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ARTICLE 7

Platform-Dependent Entrepreneurs:

Power Asymmetries, Risks, and Strategies in the Platform Economy

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Original publication:

Cutolo Donate and Kenney Martin, Academy of Management Perspectives, 2021, Vol. 35, No. 4, 584–605.

Abstract

Online digital platforms organize and mediate an ever-increasing share of economic and societal activities. Moreover, the opportunities that platform-mediated markets offer not only attract enormous numbers of entrepreneurs, but also support the growth of entire ecosystems of producers, sellers, and specialized service providers. The increased economic and business significance of digital platforms has attracted an outpouring of studies exploring their power dynamics and general impact. This research has largely overlooked the power imbalance that entrepreneurs experience as members of the platform ecosystem and provided little guidance on how these far more numerous firms should compete. Drawing upon Emerson's power-dependence theory, we show that the power asymmetry at the heart of the relationship between the platform and its ecosystem members is intrinsic to the economics and the technological architecture of digital platforms. We undertake a conceptual analysis of the sources of this power, and we unravel the novel component of risks that emanate from this imbalance. Our analysis suggests that the conditions of engagement for platform entrepreneurs are so different from traditional entrepreneurship that these entrepreneurs are more usefully termed "platform-dependent entrepreneurs" (PDEs). Further, we explore the strategies that PDEs are developing to mitigate their dependence. Finally, our study provides a framework for policy makers that are considering regulating platform-organized markets.

Keywords

Entrepreneurship, Platforms, Digital markets, Platform dependent entrepreneurship, Strategy, Ecosystems, Complementors

1 Introduction

The role online digital platforms play in controlling commerce and communication means that entrepreneurs and, indeed, a substantial portion of all businesses have to navigate a world where platform structure the reality (Cennamo, 2019; Cusumano, Gawer, & Yoffie, 2019). Because of network effects and winner-take-most aspect of these markets (Gawer and Cusumano 2002, Cennamo & Santalo, 2013), successful digital platforms have coalesced into powerful economic intermediaries. As a result, the economy is being (re)structured by platform firms and participation in these ecosystems has become vital for many businesses' existence and growth (Kenney & Zysman, 2016; Parker, Van Alstyne, & Choudary, 2016). To illustrate, it is possible to ask whether an organization that cannot be found through Google Search exists, a restaurant can afford to ignore Yelp, an online business can ignore Amazon – that now is estimated to control approximately 40% of all online sales, or hotels can afford not to rent through the online travel agencies. In October 2019, of the ten most valuable firms in the world, seven were digital platform firms, quite simply because the stock market believes they are in a position to capture an enormous share of the world market's total value.

Entire constellations of producers, sellers, and specialized service providers have emerged to earn their livelihoods through these platforms. Digital platforms such as Amazon, eBay, Etsy, Facebook, Google, Instagram, Yelp, and YouTube, among others, make it easier than ever to build a business and generate income, offering entrepreneurs access to large-scale markets and a variety of incentives to populate their platform ecosystems (Ghazawneh & Henfridsson 2013; Yoffie & Kwak, 2006). We will demonstrate that the conditions of selling or providing services through a platform are so different from traditional entrepreneurship that entrepreneurship actualized through an online digital platform can usefully be termed "platform-dependent entrepreneurship"[1].

This paper builds upon and extends the recent outpouring of research on platform entrepreneurship (Nambisan, 2017; Kapoor & Agarwal, 2017; McIntyre & Srinivasan, 2017; Eckhardt, Ciuchta, & Carpenter, 2018). When exploring the nature of entrepreneurship conducted on platforms, extant studies have emphasized the peculiarity of this context, which is characterized by network effects and winner-take-most outcomes that pose novel challenges for platform-dependent entrepreneurs (PDEs) selling through these platforms (Gawer & Cusumano 2002). While recognizing the tremendous new business opportunities created by online platforms, surprisingly, little attention is given to the power relationship between PDEs and platform owners. As members of a platform ecosystem, PDEs experience a great power imbalance in relation to the platform owners, who can unilaterally enforce changes in the competitive conditions on the platform (Kapoor & Agarwal, 2017; Wen & Zhu, 2019). Although recognition of this power imbalance is growing (Miric, Boudreau &

Jeppesen, 2019; Nambisan & Baron, 2019), there has not been a comprehensive exploration of the power dynamics faced by PDEs.

The purpose of this paper is to advance a perspective that extends and enriches our understanding of how the power asymmetries inherent in digital platforms influence and restructure entrepreneurship. We first define and describe the nature of platform entrepreneurship, showing how extant research fails to provide an adequate account of the relationship between platform owners and PDEs. Next, we rely on power-dependence theory (Emerson, 1962) to illustrate how the power imbalance in this relationship arises from the technological and economic dynamics of digital platforms and is intrinsic to platform architecture and design. By detailing the sources of power, we show that the entrepreneurial process, which is already characterized by high risk, is made even more precarious by being dependent upon a platform. In this regard, we show that unique and pervasive risks stem from this dependence. Of course, PDEs have introduced strategies that, while limited in efficacy, can provide some countervailing power. In the discussion, we reflect on how and why this changes the theory and practice of entrepreneurship, emphasizing policy implications, and promising areas for future research.

2 Theoretical background: Power asymmetry in platform-dependent entrepreneurship

Platforms have been defined in a variety of ways (Baldwin & Woodward, 2009; Parker et al. 2016; Evans, Hagiu, & Schmalensee, 2006). We adopt Gawer's (2014: 1240) definition "that platforms are evolving organizations or meta-organizations 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 side of the markets; and (3) entail a modular technological architecture composed of a core and a periphery." Any platform thus implies the presence of a group of actors, or complementors, that supply complementary products and services that generate value for the core platform business (Gawer & Cusumano, 2002; Parker et al., 2016). Complementors join a platform's ecosystem for a variety of reasons (Boudreau & Jeppesen, 2015). More recently, considerable academic interest has focused on the complementors that join a platform ecosystem with entrepreneurial intent (Nambisan, 2017; Eckhardt, et al., 2018; Nambisan & Baron, 2019). While there are non-profit platforms, the phenomenon that we address are those where both the platform owner and the complementors are entrepreneurs producing goods or services for income or for-profit entities intent upon maximizing their income.

To explain entrepreneurial action on a platform, academic attention has focused upon the impact of digital technologies on entrepreneurship-related concepts, ad-

dressing how the technological dimension of digital platforms operates to define entrepreneurial opportunities, processes and outcomes. Nambisan (2017) highlights the need for developing theory that addresses the relationship between digital technologies and entrepreneurship, as well as how digital platforms alter the uncertainty inherent in the entrepreneurial process—since conducting entrepreneurship on a digital platform implies more blurred boundaries and dispersed agency. Building on that, von Briel, Davidsson, and Recker (2018) emphasize the central role digital platforms have as enablers of entrepreneurial opportunities, dissecting platforms' influence on the agency and boundaries of venture creation at different stages of the entrepreneurial process. Exploring entrepreneurship in digital platform-organized markets must consider its unique features, such as generativity (Zittrain, 2008), technology affordances (Autio, Nambisan, Thomas & Wright, 2018), and openness (see Nambisan, Siegel and Kenney (2018).

In addition to the central role of digital technologies, scholars suggest focusing on digital platforms as a novel and unique setting for entrepreneurship. Digital platforms orchestrate entire ecosystems of value creation and exchange, opening new spaces and channels where entrepreneurs can create new firms and operate (Nambisan, 2017; Jacobides, Cennamo, & Gawer, 2018; Cusumano et al., 2019). A deep understanding of the entrepreneurial context serves multiple purposes from a theoretical standpoint, since the character of entrepreneurship, as well as the actions and outcomes of any entrepreneurial effort, depend on the rules, threats, and opportunities framing its context (Autio et al., 2014). Thus, understanding platform-dependent entrepreneurship requires explicating the context for this entrepreneurship and explaining the reasons for the dependence that emerges.

Platform-based entrepreneurship differs substantially from traditional entrepreneurship. As Nambisan and Baron (2019) point out, PDEs simultaneously fill two roles. First, PDEs operate businesses pursuing goals, with the platform as an intermediary. However, to the platform owner, the PDEs are complementors, whose existence is only important if it adds value to the platform. Consequently, entrepreneurial processes and outcomes are conditioned by the dynamics determined by membership in a digital platform ecosystem. To illustrate, Eckhardt et al. (2018) find that in an app store, digital platforms provide ecosystem members with information regarding the commercial feasibility of their products, thereby influencing their propensity to commercialize their software programs. In contrast, McIntyre and Srinivasan (2017) adopt a network perspective to illustrate how entrepreneurial success on a digital platform is intertwined with the fast-paced competitive dynamics that characterize digital platforms and their ecosystems.

