa.

The modification of the Zopa "market" model, on the other hand, can be viewed as one continuous move that included many steps. I identify these steps because they modify the residual control rights of the loans, particularly the rights of lenders to process and analyse loan information. First, Zopa introduced "quick lend" in approximately 2009 so that instead of lenders needing to make a decision on the loan parameters each time they invest, they gave the right to Zopa. Although the right was limited because Zopa needed to follow certain preset conditions by lenders, Zopa was allowed to make investment decisions when lenders were absent.

Second, there was an overall reduction in options available to lenders. In 2010 and 2011, lenders were able to decide which borrower pools they were interested in as well as the length of the period for which they were willing to lend. Lenders had at least 8 different combinations of length and pool. By 2014 and 2015, Zopa removed the lenders' ability to choose between pools. Zopa aggregated all admitted loans and categorised them into shorter-term loans and longer-term loans. Thus, there were only 2 options left for lenders. By 2016, the options were repackaged to Zopa classic, Zopa access, and Zopa plus, each with a different target interest rate.

Third, associated with the reduction in options, Zopa eliminated the lenders' ability to pick their own interest rate. In 2010, Zopa allowed lenders to set their preferred interest rate as a parameter so that Zopa could match the lender's request with the borrower's. In 2014, when Zopa packaged the shorter-term loan and longer-term loan, lenders could no longer set their preferred interest rate. The interest rate was preset by Zopa. Lenders could only decide to lend or not.

Fourth, Zopa started loan securitisation in 2016. My interpretation of loan securitisation is that Zopa considered loans as Zopa's assets, and Zopa used those loans and the interest on the loans as

security to receive new funding from institutions. Therefore, the a priori condition for securitisation to happen is that Zopa owns loans. Owning loans instead of matching loans indicates a business model shift from marketplace to reseller.

Last, Zopa started to cooperate more with institutional investors and less with retail investors (individuals) in 2016. A key feature of institutional investors is that they can fund the platform, not the loans directly. Zopa was empowered with capital to purchase loans from borrowers instead of matching the capital of lenders with borrowers. In 2018, Zopa received its banking licence and started to operate Zopa Bank, which is a reseller model, as we previously discussed.

Funding Circle History

Funding period 2010-2014:

Funding Circle was funded in 2010, explicitly targeting business borrowers and aimed at "disintermediating banks and getting better rates for borrowers and lenders". Lenders were allowed to "hank pick" and "autoselect" businesses via a bidding mechanism. Lenders could decide the interest rate that they wanted to offer, and businesses accepted partial loan offers with the lowest possible rates. Funding Circle encouraged lenders to form groups and communicate. There was also a secondary market that allowed the sale of loan parts to other lenders. In 2011, Funding Circle allowed a single business to have multiple loans listed on the platform and widened the accepted range of borrowers such that less credit worthy businesses were listed on the platform. In 2013, it cooperated with the UK government to lend to UK businesses. Funding Circle entered the USA and other European countries through M&As. In 2014, Funding circle started to cooperate with institutional investors, and instead of investing in loan parts, institutional investors were allowed to purchase whole loans.

Transition to reseller 2015-2019:

In 2015, Funding Circle removed the price auction feature it had offered since 2010, where lenders could bid for loans. The platform explained that "borrowers lacked certainty of the final interest rate until the auction period was over, which led to some of them cancelling their loan application. Investors on the other hand experienced a cash drag and sometimes had to make multiple bids to ensure they participated in the loan they wanted." After the removal of price auctions, the interest

rate on loans was predetermined by Funding Circle. In 2016, Funding Circle started its first securitisation of loans.

In 2017, the platform removed the “hand pick” method. Instead of picking between specific loan opportunities, investors could decide between two portfolios—balanced and conservative—each with a target interest rate. Investors could not select which business to lend to or sell parts of a particular business loan. The platform explained their reasoning, noting that "many investors do not currently benefit from lending to all types of businesses: currently some investors can find it difficult to access D and E loans, which are some of the most popular. We want to ensure investors lending through Funding Circle have an equal chance of accessing all loans and earn the best possible return. It can mean your lending is not spread evenly across lots of businesses: currently many investors who manually choose loans are not fully diversified and are at risk of having a negative lending experience. We want to ensure investors spread their lending across lots of different businesses, as this is the best way to earn a stable return. It can be confusing for investors: many investors tell us they prefer a simpler, easy-to-use lending experience: 73% of new investors who join Funding Circle choose Autobid, and 80% of Funding Circle investors say simplicity of lending is important to them.”

In 2018, the Funding Circle no longer had investors’ returns marketed on the front page. Instead, the page emphasised benefits for borrowers. Funding Circle made an IPO in 2018.

Funding Circle Analysis

Funding Circle’s funding business model in 2010 was representative of the marketplace. It allowed lenders to identify and evaluate investment opportunities of businesses and developed an auction system so that the price of loans was negotiated between lenders and borrowers. Similar to Zopa, Funding Circle’s transition was also a continuous move with multiple steps. Funding Circle also had an “autolend” function, but the function had been available from the beginning of Funding Circle’s creation.

First, in 2015, Funding Circle closed the price auction. Thus, lenders’ rights to negotiate the price of loans with borrowers and with other lenders were removed. Funding Circle had the right to

determine the loan price for the claimed benefit of reduced uncertainty for both borrowers and lenders. Neither lenders nor borrowers knew clearly how the price was determined.

Second, in 2016, Funding Circle securitised its loans. Again, this was an indication of Funding Circle owning some loans, and thus, they were able to securitise them.

Third, in 2017, Funding Circle removed investors' ability to "hand pick" loan opportunities for the claimed reasons of simplicity and risk diversification for lenders. Lenders no longer knew what companies they were lending to.

Last, Funding Circle's webpage design changed in 2018 from investor-centric to borrower-centric, which was a signal indicating the decreased relative importance of retail investors for the operation of Funding Circle.

RateSetter History:

Funding Period 2010-2012:

RateSetter, funded in 2010, facilitated unsecured individual loans between lenders and borrowers. It was one of few platforms that specifically mentioned that professional lending firms were not allowed to lend via RateSetter. In a simplified manner, both lenders and borrowers independently notified the platform of the amount and interest rate of loans they were willing to provide/take. Then, the platform was responsible for matching the loan offers with equal amounts and rates. RateSetter emphasised the direct lending between lenders and borrowers and mentioned the following:

"Instead of lending your money to your bank, with RateSetter you lend it directly to other people (to get a better return on your money)." "With us, you are always in the driving seat, having the ability as a lender to fully control the rate at which you lend your money to borrowers as peer-to-peer loans. After deciding the rate at which you would be prepared to lend your money at, we will then work to pair your offer with a borrower who is happy to take out a peer-to-peer loan at this rate, simplifying and speeding up the process of personal lending." (RateSetter, 2011)

RateSetter was less flexible on the length of loans. In 2010, lenders could only choose between a rolling monthly plan or a 36-month plan. In 2012, the investment length options were expanded to monthly, annually, 3 years and 5 years.

Transition to reseller 2013-2019:

In 2013, RateSetter enabled lenders to sell loans before maturity. Different from a usual secondary market, where lenders with loans can negotiate with other potential lenders, RateSetter decided the sale price of these loans. These loans were added back to the existing loan list waiting to be matched to other lenders.

In 2014, RaterSetter entered Australia directly. During the same year, it removed its funding policy of not allowing professional investment institutions.

In 2018, the platform repackaged its offerings. Instead of lenders picking investment plans by length, lenders decided by release fee and interest rate. Lenders could decide between a 3% interest rate with no release fee, 4% interest with 30 days of interest as the release fee, and 5% interest with 90 days of interest as the release fee. Lenders could still determine their lending rate up to 5% higher than the going rate determined by RateSetter.

In 2019, RateSetter was sold to Metro Bank. All new loans were to be funded by Metro Bank deposits and the company no longer accepted new investors.

RateSetter Analysis:

At the funding stage, Ratesetter's business model was more consistent with the marketplace model, where lenders can negotiate interest rates with borrowers (via the matching process), and lenders and borrowers trade directly with each other. However, Ratesetter's funding model was not a typical marketplace model, as it did not allow lenders to know more about borrowers who took the investment. Thus, lenders were not allowed to differentiate between borrowers because of a lack of information. Although lenders and borrowers did not know exactly who they were transacting with, they knew that they were transacting with someone. From the platform's perspective, the only differentiation made between approved borrowers were the interest rate and the borrowing

length. However, there are other factors that can influence the default rate of loans other than length and rate. To compensate for the potential risk caused by the difference between the platform's assumption of indifference between loans and the actual differences between the loans, the platform introduced the "Provision Fund". Thus, lenders of defaulted loans were compensated by profits made by the lenders of completed loans. Thus, the outcome of loans could be viewed as standardised (except the length and rate). When the products traded are standardised, such as stock exchange or future exchange products, there is no need for buyers to know sellers' information.

RateSetter's transition to the reseller model can also be viewed as a continuous move started in 2013. RateSetter became responsible for setting the price of immature loans. Thus, the loan price was no longer negotiated by the seller and buyer for these loans but by the platform. The 2018 repackage of products can be viewed as an extension of the 2013 policy to all loans facilitated by RateSetter. RateSetter decided on the loan price of three borrower pools. At this stage, the platform's business model was still not a reseller model because it still allowed lenders to deviate from the instructed interest rate. Ratesetter fully transformed to a reseller in 2019 after it was sold to Metro Bank. It no longer matches borrowers and lenders.

Lendinvest history:

Funding period 2013:

Lendinvest was an "incubated" firm from Montello Capital, an established firm in real estate lending. The two funders of Lendinvest were also partners of Montello. Thus, when Lendinvest was established, it emphasised real estate-related lending, especially bridging loans (less than 1-year loans that are secured by property).

When Lendinvest was funded, the business model was a representative marketplace model. The platform screened borrowing applications and showed detailed loan information to investors. Registered investors could gain access to more detailed loan information and discuss with borrowers directly via Lendinvest. In 2013, the interest rate was mostly determined by borrowers, but investors could negotiate. Investors could decide which loans and the proportion of a loan in which they were willing to invest. Partially funded loans were rejected at the end of the listing period.

Transition to reseller 2014-2020:

In 2014, Lendinvest acknowledged that some of the loans were directly funded by Montello Capital. Additionally, during this year, there was less possibility that investors could negotiate with borrowers about the interest rate. Instead, the interest rate was predetermined by the platform and borrower according to a set of parameters.

In 2016, the platform acknowledged that all approved loans were funded by the platform first and then listed on the platform for potential investors to invest.

In 2017, the platform launched a 5-year fixed interest bond on LSE and other platforms. The money was to be used to fund loans on its platform directly. Lendinvest also entered into an agreement with Citi Bank to lend to buy-2-let investors. Investors could choose if they wanted to invest in individual loans or the Lendinvest bond.

In 2019, Lendinvest securitised a portion of its loans.

Lendinvest Analysis:
The funding business model of Lendinvest in 2013 was a representative marketplace model. It allowed lenders and borrowers to know each other and to negotiate directly about the interest rate. Lenders could use various information to determine which loan to invest in and under what conditions. Although Montello Capital might also invest via Lendinvest at this stage, this did not influence the marketplace model of Lendinvest.

Compared to other platforms, Lendinvest made the transition to the reseller model much quicker. I would argue that in 2016, when all applied loans were funded by Lendinvest first and then listed for retail investors, Lendinvest transformed itself to a reseller model. One possible reason for such a swift transition is that Lendinvest may have inherited the capability and resources of direct lending from Montello Capital.