There have been significant efforts to integrate different literatures to articulate the theoretical foundations for platform entrepreneurship (Nambisan et al., 2019), while also recognizing the uniqueness of digital platforms as entrepreneurial contexts (Kapoor & Agarwal, 2017; Eckhardt et al., 2018; Nambisan & Baron, 2019). And yet,

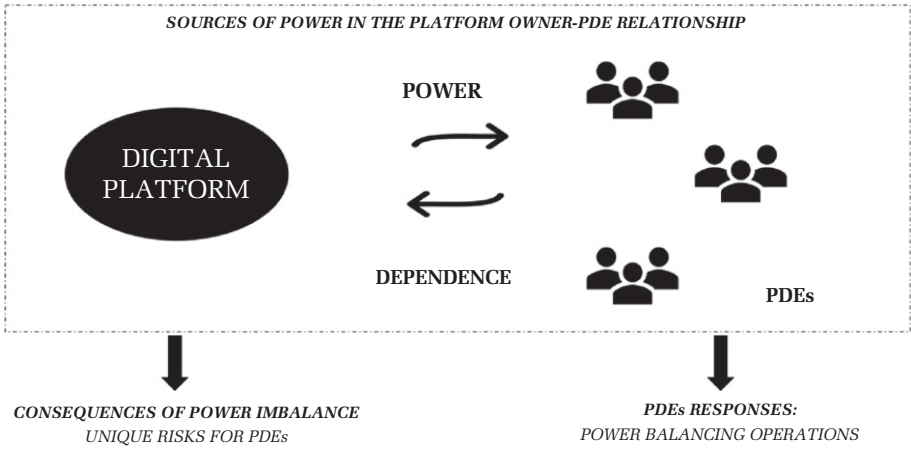
there has been less analysis of the relationship between entrepreneurs as ecosystem members and platform owners. In a recent paper, Jacobides et al. (2018: 2258) observed that the relationships between platform owners and ecosystem members differs from other inter-firm relationships as they "do not fit into the classical firm-supplier relationship, Porter's (1980) value system, or a firm's strategic networks; neither are they integrated hierarchies." Previous studies nearly always unquestioningly postulate that the relationship between the platform owner and complementor is based upon the shared objective of providing value to customers (Nambisan & Baron 2013; Adner, 2017; Jacobides et al., 2018), and thus, accept that the actors "depend on each other and share a common fate" (Tiwana, Konsynski, & Bush. 2010: 52). Others go further, depicting the relationship as a partnership (Gawer & Cusumano 2014; Zhu & Liu, 2018; Wang & Miller, 2019). Remarkably, these authors do not reflect upon what "partnership" means given the fundamental asymmetry between the platform owner and the PDE (Boudreau & Hagiu, 2009).

Platform ecosystems are not fully hierarchically controlled and their participants are separate organizations (Jacobides et al., 2018). Despite this lack of direct control through ownership, platform owners can "impose rules and constraints, create inducements and otherwise shape behaviors" (Boudreau & Hagiu 2009: 3). Nambisan and Baron (2013: 1073) correctly observe that the complementors "surrender part of their autonomy and independence" and align their businesses with the goals of the platform owner. As the intermediary between potential customers and providers, there is an asymmetric power relationship that affects the entrepreneurs' return, though the conditions of that relationship may change. While there is ample evidence of power asymmetry (Kapoor & Agarwal, 2017; Miric et al., 2019; Nambisan and Baron, 2019), there has been little consideration of the mechanisms through which platform owners wield power and of the consequences of this power imbalance. This gap in the literature leaves unaddressed critical questions regarding changes to our understanding of entrepreneurship, when increasing portions of the economy are organized by platforms.

3 Sources of power in the platform owner-PDE relationship

Platform power has already been an object of study, but scholars have mainly focused on the market power of platform firms and its consequences for competition (Eisenmann, Parker, & Van Alstyne, 2011; Khan, 2016). Despite the clear power asymmetries within the platform owner-entrepreneur relationship, their effect is explored only in passing (McIntyre & Srnivsan, 2017; Gerwe & Silva, 2018; Jacobides et al, 2018). In order to understand how this power asymmetry influences and transforms entrepreneurship, it is necessary to elucidate the sources of this power.

Figure 1 Platform Dependent Entrepreneurship: sources of platform power, consequences of power imbalance, and PDEs' mitigation responses



Adapted from Emerson (1962).

Power is an attribute of the relationship between actors rather than a consequence of their individual characteristics (Cook et al., 1983; Emerson, 1962). The central proposition of power-dependence theory (Emerson, 1962) is that, within any relationship, power stems from 1) control over valued or needed resources by others and 2) the availability of alternative sources for these resources. Figure 1 illustrates how Emerson's power-dependence lens frame our exploration of platform dependent entrepreneurship. We first outline that platforms' power is rooted in some of the techno-economic features of digital platforms, and we show that both the incentives developed by the platform to attract PDEs and the mechanisms designed to ensure their commitment exacerbate power imbalance within the PDEs-platform relationship. We then proceed to explore the consequence of this asymmetric distribution of power detailing the unique risks that PDEs face and we illustrate the balancing responses developed by PDEs to mitigate that power.

3.1 Techno-economic bases of platform power

The power imbalance in the platform owner-PDE relationship originates in the first instance from the digital nature and the peculiar dynamics of digital platforms. The fundamental source of power for online digital platforms is, of course, the value provided to its users. As an intermediary, a platform connects different groups of users

(economists term these as "sides" of a platform). Through connecting users and presumably offering them sufficient value to retain them and attract others, the platform can generate positive network effects, attracting yet more users from both the sides (Parker et al. 2016). These multisided platform dynamics in fact exhibit direct and indirect network effects (Parker & Van Alstyne, 2005), which represent the main driving force of platforms' value and market share (Cennamo & Santalo, 2013). Often, the platform can even attract entirely new groups (sides) of users. For example, YouTube solved what has been termed the "chicken-and-egg" problem by seeding a few videos that attracted viewers and providing tools for viewers to easily upload videos and embed them in other pages, thereby attracting attention to YouTube. As these two sides grew, YouTube began attracting advertisers, which were a new group of users and side of the platform. YouTube or any platform's success is predicated upon igniting positive feedback loops or what Cusumano et al. (2019) characterize as "rapid nonlinear growth".

The strength of these network effects is such that it can easily lead to high levels of market concentration, thus the successful platforms are often winner-take-most/all (Parker & Van Alstyne 2005; Eisenmann et al. 2011). Winner take-all/most outcomes are at the heart of platform value creation and capture (Amit & Zott, 2001) and they often result from competition between platforms. The belief or hope that a platform could disrupt existing competitors justifies even a willingness to suffer financial losses to capture the market.

In this process, platforms provide both consumers and producers with incentives and benefits to join and maintain their association with the platform ecosystem, and since these benefits are amplified by the increasing returns associated with network effects, they often result in lock-in (Arthur 1989; Ozalp, Cennamo, & Gawer, 2018). [2] The lock-in of platform users is reinforced by other attributes of platforms, such as the long-tail effect, which refers to the fact that dominant platforms have "everything" including the most obscure items. The ability to find anything means that customers have no need to search elsewhere, increasing the chances that they will engage in repeated transactions, thereby strengthening lock-in. To illustrate, Amazon, through its Marketplace, has "everything." Estimates vary, but one website suggests that in April 2019 Amazon carried 128 million unique items; of which 44.2 million were books -- of course, there also might be many offerings of any particular item[3]. YouTube has a similarly enormous numbers of videos, as it is estimated that 500+ hours of video are uploaded to YouTube every minute[4]. Almost invariably, all the items in the long tail are provided by PDEs, so they bear the cost of proposing the item.

Once lock-in has been achieved, there are very few alternatives and PDEs will inevitably be in a position of dependence. Moreover, PDEs must optimize their operations for the dominant platform, thereby deepening their lock-in. For example, there is an entire industry providing "search engine optimization" services, which does nothing more than design websites to be found, catalogued, and ranked high-

ly by Google. These basic dynamics of successful digital platforms' strategy have implications for the way the market operates and for the power imbalance experienced by PDEs.