Other changes after 2016, including bond issuance, cooperation with Citi Bank, and loan securitisation, which were activities that enhanced Lendinvest's reseller model.

Madison Lendloaninvest History:

Madison Lendloaninvest is a platform closely related to Madison Plc. Madison Plc is a UK firm that profits from developing web-based technologies for the finance sector. Lendloaninvest started as a privately funded project by the CEO of Madison Plc based on the technologies developed by Madison Plc. The Lendloaninvest platform was then sold to Madison Plc when the platform operated.

When the platform first operated in 2014, it operated as a marketplace for unsecured loans. Lendloaninvest described its process as follows: "Decide the interest rate you want and how much you want to lend and for how long. You will receive a better rate lending direct to other people" (Madison Lendloaninvest 2014). The platform listed approved loan information for investors to view, analyse and bid on. The bidding process was a reverse auction, and the interest rate was the average interest rate of all successful bids. Thus, loan transactions occurred after the auction period. Automated investment was also possible, where investors could set investment parameters, and when loans meeting such parameters occurred, a programme would lend money on the lender's behalf. In 2015, a secondary market was created so that investors could trade loans before maturity.

In 2019, the auction marketplace was closed. Investors could not bid on individual loans. Instead, lenders were offered two investment products, i.e., a short-term (approximately 36 months) loan and a long-term (approximately 60 months) loan. A target interest rate is estimated by the platform. In addition, the platform advertises that borrowers could receive funds within 2 days of receiving quotes.

Madison Lendloaninvest Analysis:

Unlike previous examples, where we could identify many steps and actions that the platform took to transform itself from marketplace to reseller by slowly moving residual control rights from lenders and borrowers to the platform, Madison Lendloaninvest's transition occurred in 2019, signalled by the removal of reverse auction.

Three factors might be responsible for the change being sudden instead of gradual. First, the transaction volume of this platform is small compared to that of other platforms. Thus, there is

limited secondary information available about this platform. Second, this platform started in 2014 and is the youngest platform in the change group. Thus, it had already incorporated some practices when it started. For example, automatic lending is an inherent feature in Madison Lendloaninvest but an added feature in Zopa. Last, the transition may not be complete. Madison Lendloaninvest's current business model qualifies as a reseller model due to its compliance with the two criteria—lender/borrower identification and price negotiation. There is no explicit evidence that this platform uses its own money to lend to borrowers. Thus, it is possible this platform is still in the middle of transition.

Common patterns for platforms that started as nonresellers and changed to resellers.

1. High difficulty for platforms to communicate the differences between loans—user perceived differentiation.

Compared with the no change group (platforms that started as nonresellers and remained as nonresellers), the changed group experienced much higher difficulty in communicating the differences between loans. In addition, I propose that it is the difference in communicating the differences between loans, not simply the degree of product differentiation, that influenced some platforms to change business model and some platforms to not change the business model.

From the traditional strategy view, we tend to consider this matter the degree of differentiation or standardisation. It has been argued that products with high differentiation benefited more from the marketplace model than from the reseller model. However, in this p2p lending context, the traditional differentiation/standardisation view is not enough to articulate the difference between loans sold in the change group and in the no change group. Using individual loans and business loans as an example, from the differentiation perspective, both qualify as having a high degree of differentiation. Each person's ability and intention to repay the loan vary and can largely influence the final default rate of each loan. This variation is also true in business loans. Therefore, I argue that the difference between the degree of differentiation in personal loans and in business loans is small.

However, for platforms, it is much easier to communicate to investors the difference between business loans than the difference between individual loans. The first reason for the difference in

difficulty is that there are more communicable variables for investors to understand a business loan than to understand an individual loan. The data protection-related laws and regulations prevented investors from knowing personal information about an individual borrower; instead, the Companies House provides financial information of all UK firms for the public to view. In addition, business loans tend to be secured by assets, while individual loans tend to be unsecured. The underlying asset of the loan becomes another source of information. Therefore, it is easier for investors to differentiate between company A loans and company B loans than between individual A loans and individual B loans. Second, the quantity of individual loans tends to be much greater than that of business loans. Therefore, the time cost for investors to collect and analyse all loan data is higher for individual loans than for business loans (although each business loan may be more time-consuming than each individual loan). More importantly, from 2004 to 2020, the data protection laws in the UK became stricter only in firms' usage of personal information, and the quantity of loans improved as more people started to use p2p lending.

Therefore, although from the traditional differentiation perspective both individual loans and business loans can be considered highly differentiated, it is much easier for platforms to communicate the differentiation of business loans than that of individual loans. In other words, from the buyers' perspective (investors), the differentiation between business loans is much easier (at a lower cost) to see than that between individual loans. The user-perceived differentiation is high for business loans and low for individual loans.

When buyers cannot differentiate individual loans easily, although the business model (nonreseller) is designed for situations in which they could, conflicts arise. Platforms in the changed group found that investors could not accurately price individual loans and that it might take too long for an individual loan to be fully funded. As a result, platforms could have decided to modify their business model to the reseller model, which is superior when product differentiation is low. In addition, platforms implemented practices to reduce the impact of product differentiation by setting up compensation schemes so that defaulted loan buyers could be compensated by successful loan repayments and by selling a pool of loans to investors to ensure compulsory diversification. As a result, loans were less differentiated in terms of default impact.

The figure below summarises possible interactions between product differentiation, user perceived differentiation, business model, and platform action.

Figure 3-33: Differentiation and business model

Product differentiation	User perceived differentiation	Business Model	Evaluation	Platform Action & Example
High	High	Reseller	Fit between product and perceived differentiation; Misfit between differentiation and business model.	Reseller model is difficult to capture the full potential of product differentiation.
High	High	Nonreseller	Fit between product and perceived differentiation; Fit between differentiation and business model.	Relatively stable business model.
High	Low	Reseller	Fit between perceived product differentiation and business model; Misfit between product and perceived differentiation	Relatively stable business model. Implement practices to reduce product differentiation.
High	Low	Nonreseller	Misfit between perceived differentiation and business model; Misfit between product and perceived differentiation	Change business model to reseller. Implement practices to reduce product differentiation.