In addition, several features of digital technologies combine to explain how digital platforms develop their power. As intermediaries, platforms provide a digital infrastructure that lowers search and transaction costs for both sides of the market and improves the match between the parties (Baldwin & Woodward, 2009). Because the platform is built from software, this infrastructure can be easily altered and reconfigured. For example, the *Search Engine Journal* (2019) finds that Google makes thousands of minor changes each year, and, less frequently, major changes to its search algorithms – presumably each of these changes is in Google's interest. The ability to control and alter the technical infrastructure upon which users participate and contribute to the ecosystem allows platform owners to influence other participants, directly or indirectly.

Since all actions on platforms are digital, they are all recorded, and thus giving the platform a panoptic view of the activities of all users (Zuboff 2019). Given its central position, the platform can decide what information to provide to which users and, of course, what will not be provided. This ability to analyze, recombine, and manipulate data and information allows the platform to influence attention and actions (Gerwe & Silva, 2018). As an example, collection of the online actions of each user allows a platform to serve "individualized" content to each user.

This capability to control data, direct attention and orient behaviors is fundamental to a platform's relationship with PDEs and it places platform owners in a position of considerable power as they can use it in their own favor, for instance promoting their own offerings. To illustrate, according to a recent analysis conducted by the *New York Times*, in more than 700 searches in Apple's online store, Apple ranked its apps first over competitors. For example, some searches for term "podcast" returned 14 Apple apps before showing results from other companies[5].

3.2 Platform incentives and resources to PDEs

Particularly in the initial stage of a platform's life, when network effects are minimal, it is often necessary to provide significant and money-losing incentives to attract PDEs and/or consumers in an effort to "tip the market" (Arthur 1989; Shapiro & Varian 1998). Attracting entrepreneurs is critical and offering attractive terms is vital, as the platform is often competing against others (Gawer & Cusumano, 2002). However, the incentives and the resources provided by digital platforms to attract and cultivate their relationship with PDEs have a contradictory effect. We illustrate how the very same benefits associated with joining a platform becomes the sources that sustain and reinforce the power asymmetry in the PDEs-platform relationship.

3.2.1 Access to customers

For those selling goods or services, the fundamental benefit of using a platform—whether it be advertisers paying for search advertising, Etsy sellers, or IOS developers—is customer access. Digital platforms are "matchmakers" (Evans & Schmalensee, 2016:1) and this refers to a platform's ability to match buyers and sellers or service providers, and to reduce discovery and transaction costs (Evans, Boudreau, & Hagiu, 2009; Baldwin & Woodward, 2009). A platform's market ranges from global (online sales, e.g., Amazon marketplace) to extremely local (e.g., Yelp! for locating a restaurant), but in aggregate, their scale is enormous (Cennamo & Santalo, 2013). To cope with the size of these markets, platforms offer classification systems, e.g., tags, product categories and more, that make discovery of far-flung sellers possible, thereby reducing discovery costs and creating new spaces for entrepreneurs. Control over access to customers is the fundamental first dimension of a platform's power, as it directly affects the most valued and essential resource for the PDEs: access to the market. All things being equal, as a direct consequence of network effects and winner-take-most dynamics described in section 3.1, the greater the concentration of users/customers on a single platform in a particular market, the greater the power over its PDEs.

3.2.2 Provision of boundary resources

The fundamental problem faced by every platform is to attract different groups of actors, namely, at a minimum, providers of a desired good or service (PDEs) and users/customers (Gawer & Cusumano, 2014). To attract these actors, a platform provides them with tools, (such as, software development kits, application-programming interfaces (APIs), marketing and sales information, training, templates, manuals, technical support and other resources (Boudreau & Hagiu 2009; Ghazawneh & Henfridsson 2013; Yoffie & Kwak, 2016; Eckhardt et al., 2018). These are provided to all sellers and facilitate use of the platform (Eisenhardt & Martin, 2000). These resources are the affordances that reduce both the entry barriers and scaling costs for PDEs (Eckhardt et al., 2018; Nambisan et al., 2018).

The provision and control over these resources grant platform owners considerable power by virtue of two mechanisms. First, the boundary resources generate power by forcing complementors to make asset-specific investments as a condition for participation (Eckhardt et al., 2018). The greater the investment is—which is often cumulative due to platforms' ranking and reputation systems—the greater the power platform owners accrue (Luca & Zervas 2016). In other words, platforms attempt to create lock-in and limit the possibility for PDEs to pursue economic interests outside the platform. Second, boundary resources are designed to control actions on the

platform (Ghazawneh & Henfridsson 2013), as they specify the parameters of permissible action (Eaton et al., 2015: 220).

3.2.3 Platform governance

The platform owner is responsible for the functioning of the ecosystem through the provision of modular architecture and by setting the rules of engagement for actors (Gawer & Cusumano, 2002, Wareham, Fox, & Giner, 2014). As ecosystem curators, platform owners must coordinate their PDEs to prevent dysfunction (Thies, Wessel, & Benlian, 2018; Jacobides et al. 2018): platform governance encompasses decision rights partitioning, control mechanisms, and pricing policies (Tiwana et al., 2010). In other words, platform owners act as private regulators who are expected to reduce negative externalities created by ecosystem members in order to maximize the value for the system as a whole (Boudreau & Hagiu, 2009; Evans, 2012). The profit of the platform owner and the value of the ecosystem are directly linked, and insufficient control over opportunistic behaviors by PDEs can degrade the ecosystem and even result in a platform's failure (Täuscher & Kietzmann, 2017). Platforms are thus strongly incentivized to perform a regulatory role, and they have a large set of control mechanisms to do so, (Evans, Hagiu, & Schmalensee, 2006) including data-driven technologies, such as algorithmic recommendation and reputation metrics, gatekeeping, and exclusion from the ecosystem (Curchod, et al., 2019).

Platform governance also sustains the power asymmetry between owner and PDEs. The ultimate source of a platform's power is its ownership of a digital "space" and within this digital space, the owner has the right to set and change any parameter—barring violation of the law. This power is expressed in two ways:

First, there are the "hard" technical components that are the core of the platform. These include the data, algorithms and boundary resources provided, including software development kits (SDKs) and APIs. These frame actions, e.g., only a video with such-and-such specifications can be uploaded on YouTube, etc. (Ghazawneh & Henfridsson 2013; Eaton et al., 2015), or only particular types of data can be inputted to or extracted from the platform. To illustrate, before 2016 Uber did not include a timer (hard-coded in the driver's app) that counted down the five minutes a driver had to wait before being able to leave and collect the cancellation fee. Prior to including the timer, the drivers had to estimate the time of their wait, because if they left and the tardy passenger complained, the driver might lose the cancellation fee particularly because Uber "recommended" that drivers wait ten minutes. The timer was only implemented for all Uber services after the Federal Trade Commission opened hearings on the matter (Rosenblatt, 2018: 120-121). Implementing the wait timer created transparency, which provided drivers with protection. In another case, as Rosenblatt (2018: 122-123) shows, in 2016 Uber implemented "up-front pricing",

which allowed a rider to know the price in advance. However, prior to up-front pricing a passenger could wait in the car and compare what they paid with what the driver received. With the new system, Uber instituted a delay so that the driver and rider could no longer make this comparison. These are simply anecdotal illustrations of the more general point, which is that the goals of a platform can be hard-wired into its technical components—and in each case, these software implementations were undertaken without discussion with the affected parties

Second, to operate effectively, many "soft" components, such as rules, principles of community, etc. are designed to channel and control the actions of the actors. These provide guidance on acceptable behavior that include types of content, legitimate action on the platform, etc. These soft components can be powerful because they are vague and thus provide broad parameters for platform action. The principles of community have often been reinterpreted to prohibit previously approved actions, such as, when YouTube demonetizes videos posted prior to the reinterpretation of its principles[6].

Quite simply, platforms can unilaterally set the terms of engagement for PDEs, and this power is intrinsic to platform design, technological architecture, and terms and conditions of use. Starkly put, platform users have two choices—accept the technical and contractual conditions or cease using the platform.[7]

4 Consequence of the power imbalance: Unique risks for PDEs

The power asymmetry at the crux of the owner-PDE relationship can be understood as an asymmetric distribution of dependence between the actors (Emerson, 1962). Although the platform-PDE relationship has some resemblance to other asymmetric inter-organizational relationships characterized by a strong power imbalance, such as those documented in the literature on global value chains (Gereffi, Humphrey, & Sturgeon, 2005; Katila, Rosenberger, & Eisenhardt, 2008; Yamin et al., 2015), the PDE relationship has the following features that make it fundamentally different.