2. The change process is continuous, manifested by many practices.

The business model change process is consistent with continuous change, manifested by the removal of practices that resemble the features of nonresellers and the addition of practices that resemble the features of resellers. More importantly, these changes follow the shift of residual control rights from investors to platforms.

Among the five platforms that changed their business model, the common change practices include the following: 1. the addition of automatic lending (relative to manual bidding and loan selection process); 2. the addition of boundary conditions, i.e., interest ranges and recommended interest rates, to investor-borrower negotiated interest rates (via auction process); 3. the replacement of the investor-borrower negotiated interest rate by the platform determined interest rate; and 4. the start of platform ownership of loans at some stage of loan transactions, i.e., funding loans by the platform's balance sheet and securitisation.

These four common practices happened in this particular sequence, and previous practices were necessary for the later practices to occur.

3. Learning differential

In the previous section, when I proposed the difference between product differentiation and perceived differentiation, I treated them as rather static constructs that are stable over time in the particular context. Here, I want to challenge this assumption and suggest that, while for retail investors as a whole, it is difficult to differentiate among different individual loans, in the long run, it might be easier for platforms to differentiate among different individual loans. Platforms enabled by machine learning technology and big data are able to learn much faster than retail investors about the differentiation among retail loans.

One reason this may happen is that unlike in a typical marketplace, where buyers and sellers negotiate directly, in the p2p lending marketplace, buyers and sellers negotiate via the marketplace. Thus, the negotiation process is monitored and controlled by the marketplace. In other words, data generated through the negotiation process are available to buyers, sellers and the platforms. For a given transaction, the platform learns as much as the buyers and the sellers. However, the platform is able to gather and process data from all buyers and sellers on the platform, while such data are

not totally available to individual buyers or sellers (some platforms publish a loan book at the aggregated level to show transactions between different sellers and buyers).

Therefore, compared to a new lender trying to bid on a loan, Zopa, with its more than 10 years' knowledge on assessing risks and rewards of an individual loan, can propose an interest rate that better reflects the riskiness of the loan.

The accumulated advantage for platforms to differentiate individual loans can only increase over time. Therefore, although at a static level, in the words of Hagiu and Wright (2015), there might be information asymmetry between the platform and its users in how to best sell the loans, and over time, the platform continuously gains accumulated knowledge. This advantage favours the reseller model over the marketplace model in the long run.

Conclusion

This chapter attempts to answer three questions. 1. Why do some platforms start as marketplaces, while others start as resellers? 2. How does the initial business model choice impact the performance of these platforms? 3. How did platforms change their business models?

To resolve these questions. I collected both quantitative and qualitative data on a sample of UK p2p lending companies. This sample is representative of the whole UK p2p lending industry since the funding of Zopa. The dataset provides a real opportunity to study both surviving and extinct platforms, as well as platforms with different business models at different time periods.

I found some evidence to suggest why the marketplace is the preferred business model during the early stage of the industry. The marketplace model requires fewer financial resources than the reseller model in p2p lending and is less risky, because unlike the reseller model, which needs to operate balance sheet lending, the platform does not need to lend its own money to borrowers. Moreover, when there is default, a marketplace model that does not own the loan would directly pass the burden to investors, while the reseller model will suffer the default damage if it is the loan

holder. These two problems are especially potent during the early stage of the industry because industry uncertainty is high. Start-ups are more likely to use the asset-lite approach (marketplace).

In addition, I propose that analogical reasoning may influence the business model choice of the early founders. I found that platforms tend to use two types of analogical reasoning: being different from banks and being eBay for the loan market. Knowing that the business model for bank loans/deposits is more consistent with the reseller model and that the business model for eBay is more consistent with the marketplace model, it is reasonable to argue that when the founders designed their business models, they tended to use these two types of analogical reasoning, which led to the preference of marketplace.

For the second question, I have some very interesting findings. I have operationalised "performance" to "survival" because almost all of the platforms are not making a positive profit and they are usually extinct after a couple of years. The usual performance indicators would not make sense if they were applied to this specific sample.

Using binary logistics, first, as anticipated, platforms with more financial resources survive longer. In addition, we know already that resellers tend to have more financial resources than matchmakers. However, when both factors are considered, including other control variables, I found that starting as a reseller has a positive relationship with extinction ($p=0.056$). This result is held under both linear regression ($p=0.039$) and Cox regression ($p=0.024$), which examine the length of survival.

The direct and usual interpretation of the finding would be that in the p2p lending market, marketplace platforms outperform reseller platforms; therefore, they survive longer. However, if we move the focus from the funding business model of the platforms to the current business model of p2p lending platforms, according to FCA CP18/20, the discretionary model (reseller) comprises 60% of p2p platforms and an 88% market share. This means that between 2005 and 2018, a significant change in the p2p platform's business model occurred. What we now observe from the data is that although when entering the p2p lending market, the reseller is likely to become extinct faster, after 13 years of development in the industry, the reseller has become the dominant business model in the market.

For the last question, I sampled 22 platforms with enough financial resources and that have survived for a sufficient length of time such that a change in their business model could have occurred. Among the 22 platforms, 10 of them started as reseller business models. I found that nonreseller platforms do change to reseller platforms, while the reverse change did not happen. More importantly, nonreseller platforms are more likely to change to resellers when the originated loans are unsecured individual loans (compared to secured loans and business loans). I collected more refined data on each of the 22 platforms and found that 1. the change process is continuously manifested by many practices that gradually change the balance of residual control rights; 2. perceived differentiation rather than product differentiation may determine the "right" business model choice; and 3. the change to the reseller model may also be induced by the learning differential, where platforms can learn faster about loan pricing than investors and borrowers.