First, despite the fact that imbalances in other inter-firm relationships are also predicated upon resources uniquely provided by a more powerful partner (Katila et al., 2008), traditional supplier relationships are better balanced. First, the supplier often has multiple channels from which they can select, prosaically, Walmart, Costco, and Target (Yamin et al., 2015). Due to winner-take-most dynamics in platform-based markets (Cennamo & Santalo, 2013), the platforms are often quasi-monopolies, leaving few alternatives for PDEs. To illustrate, Apple and Google account for 97% of the mobile operating system market share ex-China. Thus, alternatives are virtually non-existent even for large firms.

This extreme concentration results in the contractual obligations regulating the platform-PDE relationship differing markedly from the traditional supplier-buyer relationship. For nearly all platform users, the terms and conditions of participation are non-negotiable. Even powerful actors, such as Spotify, have found it nearly impossible to demand better terms from the Apple app store. Whereas a traditional supplier usually signs a long-term agreement that normally includes protections for both sides, the contracts signed with platforms invariably permit unilateral changes and with little or no notice. Such changes may alter the terms and conditions, various algorithms, website structure, and profit margins. PDEs can petition the platform to rescind or alter its decisions, and as Eaton et al. (2015) shown, the platform, may, at its own discretion, relent. Moreover, unless the contract violates the law, there is rarely any legal recourse. Finally, by its very nature, in contrast to supplier relationships, the transactions over the platform are not transactions with the platform.

Conceptualizing platform-dependent entrepreneurship as a unique power-dependence system allows a better understanding of the actions and outcomes for the actors involved. It is axiomatic that entrepreneurs face not only everyday business risk but also uncertainty (Schumpeter, 1942; Knight, 1921). However, entrepreneurs building a business on a platform face unique risks that emanate directly from the inherent nature of platforms and the power they wield over members of their ecosystem. For instance, as an intermediary, a platform separates PDEs from customers. Platform owners have the ability to enter into the market space of their PDEs and, immediately, benefit from deep visibility into their now competitor's business. The power-dependence asymmetry provides the platform with the ability to shift the competitive conditions in its favor and to overcome resistance to its actions, and appropriate more value from the member of its ecosystem. Due to the winner take most dynamics, alternatives decline or disappear. As a result, the terms of engagement shift decidedly in favor of the dominant platform.

4.1 Separation from Customers

The relationship between a seller and their customer is fundamental and vital for discovering customers' needs and benefiting from user-led innovation (von Hippel, 1988). Because the platform is the intermediary between the actors transacting on the platform, it is in the platform's interest to keep the sides estranged. As such, the platform channels all interactions through the platform and blocks attempts to circumvent this process. For example, transaction platforms, such as, Amazon, Booking.com, etc. resist sharing the customers' email addresses with PDEs. Pre- and post-sales interaction between the transaction parties are managed through anonymous alias email addresses. The PDEs thus depend upon the platform to maintain the con-

nection, and, if the PDE loses platform access, then customer access is also lost. To illustrate, YouTubers actively cultivate their community by interacting with their fans to build their followers. For example, when YouTube blocks a creator, they immediately lose access to their fan base and have no way of contacting them to alert them to the new "address". The motivation to maintain this separation is understandable. To illustrate, eBay uses machine learning to identify violations of its policy forbidding the exchange of contact information between buyers and sellers[8]. Separation from one's customers effectively ensures "ownership" of customers to the platform and disrupts PDE's relationship with them.

4.2 Algorithmic management: Ratings, rankings and recommendation systems

Digital platforms utilize algorithmic mechanisms to foster trust between anonymous parties[9], identify reliable vendors, aid in discovery, ensure standards compliance, limit opportunistic behavior, and reduce transaction uncertainty (Tadelis, 2016). In this regard, user-generated ratings and reviews are an essential feature of many platforms because they feed ranking systems that function as screening mechanisms. Review ratings directly influence customer preferences, as Luca (2011) found that a one-star increase in a Yelp rating led to a five to nine percent increase in a restaurant's revenue and visibility. Ranking systems have become vital, since they enable zero-cost trust creation, monitoring, and a conformity-enforcing mechanism (Ghose, Ipeirotis, & Li, 2014). Effectively, these ranking and review systems shape behavior (Orlikowski & Scott 2012).

Recommendation systems are often vital for platform operations. For example, to help customers discover what they might not find on their own due to the size of the markets, platforms provide personalized recommendation systems. While recommendation systems benefit customers by suggesting products or services tailored to their preferences, they also direct traffic, thus altering market visibility and user action. For PDEs, ranking and recommendation systems are both critical for success and perilous, as they are based on algorithms that can be changed unilaterally.

The algorithms and the data used to regulate rankings, recommendation and discovery are invariably opaque and constantly in flux (Orlikowski & Scott, 2014). For the platform owner, there is little incentive to provide transparency. As a result, PDEs can only speculate on what behavior will satisfy the algorithm. PDEs are thus embedded in a Kafkaesque system, not only of risk, but more seriously, profound uncertainty and vulnerability (Curchod et al. 2019). While algorithmically generated results are often accepted as objective, in fact, they express the platform's agenda. The algorithms and data upon which they work are opaque, and particularly, the changes in it can appear to be capricious (Scott & Orlikowski, 2012). To illustrate, scores

that determine rankings can include a variable that positively values the fact that the ranked firm advertises on the platform. The knowledge that advertising on the platform can affect discovery places great pressure on PDEs to purchase advertising, regardless of whether it provides actual benefits. Consequently, competing PDEs must bid until their profits are reduced to their lowest acceptable level.

4.3 Entry into the PDE's business

Market competition is an intrinsic risk for entrepreneurs. One fundamental risk that a PDE faces, particularly in the case of innovation platforms, is that the platform owner may decide to compete with them. This is particularly potent because, as we mentioned earlier, the owner has a panoptic perspective on all activities (Boudreau & Lakhani, 2009) and the ability to direct traffic towards its offering. The term "asymmetric information access" underappreciates this power (Shapiro & Varian, 1998). The case of Amazon illustrates the use of information to enter a PDE's market space. A former Amazon employee was quoted as saying that Amazon retained "the most valuable data for itself; provides less valuable data to marketplace sellers." The employee continued that the "most valuable info Amazon doesn't share is info about which people have searched for a particular product in the past." Should Amazon decide to enter a particular market niche, it can use this information to "target their private label products with perfect precision" (Capitol Forum, 2018). Although platform entrepreneurs can benefit from valuable information about their products/services (Eckhardt et al., 2018), they only have knowledge about customers that the platform deems beneficial to itself – and the information provided can change as terms and conditions change.

Digital platforms can survey activities on their platform and research market opportunities. With this knowledge, platforms decide whether there are benefits to introducing a targeted competitive product or integrating a specific functionality into the platform's own offerings. For example, Zhu and Liu (2018) showed that Amazon's entry patterns into market segments established by independent merchants targeted entrepreneurs that had high profit margins. This power was described by a former employee:

> Let's say Amazon wants to get into folders. I would find all of the ASINs [Amazon Standard Identification Number] that are being sold on the website now. I'd pull up the history. I'd look at the volumes, price points. Regardless of whether it was sold wholesale or third party, I'd pull it all together. I'd look and see what's the hottest product. What's the hottest variation in color? We'd have these folders in these colors at this price point, and we'd go off and make it ourselves. (Capitol Forum, 2018: 3)

Effectively, in this scenario, the most innovative entrepreneurs operate as scouts for the platform. PDEs innovated new businesses that the platform could then enter and capture, by using its better information and ability to manipulate the platform itself, thereby appropriating the innovator's rents. Alternatively, platforms could decide to raise the fees it charged to successful entrepreneurs to appropriate surpluses. Finally, in the absence of an adequate system of intellectual property protection, such as patents or copyright (Ceccagnoli et al., 2012), the platform can even expropriate the PDEs' businesses. For example, after Microsoft recognizing the potential for Netscape to be a new killer application, it destroyed the new entrant and its business model by bundling Internet Explorer into its operating system (Yoffie & Cusumano, 1998). In effect, Microsoft redesigned the Windows operating system platform to absorb the innovation developed by its ecosystem member, Netscape (Eisenmann et al., 2011).

As a direct consequence of its digital nature, platforms not only broker relationships, but also direct traffic and subsidize the adoption of its offerings, as Amazon has done very effectively. While not always successful in entering a complementor's business, platform owners have a remarkable array of tools to shift the competitive landscape in their favor. In a recent study, Wen and Zhu (2019, p. 16) found that Android app developers responded to Google's threat of market entry and subsequent competition by undertaking "no entry deterrence behavior, such as price reduction and additional innovation . . . [however,] because of the platform owner's power, its entry is unlikely to be deterred". Direct competition from the platform is not simply risk, but a new Knightian uncertainty regarding the defensibility of PDEs' innovations and businesses. Effectively, the Schumpeterian rents "guaranteed" to the successful innovator are at constant risks of appropriation by the platform.