Discussion

Operationalisation of the business model

A critical challenge for me in this chapter is the operationalisation of business models. At different levels of abstraction, the number and meaning of business models can differ. Baden-Fuller and Morgan (2010) compared three ways of categorisation: typology, taxonomy and ideal types. According to them, "the usual way to differentiate them is to think of a taxonomy as being the classes (or kinds) of things observed in the world, and as being developed from empirical work, bottom up. A typology is usually understood as delineating types of things (or events) where the types are decided theoretically or conceptually by the scientist, top down……. For Weber, ideal types are generalisations constructed from the facts of experience, yet they create abstract concepts that he described as 'pure fictions'. So ideal refers here not to the notion of perfection, but to the adjectival form of 'idea '- and type refers not to a classificatory kind we meet in the world, but to a 'mental construct'." In this chapter, I have discussed the classification of business models based on the above three methods. I argue that they have different impacts on the operationalisation of variable construction and measurement.

The continuum view of Hagiu (2007) is a conceptually defined categorisation and hence a typology. For him, the two business models lie on the continuum of residual control rights: complete residual rights indicate the reseller model, and no residual rights indicate the marketplace model. Real-world platforms are located between the two extremes. While this continuum view is very straightforward in explaining the crystal-clear differences between the two models and can be helpful in modelling the behaviours of platforms, I sense there are two limitations. First, it only allows a single-dimensional difference between the two models. Other important factors are thus ignored. Second, the continuum tends to implicitly assume mutual exclusivity. Thus, in Hagiu and Wright (2015), when they use Amazon as an example to illustrate hybrid models, their explanation of the hybrid model is that some products on Amazon should be sold via the marketplace model, while others should be sold via the reseller model. It is not logical for the same product to be sold via both marketplace and reseller models. However, in the p2p lending setting, we can see that for the same loan, it could be sold via both models.

Determining the business model of a specific p2p lending platform can be challenging using this method. First, residual control rights can be a very complex latent variable with multiple different

reflections in firms' activity. Thus, it is difficult to assign a "residual control rights" score to a specific platform. Additionally, there is a conceptual challenge. Assuming a variable, i.e., a residual control rights index that could be scored from 1 to 100 and for which scores from 1-50 would denote a low index score indicating a marketplace and scores from 51-100 would denote a high index score indicating a reseller. However, it is difficult to think that two firms that scored 50 and 51 (marketplace and reseller) would be more different from each other than two firms that scored 1 and 50 (marketplace and marketplace). Thus, this method may be very effective at illustrating differences conceptually but very difficult to use to operationalise variables in empirical work.

As an alternative to the continuum view on the two models, I can also apply a business model view or the concept of ideal types. The "platform strategy" and "pipeline strategy" by Van Alystyne et al. (2016) can be viewed as ideal types. They both denote a role model for others to learn from and a scale model that only emphasises key model aspects and ignores many other aspects. According to Baden-Fuller and Morgan (2010), "management scholars generate descriptions of firm behaviours that capture their salient features: like scale models, these business model descriptions are neither so general that they fail to distinguish the main differences between firms, nor are they so particular that they cover every last detail of contract and activity. Scholars recognise that firms – for all sorts of reasons - do not all behave the same: but nor are they all completely different, for if they were, every firm would appear to have a different business model. This 'in-between 'quality is the first sense of what we mean by a 'generic level', but it is intimately linked with the second sense that lurks in the idea of business models - that there are generic kinds of behaviour which are distinctly different. And it is these generic kinds of behaviour - that form the set of known business models at any point in time - that enable scholars to classify individual firms that they study into groups according to those described kinds." The business model view eliminates the two limitations in the continuum view. It first recognises "kinds of behaviour", instead of single behaviour, i.e., residual control rights. Thus, we could capture other differences between the marketplace and reseller model in the p2p lending industry, such as the financial capital requirement, burden of default risk, loan approval speed, and profit margin. Some of these factors may be related to residual control rights but are not a complete reflection of residual control rights. Second, the business model view assumes no polarities between the two business models and only assumes that they represent different kinds of firms. Moreover, the role-model feature of the business model indicates that entrepreneurs may take one model as an analogy source to learn from or to communicate what the

platform is. Zopa claimed that it was inspired by eBay's marketplace model and that it was the eBay in p2p lending. However, Zopa's real activities deviate from how eBay works.

Despite the advantage of the ideal type view, it also has limitations in operationalisation. Deciding if a real-world platform is marketplace or reseller requires an iteration between theory and empirics. This process can be very subjective. Thus, different people may categorise the same platform into different business models based on their own interpretations of theory and empirics.

The next classification is how FCA categorised the three types of loan-based crowdfunding platforms: the conduit, pricing and discretionary models. This classification is more consistent with a taxonomical classification. The FCA has identified two clear identifiable dummy variables—the pricing decision and loan opportunity identification—and categorised platforms based on these two variables. Unlike residual control rights, these two variables are easily observable and are designed specifically to the p2p lending context. Thus, they may not be relevant in categorising platforms in other contexts but are very effective in the p2p lending context. Therefore, although this chapter is heavily inspired by Hagiu and Wright (2015) and Van Alystyne et al. (2016), when operationalising business models in the real world, I also used "pricing decision" and "loan opportunity identification" as two variables that helped me to identify whether a platform is marketplace or reseller. Of course, there are other variables that can help categorise business models. For instance, the carrier of the default risk can also distinguish between marketplaces and resellers. However, it is difficult to use publicly available information to determine who directly carries the default risk.

A challenge raised in my operationalisation process is that, conceptually, there are two business models: marketplace and reseller. Empirically, the two variables provided three business models, as indicated by Figure 3-34 below.

Figure 3-34: Operationalisation of business model categorisation in p2p lending.

Loan opportunity identification\pricing decision	Platform decides price	Buyer and seller negotiate price
Buyers can identify loan opportunity (sellers) and/or vice versa	Theoretically unclear. Empirically clear - a middle category.	Theoretically clear - marketplace. Empirically clear - marketplace.
Buyers cannot identify loan opportunity (sellers)	Theoretically clear - reseller. Empirically clear - reseller.	Theoretically impossible. Empirically impossible (does not exist in the sample)

Taking different methods of categorisation would have treated this situation differently. Using the typology lens—the continuum view using residual control rights, because buyer–seller identification is a precondition for buyer–seller price negotiation, on the continuum, identification is closer to reseller than is negotiation.

We can imagine Figures 3-35 below.

Figure 3-35: Relationship between two business models and two operationalised variables

The above figure, however, can only illustrate the relative position of these constructs. The lack of absolute position indicates that unless I can form an objective measurement of the residual control rights, I cannot make any conclusion.

Using the taxonomy lens—the way in which FCA categorised these platforms—I would need to create an in-between category, as shown in the table above, just as FCA created the pricing model, which would be parallel to the other two models.

Using the ideal type lens—seeing business model as models—I would need to reflect on the essences of some of the most representative marketplace and reseller models.

Figure 3-36: Representative businesses and their relationships with operationalised variables

Marketplace business model representative	Pricing negotiation	Identification	Reseller business model representative	Pricing	Identification
eBay (online retail market)	negotiated via auction	Buyer can identify offering and seller's eBay information	Walmart (Supermarket)	Supermarket decides	Buyers can identify product brand that they purchase
Airbnb (house rental)	negotiable between renter and landlord directly	Buyer can identify seller and offering	Barclays (Commercial bank)	Bank decides	Depositors cannot identify who borrows their money
Vegetable market	Negotiable between buyer and seller, although the market may set a price range	Buyer can identify seller and offering	A reseller in a vegetable market	Reseller decides	Buyers would not know the farmers behind the vegetables

Marketplace business model representative	Pricing negotiation	Identification	Reseller business model representative	Pricing	Identification
London Stock Exchange	Negotiated via auction, although the market may set a price range	Buyer can identify offering but not seller's personal information	Spotify (music distributor)	Platform decides	Listeners can identify the musicians but not the exact appropriation of fees

Using the above table as an illustration, we can see that both pricing negotiation and buyer identification of sellers as a necessary condition for the marketplace. No price negotiation is a necessary condition for resellers. The inability of buyers to identify sellers is not a necessary condition for resellers; in other words, buyers may or may not be able to identify the producer/original seller of the offering. Therefore, I can make a subjective decision that when a p2p lending platform allows buyers to negotiate prices with sellers, it is consistent with a marketplace business model; otherwise, it is consistent with a reseller business model.

In this chapter, I decided that when analysing the quantitative data, I would start with the taxonomy approach because it allows me to capture the potential difference between the three business models. I will compare the result with the ideal type approach.

Of course, it is reasonable to argue that there are other classification methods. To an extreme, we could argue that each platform is differentiated from other platforms on this or that element and thus that each platform has its own model. I limited the number of categories to two and three because it captures the key difference that I wanted to examine, i.e., how a platform manages the lender-borrower relationship, and because it made the analysis less complicated and easier to comprehend.

Market Entry and Market Creation

This chapter primarily contributes to the literature on platforms and business models. This chapter also describes a process of new market entry and creation.

The question of how a firm enters a new market is central to strategy, and scholars have debated for decades philosophically regarding an underlying question—is opportunity created by people or discovered by people?

Sarasvathy and Dew (2015) suggested that the discovery perspective is based on the assumption of "optimal decision making, based on the application of well-defined preferences to a known opportunity set". Therefore, new market entry is framed as "search and election". In the context of entrepreneurship, Shane and Venkataraman, 2000) see it as opportunity recognition followed by product prototype.

On the other hand, the opportunity creation perspective is based on how bounded rational entrepreneurs behave, which is labelled "effectuation" and coined by Sarasvathy (2001). This process is often found in user entrepreneurs who prototype products first and then look for opportunities to commercialize it. (Haefliger, Jager and von Krogh, 2010).

Following this distinction, I would suggest that what I observe in p2p lending platforms started as new market entry, as Zopa identified the gap between unsatisfied retail investors and unsatisfied borrowers. Zopa was able to prototype its product (the p2p lending platform) to fulfil the need.

Thus, using the market entry perspective, I reviewed the 30 most cited "market entry" articles. I found that the context studied is usually the internationalisation of companies, namely—expanding from the local market to the foreign market, which could be born internationally or expanded internationally gradually. Scholars in this field tend to use a contingency-based framework. Thus, the emphasis is on the major strategic choices that companies face when entering a new market and the condition under which a particular choice is preferred over others. Four sets of strategic choices are emphasised by scholars: 1. to enter or not; 2. where; 3. when; and 4. how.

1. Enter or not?

Three theories have been used to analyse this question: transaction cost economics and resources and capabilities. The two theories give different logics for the entry decision. For TCE, the logic is transaction cost minimisation (Madhok, 1997; Brouthers, 2002). For RBV and capabilities, the logic is enhancing value (Lieberman and Montgomery, 1998; Brouthers, 2002). Although the question is important, it is no longer the emphasis of most studies. Scholars have started to emphasise the key decisions involved after the firm decides to expand internationally.

2. When?

The timing of entry, pace of entry or speed of entry are often documented as key strategic decisions, and managers need to choose carefully. First-mover advantage (Lieberman and Montgomery, 1998) is the most representative theory about the timing of entry. Later scholars documented the conditions under which firms should be first movers or followers and whether they should expand quickly or slowly (Hennart and Reddy, 1997; Jones and Coviello, 2005; Rialp, Rialp and Knight, 2005; Zott and Amit, 2008).