4.4 Changing the terms of participation

For rational actors, market entry is determined through cost-benefit analysis, based upon an understanding of market rules. In a traditional business, the most salient terms of competition are leases; supplier, customer, and competitor relationships; and government regulation. In contrast, a PDE must agree to the platform's terms and conditions for participation (Tiwana, 2014). The key clause in these contracts is that any changes can be made unilaterally.

Changes in the terms of participation regard both the technical components and the rules of engagement. Core issues such as the interface of the platform or the division of revenue between the platform and PDE are decided solely by the platform owner. To illustrate, in fall 2018, eBay unilaterally announced a 12% increase in its commission fees in the Books, DVDs, and Movies categories, while removing the fee discount that eBay Store owners enjoyed[10], thereby directly affecting PDEs' profit margins. For self-published books, Amazon decided that for books priced between

$2.99 and $9.99, the author's share should be 70% of the retail download price. For those priced above or below this range, the share would only be 35%. In this case, authors and publishers' pressure to accept its pricing model, which presumably was the best price for Amazon's goals. Of course, this happens in the non-platform world also, but almost all supplier contracts have fixed terms, whereas the contracts between the platform and PDEs essentially operate as "spot" transactions, in that the terms can be modified at will by the platform.

Entrepreneurs conducting business in a physical store or through their own website are not vulnerable to these shocks. To illustrate, the entrepreneur's landlord cannot, upon seeing their tenant's success, unilaterally abrogate the lease and appropriate the business. Such terms of participation are of critical importance, as they directly affect the emancipatory promise of entrepreneurship (Rindova et al., 2009). In reality, this substantial difference in the terms of participation require surrendering many of the traditional attributes of being an entrepreneur.

4.5 Platform access and delisting

Platforms are private marketplaces and thus access is provided solely at the discretion of the owner. PDEs can be excluded from the platform for undesirable behavior (Evans, 2012), but exclusions can just as easily be "distorted away from pure value creation in the ecosystem towards actions that lead to higher platform profit" (Boudreau & Hagiu, 2009:8). Remarkably, the literature suggests that successful platform owners should be a neutral or, at least, a trusted party (Iansiti & Levien, 2004), perhaps, not recognizing that the owners are for-profit organizations. To illustrate, in return for Apple agreeing to sell on Amazon, the quid pro quo was that the unauthorized independent Apple resellers had their listings removed[11]. In this case, Amazon sacrificed its PDEs for the more valuable Apple account, thereby violating the assumption of neutrality. Paradoxically, the same mechanisms necessary to protect the ecosystem can be used to pursue other goals that advantage the platform.

Exclusion can occur without warning. Additionally, platforms are not required to provide reasons. For a PDE, the decision has immediate repercussions, as their income disappears. Further, the reasons given for suspension are invariably cryptic and platforms provide unclear criteria for adjudicating appeals. Even in the case of a successful appeal, PDEs does not return to status quo ante, as competitors will have displaced them in the rankings. In fact, unethical competitors can report fabricated infractions to the platform[12] (Luca & Zervas, 2016). Effectively, the possibility of delisting means that PDEs' entire business is at constant risk of disappearance. Moreover, the larger and more successful a PDE's business is, the greater the uncertainty and precariousness experienced (Curchod et al. 2019). Moreover, because, many of these platform markets are winner-take-most, there are few alternatives.

5 PDE responses: Power-balancing operations

As power-dependence theory suggests, the subordinate party will try to reduce the power disadvantage in the relationship through what Emerson (1962: 35) termed "balancing operations". Such actions are aimed at altering structural features of the power relationship by reducing the relevance of the resources exchanged and/or by identifying alternative valuable opportunities. Because, in most cases, complete exit is not a viable option due to the winner-take-most aspects of these markets, PDEs have developed responses aimed at mitigating their vulnerability (Kapoor & Agarwal, 2017; Wang & Miller, 2019; Wen & Zhu, 2019). Successfully operationalizing these strategies is difficult because they often challenge a platform's power over the ecosystem (Wen & Zhu, 2019; Wang & Miller, 2019). Thus, a platform's goal is to either stymie or co-opt the strategies discussed below.

5.1 Multihoming

Multihoming refers to a PDE offering a product or service on multiple platforms (Kenney & Pon, 2011), thereby increasing their alternatives (Wang & Miller 2019). There are three general types of multihoming. The first is the classical case, where a PDE operates through multiple platforms (Bresnahan, Orsini, & Yin, 2015). The second type of multihoming is where a PDE uses different channels, e.g., sells on a platform, operates its own website, and may even establish a physical shop (Wang & Miller, 2019). The final type of multihoming is the diversification of income sources discussed in the next section. Often, PDEs combine all three types of multihoming.

5.1.1 Platform multihoming

The costs of multihoming can vary dramatically (Cennamo, Ozalp and Kretschmer, 2018). For example, entrepreneurs selling products on Amazon can easily, with little investment, open a virtual store, listing the same products on the eBay or Etsy platforms. Similarly, for hotels, the costs of multihoming with different online travel agencies are low. In contrast, porting software from iOS to Android or vice versa is more expensive and technically difficult because products must be tailored to platform-specific infrastructure and design (Cennamo et al., 2018). To illustrate, when Snapchat's app update was ported from iPhone to Android, it was buggy, which had a powerful negative impact on revenues[13]. The fact that PDEs must customize their offerings to each platform's specifications is a powerful force for winner-take-most outcomes, as PDEs are unwilling to do so for large numbers of platforms. The decision to multihome is determined by weighing costs against the

potential market size (Bresnahan et al. 2015). For example, many PC game firms did not port their games to Apple Macs, as the market was so small that it was not economically justifiable.

Platforms discourage multihoming because it provides PDEs with alternative channels to the market. The tactics used to obstruct multihoming range from designing technological architecture in such a way as to increase the difficulty of multihoming (Cenammo et al. 2018) to prohibiting multihoming in the terms and conditions of the platform's use. Another method is to alter interfaces such as APIs to create incompatibilities, which Apple did to make iOS incompatible with Adobe Flash[14]. To discourage multihoming, platforms make it difficult or impossible for PDEs to inform their audience/customers that they offer the same or similar content on another platform. To illustrate, YouTube terminated the accounts of creators that used their YouTube videos to promote their streams on Twitch, a competitor platform[15]. In certain cases, platforms may recognize the growing power of key PDEs and provide incentives to retain them. Effectively, the possibility of multihoming actualizes a potential threat that PDEs will move their business to another platform.

5.1.2 Channel multihoming

PDEs may also change the balance of power by developing non-platform channels through which to transact. For example, in cases where PDEs and consumers can communicate with one another, it may be possible for them to disintermediate the platform for future transactions. With sufficient trust, PDEs can connect directly with their customers on an off-platform communication medium, thereby excluding the platform and sharing the savings from the platform's fees. Disintermediation is an existential threat not only because it eliminates platform owner's returns, but also because it removes the transactions from the ecosystem (Zhu & Iansiti, 2019). If successful and in sufficient numbers, disintermediation could create an alternative transaction ecosystem.

The two most prominent alternative channels for disintermediation are first, to establish their own website through which customers can purchase goods or services directly and second, to establish a physical store. For both of these strategies to work, a PDE must have the ability to attract traffic. Paradoxically, launching a new channel may include buying online advertising from Google or Facebook platforms to attract customers in the hopes of retaining them for repeated transactions. Another strategy is to use platforms such as the Amazon Marketplace as a marketing platform to connect with potential customers in the hopes that later they can be directed to one's own website. Developing another channel requires greater investment, and it can be initiated only after establishing that there is a market for the product or service outside the platform. Still, it reduces PDEs' dependence upon the platform.