3. Where?

Usually, the question of where to enter is framed as geographical locations, i.e., different cities, regions or foreign countries. For example, in the renewed Uppsala model (Johanson and Vahlne, 2009), the geographical location to enter is still a key decision that managers need to make. Other scholars have also discussed factors that influence a firm's choice of where to enter and how many places to enter (Zahra, Ireland and Hitt, 2000; Xu and Shenkar, 2002; Rialp, Rialp and Knight 2005).

4. How?

How should a firm enter a new market? This is the most studied strategic issue among the four issues listed. However, it is surprising that most scholars tend to define "how" narrowly as the mode of entry. Specifically, the mode of entry is usually determined by the level of control, resource commitment and risk involvement (Anderson and Gatignon, 1986). Therefore, managers can choose among a long list of entry modes or taxonomies, and each scholar tends to have their own taxonomies of entry modes, such as exporting, licensing, joint ventures, sole ventures, and acquisitions (Agarwal and Ramaswami, 1992; Brouthers, 2002; Xu and Shenkar, 2002; Helft and Lieberman, 2002).

Buckley and Casson (1998) have pointed out that strangely, the majority emphasis on mode of entry was on production and investment facilities. Scholars distinguished between “investment in production facilities and investment in distribution facilities - an important practical distinction that has been overlooked in much of the international business literature."

As a result, the emphasis of how to enter a new market centres on the production or supply side of the whole value creation and capture processes. Even though Helft and Lieberman (2002) recognised that “any shift in technology, customer needs or the state of business practice can lead to new segments”, adding an emphasis on the term “business practice”, when they categorised market entry opportunities, their emphasis was still on product differentiation and the supply side (new-to-the-world industry, new product-market niche, different geographic location and established product-market).

It was not until Teece (2014) that the impact of business models on the success or failure of new market entry strategies was discussed. He noted, “By the right things [dynamic capabilities], I refer to investment in new products, processes, and business models that are in tune with the firm's business environments at home and abroad, and with its strategy.”

Thus, there is an empirical gap in the new market entry literature about the impact of different business models on new market entry. This chapter suggests that in the p2p lending market, firms entering with the marketplace model are more likely to survive longer.

My understanding of platform, platform business, platform strategy and platform business model

In my understanding, a platform, a platform business, a platform strategy and a platform business model mean four different but connected things. However, these four objects are rarely clarified in a connected matter by authors.

For the definition of a platform, I take the architectural view of Baldwin and Woodard (2009). Thus, a platform can only be identified with a platform architecture that consists of three parts: the platform, peripherals and interfaces. In this structure, a platform is defined as a set of assets that are repeatedly used. This definition of a platform is very inclusive but captures the essence of a platform's meaning under different contexts. For instance, from the technical view, de Reuver, Sorensen and Basole (2018) defined a "digital platform" as" an extensible codebase to which complementary third-party modules can be added", which is very consistent with the definition of a platform. This understanding and definition of a platform is well understood by the platform community.

However, in the strategy community, our interests are less on the platform itself but on the platform business. However, the platform business is rarely defined by scholars who write about it. For instance, when Eisemann, Parker and Van Alstyne (2011) write about platform envelopment, they illustrate many platform businesses. However, there is no standard about how these companies are chosen—how they define if a business is a platform business. Similarly, when Evans and Gawer (2016) produced a platform enterprise global survey that identified 135 platform companies, they relied on searching key words related to "platform" in a variety of databases. There were no clear criteria for including and excluding businesses from platform businesses. Therefore, the identification of a platform business relied on the self-identification of or propaganda on businesses but was not based on a clear objective definition. Combined with the inclusive definition of platform, as a result, almost all companies can claim to be a platform business. Platforms can be found in almost all companies. However, as strategists, when studying platform businesses, we are interested in a particular group of businesses. In my understanding, it is the group of companies that relies on and controls a functioning platform to survive and prosper, to create value and to capture value. Thus, I define a platform business as a business unit that controls and relies on a platform to function and prosper.

This separation between platform and platform business is very important. First, we can be more precise about the unit of analysis. For example, platform competition and platform business competition can mean two different concepts. The former emphasises features of the platform itself, i.e., arrangement of letters of typewriters and codes of iOS compared to codes of Android. The latter emphasises business policies regarding the platform, such as diversifying offerings or exclusive signed contracts, pricing policies, differentiated treatment of participants, and openness policies. Competitive advantage may arise from the platform itself and may also arise from the platform business.

Second and more importantly, one platform business can control several profit generating platforms at the same time. These platforms can be strongly and uniquely dependent on each other. In the case of Apple's iPhone business, the iOS is a platform, the App Store is a platform, and the iPhone hardware business is also a platform. These platforms are strongly dependent on each other and have synergies to support each other. Hence, when evaluating the success of the iPhone business, we must show not only the influence of each of the platforms but also the interdependency between these platforms.

Following my argument for a platform business, I suggest that when scholars use the terms "platform strategy" and "platform business model", the unit of analysis is mostly platform business instead of the platform. Is there a distinction between platform strategy and the platform business model? If so, what is the distinction? One way to look at the issue is by describing the difference between "strategy" and a "business model". For example, Demil, Lecocq and Warnier (2018) illustrated key assumption differences between strategy and business models: the business model (compared to a strategy) emphasises the configurational approach, value proposition and delivery, diversity of performance appraisal and active treatment of the environment. My emphasis of the issue is not on the difference between strategy and business model but on the relationship between the platform and the business model.

Baden-Fuller and Morgan (2010) identified two ways of thinking about business models: a model of a business and a model for a business. The former is a simplified representation of a business, and the latter represents a role model that others could study and learn from. They suggest that the

usage of business models includes elements of both. For them, "each firm is studied not just for its own sake as an exemplar, but as the 'type 'against which other firms following the same generic business model can be measured and compared."

Returning to the platform business model, it is often understood at two "extreme" levels, namely, a specific level representing the business model of each specific platform business and a generic level representing the business model of any platform business. Neither of these two understandings of platform business models are helpful in portraying it as a role model. The specific understanding would create as many platform business models as platform businesses, and the generic understanding would create one overly inclusive label, the "platform business model", with very high diversification within it. For example, in the context of UK p2p lending, both reseller lenders and marketplace lenders would be categorised platform business models, yet their operations, value creation and value delivery are different. Using this logic to an extreme, a bank and a pawn shop could also be seen as a platform business and as using a platform business model.

To overcome this issue, I think there are two possible solutions. For the first solution, we could keep the label "platform business model" as the business model of any platform business. Then, under this label, we use new labels that truly represent different types of businesses. For instance, for intermediary platform businesses, we could have a reseller business model to describe one type of platform business that shares similarities in value proposition and delivery and a marketplace model to describe the other type of platform business that shares another set of similarities.

One might ask about the relationship between different platform business models and different kinds of platforms, such as transaction platforms, innovation platforms, investment platforms and integrated platforms, as identified by Evans and Gawer (2016). I suggest that the unit of analysis for different kinds of platform business models is the business model, and the unit of analysis for different kinds of platforms is the platform. Thus, by design, the transaction platform is a different innovation platform. However, the reseller model and marketplace model might depend on the same platform. Zopa's website hosted the Zopa listing model and the Zopa market model simultaneously. The key difference is not the platform itself but how the business uses the platform to form different value propositions and deliver the value differently.

For the second solution, we could make the "platform business model" more exclusive. Instead of being a business model of any platform business, a "platform business model" could represent a business model of a particular way of forming a value proposition and delivering it. As I illustrated in my thesis of p2p lending, although banks and some p2p lending platforms (reseller model) hold kinds of platforms, one is digital, and one is physical. The way that they broker a loan is similar. In terms of a value proposition, borrowers do not need to wait for other parties (depositor/lender) to approve their request. In terms of value delivery, they both rely on balance sheet lending, the loan contract is between the borrower and the bank/p2p platform, the inventory and default risk are carried by the bank/p2p platform, and most importantly, the relationship between depositor/lender, borrower and bank/p2p platform can be reduced to two sets of dyadic relationships. The lender and borrower may not know anything about each other. In addition, when the relationship between the three parties can be reduced to sets of dyadic relationships, it resembles our long-known topic, the supply chain, or pipeline, in the words of Van Alystyne et al., (2016). Therefore, I consider this way of managing a platform is not a platform business model.

In contrast, some p2p lending platforms have different value propositions and delivery mechanisms. When they do not need to lend their own money, they facilitate a contract between lenders and borrowers. This model requires fewer upfront financial resources for the platform business, and inventory and default risks are always held by lenders. At cost, when borrowers apply for loans, the business needs to wait for lenders to approve the request. The relationship between the three parties is triadic and cannot be reduced to sets of dyadic relationships. In addition, the model often referenced by p2p lending platforms, the "eBay model", has a similar value proposition and delivery mechanisms. Therefore, I consider this way of managing the platform a platform business model.

In my thesis on p2p lending, I mixed these two solutions. Therefore, in digital intermediary businesses, I consider the marketplace model to be a platform business model and the reseller model to be a nonplatform business model. As a result, I argued that not all platform businesses utilise a platform business model. In this understanding, a platform business model is neither a business model of a specific platform business nor a business model of any platform business. It is a representation of a particular combination of a value proposition and value delivery and/or of value creation and value capture mechanisms. It is formed based on a collection of platform businesses, but after formation, the model has its own life. As a result, although I make a connection between

a platform, a platform business and a platform business model, a platform is used as an antecedent to a platform business and to a platform business model. For any new business or business unit, the platform business model could occur before the formation of the platform business.

Last, what is platform strategy and its relationship with the platform business model? I do not think I have enough experience to form a definition for platform strategy. However, I want to show the connection and relationship between platform strategy and a platform business model. Using the words of Casadesus-Masanell and Ricart (2010), strategy "refers to the choice of business model through which the firm will compete in the marketplace". Following this line of argument, platform strategy refers to the choice of a business model for a platform business. In the setting of UK p2p lending, the platform business may choose to use the marketplace model or the reseller model; the business may choose to use both at the same time or some unique configuration that is neither a typical marketplace nor a typical reseller model.

Performance Measurement

The performance of firms is one of the most important, if not the most important, dependent variables in the empirical study of strategy. Very often, performance is reflected by financial figures such as profit and revenue. My research in UK p2p lending used platform survival length as a performance indicator of p2p lending platforms, which offered many advantages that future empirical studies might consider. Here, I briefly discuss the conditions under which survival length should be considered.

First, profit is not the core objective of the sample firms. In the case of p2p lending platforms, their main financial target is the volume of transactions. To achieve this target, many platforms monetarily subsidised both lenders and borrowers so that they could use their platform. As a result, both successful and failing platforms have negative profits.

Second, when the sample industry is at an early stage and manifested as SMEs, survival length is advantageous. At the early stage of an industry with SMEs, firms tend to submit simplified versions of financial accounts. For instance, in the UK, a small company (any 2 of the following: less/equal than £10.2 M turnover, less/equal than £5.1 million balance sheet, less/equal than 50 employees) only needs to submit small company reports to the government. Within the simplified financial reports, an income statement is not needed. Thus, it is difficult to know exact information on the profit and revenue of SMEs.

Last, platform survival length captures the performance of a particular platform instead of a company. Many companies have multiple businesses and platforms, and their annual accounts usually aggregate these businesses. It is difficult to isolate platform performance from firm performance.

However, survival duration can only partly capture platform performance. Platforms surviving longer do not necessarily mean more successful platforms. For example, Ratesetter ended because it was sold to Metro Bank for a profit. Some platforms may end due to future concerns instead of present troubles. Survival duration could not account for these issues.

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