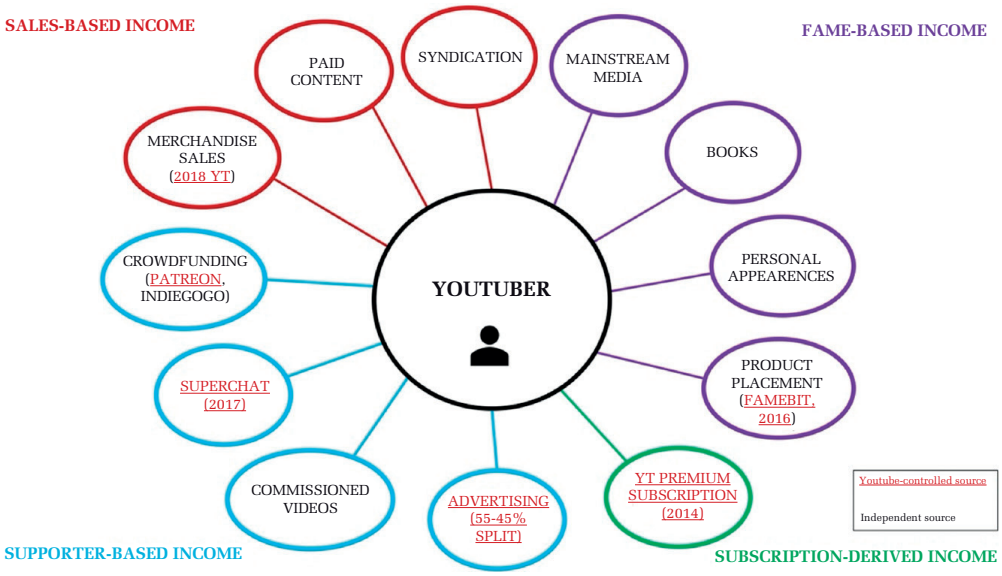
Multi-platform and multi-channel homing provides PDEs with greater market stability and the ability to resist unwelcome changes by the focal platform. Of course, the effectiveness of multiplatform homing can be limited by the lack of alternative platforms. If a PDE is able to attract customers to its own website, then it can increase control and revenue predictability, decrease payments to a platform, and reestablish the ability to interact directly with and learn from one's customers/followers. However, even with an independent website, discoverability continues to be subject to Google Search or influencer recommendations.

5.2 Income diversification

Income diversification is another strategy to mitigate platform power. If extremely successful, off-platform income can increase to the extent that a PDE can leave the platform entirely. On influencer platforms such as YouTube, Instagram, and Pinterest, where a successful PDE can build a large following, they can leverage their fame to create extra-platform income sources. For YouTubers, the direct platform income is a share of advertising revenue. However, because of their strong relationship and direct interaction with users, they can "influence" their audience and generate income from a variety of sources, including but not limited to: personal appearances, merchandise sales, in-video product placements, donations, subscriptions to premium content such as classes, and many other innovative schemes. Income diversification is easier for PDEs in content-based platforms, such as Instagram, Pinterest, or Facebook, since they can grow and leverage their status as public figures. On other platforms, mainly transaction platforms, such as app stores or Etsy, there are far fewer ways to generate an alternative income stream.

Not surprisingly, there can be a tension between PDEs seeking to diversify their income streams and the platforms, which aim to increase their own income and maintain control over their PDEs. Figure 2 summarizes the dialogic evolution of YouTubers' source of income and YouTube attempts to capture either a portion of these alternative income or, at least, to direct it through the platform. For instance, in 2016, to better control sponsorships, YouTube acquired FameBit, a firm that connects creators with brand sponsorships. As part of YouTube, FameBit can provide more granular information about complementors.[16] Now, FameBit has an advantage over competitors and, more importantly, it allows the further "control" of the ability for YouTubers to develop income streams from brand sponsorships. In a similar vein, in 2017, YouTube removed the links YouTubers placed on their channel to direct viewers to their Patreon sites where they could contribute money[17]. As a way of diversifying their income and loosening the hold YouTube had on them, YouTubers contracted to third parties to fulfill their merchandise sales. In response, in 2018 YouTube began a program to introduce "approved" vendors that would fulfill the merchandise sold

Figure 2 YouTubers' income diversification strategies and YouTube ripostes



through channels. This permitted YouTube to gain insight into how much was being sold and to whom[18], and, since YouTube charged the approved vendor a fee, to also increase both its income and its control over the platform-dependent YouTubers.

5.3 Collective action

Collective action is a type of coalition formation (Emerson, 1962) aimed at increasing PDEs' power versus the platform owner. Of course, organizing collective action can be difficult because often, the "public spaces" where PDEs interact are owned by the platform. One mild and unthreatening form is to participate in user forums of various types where PDEs exchange advice and support, and share their experiences (Kuhn & Galloway, 2015). The platforms themselves sponsor these user forums that, unsurprisingly, are not oppositional in nature.

Independent PDE-oriented websites can be venues not only for discussion but also to express grievances. In a number of cases, these have become focal points where resistance to specific changes in platform governance has coalesced. Thus far, most collective action has centered on complaints regarding changes in the terms and conditions[19], and, in certain cases, the platforms have rescinded the changes (Eaton et al., 2015). Such reversals often quell dissent among the PDEs.

There have been cases of more robust collective action, such as the collective withholding of products and services. In November 2018, AbeBooks (owned by Amazon) banned several antiquarian booksellers because their countries did not have acceptable banking institutions for payments. In solidarity with their competitors, hundreds of booksellers removed their listings, and AbeBooks reversed its decision[20]. In this case, the PDEs had alternative market channels and a strong, shared occupational identity that increased solidarity. In July 2019, a German group of YouTubers created a labor organization named "FairTube" and affiliated with IG Metall, the largest German union. Their demands were for YouTube to set up an appeal process that was overseen by a third-party council and provided human contacts for disputes and better explanations about violations, so YouTubers could better understand the decision-making process[21]. While Google agreed to discuss some issues with the organizers of FairTube, it refused to negotiate changes in compensation etc. Collective action can be successful in reversing in changes, though it is more frequent that the platform expresses understanding of the objections by the PDEs but does not reverse the changes.

5.4 Government action

The relationship between a platform and its PDEs is largely within the province of contract law. For this reason, there has been comparatively little litigation by PDEs, as agreed to the terms and conditions when they joined the platform voluntarily and are free to leave. More recently, competition authorities in the European Union have investigated and fined platforms for legal violations. Though Amazon Marketplace has drawn interest from legal scholars and the popular press, most actions, thus far, have not recognized that these vulnerabilities are condition all PDEs experience. Government entry as an additional actor in the PDE-platform relationship could mitigate the dependence of PDEs. To illustrate, small Indian retailers successfully pressured the government to promulgate new rules that make it difficult for retail platforms, such as Amazon and Walmart-owned Flipkart, to sell directly to consumers and operate an online marketplace at the same time[22]. Such actions can prevent a platform from competing directly with its complementors. How far government action will go to change the relationship between platforms and PDEs is uncertain given the current US political debates about platform power.

6 Discussion

Platform ecosystems represent a novel context for entrepreneurship, with peculiar dynamics that contribute to shaping entrepreneurial processes and outcomes. To date, research has mostly focused on platform firms and how they might create an

ecosystem and achieve lock-in. Entrepreneurship scholars have principally concentrated and theorized upon how unique affordances of the digital technologies affect entrepreneurship (Nambisan, 2017; von Briel et al., 2018).

In preponderance of the platform and entrepreneurship literature, the relationship between platforms and PDEs as joint ecosystem members is conceptualized in terms of commensalism or mutual benefit. This is a valid but limited perspective. With very few exceptions, commensalism misses a key aspect of this relationship—unequal power between the platform owner and the PDEs. This component should be more clearly recognized in entrepreneurship research on platform-defined markets (see, for example, Nambisan & Baron 2019).

Our analysis is a first step in this direction, as we show how this power imbalance makes platform entrepreneurship substantially different from traditional forms of entrepreneurship. For PDEs, platforms have a contradictory character. New entrants experience a more balanced power-dependence relationship, as the platform owner offers many resources that can allow PDEs to enter the market rapidly and at low cost (Ghazawneh & Henfridsson 2013; Yoffie & Kwak, 2016). In comparison to traditional entrepreneurs, PDEs benefit from a larger population of potential customers, lower entry costs and investment risk in the initial phase of their business. To illustrate, the costs of uploading to YouTube, listing an object on eBay or Amazon, or placing an app in the Apple App Store are trivial. Therefore, new entrants can experiment with part-time activities. In fact, many YouTubers began in their bedroom or dorm room and eBay sellers began by selling miscellaneous items from their home.

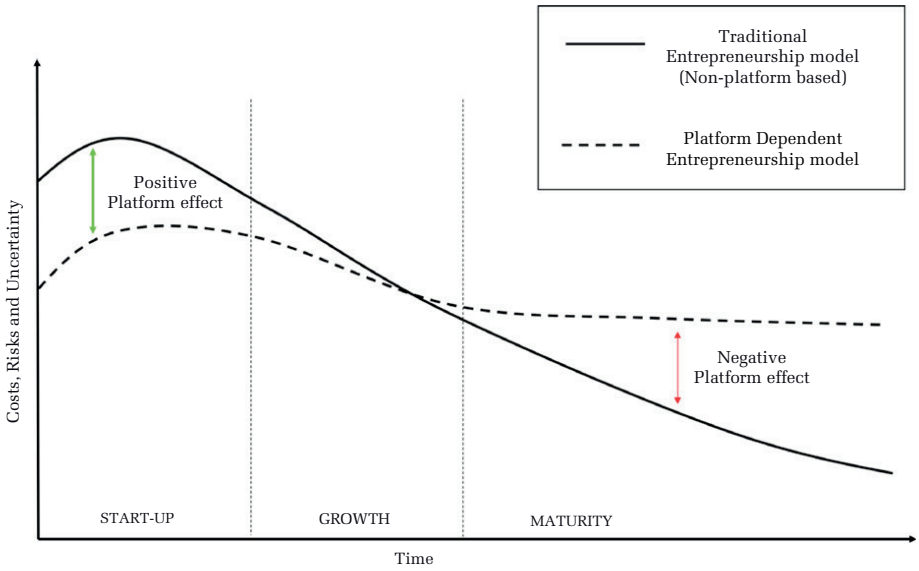
When a PDE's business grows on the platform, the platform's modular infrastructure and boundary resources allow it to scale up at little cost. Platforms may offer PDEs incentives to do so, as successful PDEs create more value for platforms. Whereas a traditional business must invest in infrastructure to meet the demands of growth, a PDE does not need to invest as much because most of the infrastructure is provided by the platform. The platform handles many of the technical and functional issues associated with growth (Ceccagnoli et al., 2012), which is quite important for small businesses, as they are particularly resource-constrained.

As the business matures, growing lock-in effect emerges due to the asset-specificity and lack of portability of the cumulative investment in building their reputation and ranking, transaction history, and ecosystem understanding. In addition, given the winner takes most features of digital platform markets, the PDE's dependence upon the platform increases as the availability of viable business alternatives outside the platform decreases. Mirroring Emerson's argument (1962), as the platform grows and matures, power asymmetries increase while the importance of the individual entrepreneur decreases. Under these circumstances, the incentives provided have a contradictory effect as they reinforce the power imbalance and unique risks emanate from the platform's actions and decisions.

It is possible to illustrate the differences in risk between an entrepreneur establishing an online as opposed to a traditional business. As Figure 3 shows, in comparison to traditional entrepreneurship, platform-dependent entrepreneurship is initially very attractive to entrepreneurs due to the Positive Platform Effect discussed extensively in the literature (Nambisan, 2017; Eckhardt et al., 2018). In the startup phase, the traditional entrepreneur experiences greater difficulty and higher costs of entry because they must secure access to resources and customers. In contrast, PDEs receive these and benefit during their growth phase, as the platform supports scale-up. In contrast, as the traditional entrepreneur's business grows, it owns tangible and intangible assets such as reputation and customers. Thus, it is not as vulnerable to unilateral decisions by another party.

The Negative Platform Effect has received substantially less attention. This effect reflects the novel components of risk that originate from the platform's power over PDEs and strengthens as the platform becomes dominant in a particular market. Entrepreneurship and building a business has always been fraught with risk. Dependence upon a platform, however increases not only risk, but also actually creates a new source of Knightian uncertainty. PDEs' pervasive precarity stems from the fact that this unknowable future distribution of risk extends to the basic tools for doing business, as platform owners can control access to customers, prices, and profit margins—and thereby, the survival of the business. Paradoxically, as the PDE grows,

Figure 3 The different risk profiles of a traditional versus a Platform-Dependent Entrepreneurial firm over Time



while traditional risks may decrease, other things being equal, their dependence and insecurity upon the platform remains—and, in cases of great success, may increase. Successful businesses may in fact become a target for the platform to envelope or for increased usage fees, unless they take actions to build alternatives.

Platform-dependent businesses challenge a number of the key assumptions about competition and value appropriation. For today's entrepreneurs, it is vital to develop a business model that leverages the resources and customers available from a platform to build one's business, while also mitigating the platform's control over that business. PDEs actively implement responses aimed at weakening a platform's grip, by altering the structure of the relationship. Yet, actions meant to counterbalance platform power may be difficult to implement or costly, especially for smaller firms with fewer capabilities (Cennamo et al., 2018).

6.1 Implications for policy-makers

With regard to their ecosystems, platforms are essentially private regulators—a reality that has important policy implications. Not surprisingly, due to their growing and ever more apparent power, platform firms are facing increasing public criticism and regulatory scrutiny. To date, most attention has been directed toward macro-level, anti-competitive dynamics such as the impacts upon public opinion formation, consumers, and data privacy (Furman et al. 2019; Khan, 2016). While all valid concerns, we suggest that governments have not fully grasped how platforms are reshaping the playing field upon which competition and entrepreneurship takes place. Policy-makers have focused less upon the micro-level relationships between platforms and PDEs. Yet, this is where platform power is expressed.

One solution commonly advocated is to dismantle these platforms. Such action should be undertaken with care, as these platforms are also the source of income and livelihoods for an enormous number of entrepreneurs and provide consumers with great variety at attractive prices. Incremental, government regulation could perhaps address the terms and conditions of contracts between PDEs and platforms to ensure that they are not too one-sided. For example, the government could require a reasonable advance notification for any fee and sales commission changes. Delisting or demonetization due to changes in policy should require advance warning and an approved adjudication process. Addressing these terms-and-conditions-related issues could reduce the precarity experienced by PDEs, while not destroying the social benefits that platforms bring.

Policy makers are increasingly considering the implications of platform power. For example, the Indian government recently required Amazon and the Walmart-owned Flipkart to choose between being online retailers and sales platforms to eliminate unfair competition between panoptic platform retailers and PDEs, the compe-

tition authorities in the European Union have undertaken a wide variety of actions related to the largest platforms. These include imposing large fines on Google; first, in 2017, for favoring its own shopping website over competitors in its search results, and again, in 2018, for requiring that its apps be pre-installed on Android.

In order to support PDEs to redress power over platforms, in 2019, the European Commission issued a set of rules meant to ensure a "fair, transparent and predictable business environment for smaller businesses and traders on online platforms" (European Commission, 2018, 2019). This EU rule making aimed to alter the terms and conditions set forth in the contracts that PDEs agree to when they join a platform. In 2019, the European Union (2019) enacted a regulation whose explicit goals were to redress the power imbalance by mandating greater transparency and explicit procedures through which the PDEs can file grievances. This initiative and the accompanying regulation, while recognizing the benefits that platforms produce, sets forth a number of requirements regarding the relationship between the platform and the businesses dependent upon it. For example, the 2019 regulation mandates than any major change in the contract between the platform and the PDE requires the provision of 15 days' notice. Platforms are further required to develop transparent dispute-settling mechanisms that businesses selling through a platform can utilize. Moreover, the platform must allow those selling on the platform to have direct contact with their customers, thereby creating an opening to increase direct sales. Finally, the EU regulation requires that platforms provide an account of the main factors used in their online ranking systems and provide advance notice regarding any major changes in such systems. These changes suggest that in Europe the power imbalances that we have identified may be ameliorated, at least, to a certain degree. These European changes also provide openings for future research that can treat the changes as a quasi- experimental setting for understanding the impacts of regulatory changes on PDEs' conditions.

Regulators could promote policies aimed at reducing PDEs' dependence on a single platform. One powerful strategy is to limit platforms' ability to hinder multihoming, thereby increasing competitiveness. If PDEs were more easily able to transfer their businesses to another platform, it would facilitate the entry of new competitive platforms. Currently, most regulatory and antitrust activity is conducted by existing agencies. It might be possible to establish a Platform Competition Authority, whose role would be to investigate PDE complaints and establish a body of regulations aimed at ensuring the viability and health of platform ecosystems.

Governments could also change laws to allow the formation of trade associations or even unions to represent PDEs; something that is currently illegal in US law, as PDEs are treated as independent businesses and not employees. Unfortunately, under current antitrust law because PDEs are businesses this might be seen as forming a cartel and illegally restraining trade. Already, organizations such as the Online Merchants Guild for Amazon merchants and the YouTubers Union formed

in Germany for YouTube content creators have emerged[23], but they still lack adequate policy support.

Responses that are more radical could be the formation of stakeholder councils that include the various sides of a platform. For example, councils at YouTube would include representatives of the creators, advertisers, and viewers and councils at Amazon Marketplace would be composed of spokespersons for buyers and vendors. These councils could discuss the implications of major changes on the platform and consider how they would affect ecosystem members. Finally, there has been discussion of forming platform cooperatives, which would create non-profit platforms that operate for the benefit of all stakeholders (Scholz, 2016). An economy, within which platforms are becoming increasingly powerful private regulators, requires the development of novel and innovative regulatory institutions, so that we may continue to reap the benefits of platform-organized markets while ensuring that ecosystem members and the public interest are considered.

6.2 Future Research Directions

The sheer number of PDEs means that entrepreneurship studies must acknowledge their growing relevance in the global economic landscape. Platform-dependent entrepreneurship differs fundamentally from traditional entrepreneurship due to the power asymmetries that define the relationship between PDEs and platform firms. Unraveling the unique risks entrepreneurs face amid powerful platforms lays the groundwork for future research exploring entrepreneurs' platform dependency in greater depth.

We identify several research questions that deserve further attention and we develop a future research agenda around three main area of analysis: the experience of PDEs, the interaction between PDEs and platforms, and the broader implications of this dependence for entrepreneurship in the economy.

6.2.1 The experiences of PDEs

Far more studies are needed on the risks deriving from this power imbalance and on PDEs' strategies to ameliorate them. Competitive dynamics in digital platform markets have peculiar and distinctive features, but managerial scholars have mostly embraced the platform's perspective (Cennamo, 2019; Cusumano et al., 2019). How can PDEs develop and combine strategies to mitigate risks and capture a larger share of the value they create (Wang & Miller, 2019; Wen & Zhu, 2019)? In section 6, we listed many of these strategies, but we do not know which ones are the most effective, under what conditions can an PDE implement them, and, as importantly, the strategies that a platform can use to respond.

Another important research area explores the cost of dependence for PDEs. Further research could develop a more nuanced understanding of how PDEs cope with pervasive uncertainty and the consequent stress, anxiety and precarity that are evident in their accounts of working on a platform (Nambisan & Baron, 2019; Curchod et al., 2019). For example, in exploring the experiences of independent workers in the gig economy, Petriglieri, Ashford & Wrzesniewski (2019) describe how individuals cultivate connections with routines, places, people and broader purposes to deal with the emotional tension of their precarious working conditions. What tactics that make PDEs more resilient?

A related avenue for future studies is the rise of virtual communities of PDEs that offer support and resources to members (Kuhn & Galloway, 2015). Digital entrepreneurship has contributed to an increased distribution of entrepreneurial agency. Investigating how the interplay between competition and cooperation is affected by dependence is a fascinating area for future research.

6.2.2 Interactions between PDEs and platforms

Management of the PDE-platform relationship is essential for the success of both. Platforms offer PDEs easily accessible resources for easy market entry and, if successful, rapid growth. Yet, PDEs face the possibility that a platform firm will change the conditions for success at any moment, potentially without warning or recourse. This means that as entrepreneurs build their business on a platform, they become dependent upon the platform's actions, which are oriented in a balance between sustaining or growing their ecosystem and their own profits.

This paper is a discussion of the general case, and many differences exist due to the remarkable variety of PDEs. Nonetheless, power-dependency is a fundamental constitutive element of the relationship between the platform and its PDEs. Whether PDEs are larger venture capital-financed firms, individuals, and even established businesses transitioning to selling through a platform, their structural position ensures that will experience dependency. Of course, the PDEs' own resources and capabilities affect the degree of dependence (Eaton et al., 2015). For example, in 2017, after a long resistance to selling directly through Amazon, Nike joined the Amazon platform. Because of its market power, Nike was able to negotiate an arrangement with Amazon by which sales from unlicensed Nike distributors and those of knockoff items being sold by third-party sellers would end. In 2019, Nike withdrew from the relationship because it felt that Amazon did not fulfill the agreement and renewed efforts to sell to consumers directly through the Nike website[24]. This example shows how compelling Amazon was, but also the fact that the platform-PDE relationship was so onerous that Nike decided it was better to terminate the relationship. Our work sets the bases for future theorizing on the peculiar features and circumstances

that make PDEs more or less dependent upon the platform owner. Identifying the dimensions and their relationships that define the degrees of dependence is a fruitful direction for future entrepreneurship research.

Based on the implications we highlighted, to what extent do entrepreneurs anticipate their dependency when designing business models and strategies for the platform economy and how does this influence their actions? Although digital platforms allow for experimentation with new technologies and business models (Nambisan, 2017; Eckhardt et al., 2018), future research could examine PDEs' degrees of freedom in developing their businesses when platforms can easily identify those creating Schumpeterian rents and attempt to capture those rewards.

It is also important to explore how dependence evolves during the platforms' lifecycle. In order to achieve and maintain a dominant position, platforms owners need to actively and strategically manage the interaction with their complementors over time (McIntyre, Srinivasan, & Chintakananda, 2020), and PDEs will almost certainly face greater demands and higher risks as power asymmetry becomes greater in the later stage of a platform's lifecycle. Rietveld, Ploog, & Nieborgoffer (2020) provide empirical evidence of the increasing costs borne by PDEs when a platform gains dominance, showing that a dominant market position shifts platforms' governance strategy towards profit maximization, and, as a consequence, the value captured by PDEs decreases significantly. The proliferation of user forums where PDEs share and discuss issues (Kuhn & Galloway, 2015) offers a fruitful avenue to further investigate this question empirically, by exploring how PDEs engage with different problems at different stages of a platform's lifecycle.

7 Conclusion

In 2020, platforms are becoming the infrastructure of economy and therefore the context within which entrepreneurship takes place. Launching a new business today requires almost certainly a social media strategy, using online advertising, and deciding whether to offer one's good or service through a platform. We showed that many tenets of traditional notions of entrepreneurship are no longer valid in situations where the entrepreneur depends upon a powerful online digital platform. Paradoxically, this is true despite and because of the fact that the initial investment and risk of establishing a business decreased due to the many resources platforms provide. And yet, building one's business on a platform means facing new dimensions of uncertainty. In particular, platforms are in a powerful position to, in Teece's terminology (2017), "sense" and "seize" the rents that normally accrue to innovators and entrepreneurs. Ultimately, this is because PDEs have no control or little influence over the actions and strategies of platform owners. In fact, in most cases, the can only speculate as to the reasons behind many of changes they experience.

Entrepreneurship education must recognize and incorporate lessons on how entrepreneurs can navigate and manage this new world of affordances and uncertainty. Students must be provided with the knowledge and skills to understand the pitfalls and consequences of their platform-related decisions and have plans to mitigate their dependence. It is vital to increase the awareness among potential entrepreneurs of the paradoxes inherent in building a business on a platform. Platforms are part of the context for entrepreneurship and tools to be used by entreprenerus. To illustrate, an entrepreneur can use Amazon as a marketing forum, while directing repeat consumers to one's own website. Entrepreneurship pedagogy should include case studies to build awareness of alternative strategies, whereby the platform is a resource to achieve the independence that is the promise of entrepreneurship.

We have argued that the fundamental tenets of market capitalism and traditional Schumpeterian notions of entrepreneurship may no longer be valid in the markets where platforms are increasingly powerful. To what extent do we need new theories to understand platform-dependent entrepreneurship? The emergence of platform economy challenges the traditional and iconic vision of entrepreneurial agency, independence, and mastery of one's own destiny. In this environment the "emancipatory potential of entrepreneurship" (Rindova et al., 2009) is threatened by the new risks and multi-dimensional uncertainty that we have chronicled. It is vital for entrepreneurship, strategy, and organizational behavior researchers to better explicate how the platform firms are fundamentally shifting the context for entrepreneurial agency and strategic action.

Endnotes

[1] Our definition of platform-dependent entrepreneurs evokes a long-standing debate about who should be considered an entrepreneur (Shane & Venkataraman, 2000). We use the term platform-dependent entrepreneur to indicate individuals or existing organizations entering a platform market. In this regard, platform-dependent entrepreneurship is an inclusive concept that incorporates different entrepreneurial expressions that include app developers on the Apple store, individuals selling on Amazon, but also Instagram influencers and YouTubers. By doing so, we respond to Aldrich & Reuf's (2018) call for a more comprehensive perspective in entrepreneurship research.

[2] For a detailed analysis of users' lock-in in digital businesses see Amit and Zott (2001). The authors focus on the consumers' side, but similar considerations can be made for producers. It is important to note the consumers and producers lock-in is directly linked and further magnified by the presence of indirect network effects (Parker & Van Alstyne, 2005)

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[9] In China, one of the most important elements for Alibaba's success was that it overcame a generalized distrust of strangers, by introducing an escrow system in which the buyer would place the money in escrow with Alibaba that would only release it when the buyer signaled that the transaction was satisfactorily completed (Yu & Shen 2015).

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