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# Platform-Dependent Entrepreneurs as Private Regulators in the Platform Economy

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**The Emergence of Platform-Dependent Entrepreneurs: Power Asymmetries, Risk, and Uncertainty**


ABSTRACT

Digital platform firms are among the most valuable in the world due, in large part, to the ecosystems of complementors that have emerged around them. We explore the contradictory impact that platforms have on entrepreneurship. The ecosystem metaphor used to describe the network of interdependence among the members is intrinsically flawed because it obscures the power of the platform owners. In fact, complementors are platform-dependent entrepreneurs whose businesses and existence are largely determined by the platform owner. We show that digital platforms ease entrepreneurial entry by lowering entry costs and providing boundary resources to attract and support complementors. Yet businesses dependent upon digital platforms are precarious. The reasons for this precariousness include the visibility that platform owners have over all participants and the ability to unilaterally change the terms and conditions of participation, even become a direct competitor to entrepreneurs who are dependent upon the platform. We discuss the strategies that PDEs can use to mitigate their dependence. We suggest that the relegation of entrepreneurs to dependence requires a new way of thinking about entrepreneurship as the platform economy continues to become more central to the global economy.

## 1. Introduction

At least since Joseph Schumpeter, it has been recognized that entrepreneurs discover and create opportunities and build new independent firms (Alvarez & Barney, 2007; Audretsch, 2007). More recently, scholars such as Brynjolffson and McAfee (2014) have hailed entrepreneurship as a vital response to the increasing concerns about digitization's impact on the future of work. Academics studying platforms have emphasized the importance of platform complementors in providing variety and innovation to generate a platform's "ecosystem" (Boudreau & Lakhani, 2009; Parker et al., 2016). While recognizing the tremendous new business opportunities created by online platforms, we differ from many others in arguing that enterprises dependent upon a platform are not independent, in the traditional sense, but, rather, can be better understood as "platform-dependent entrepreneurs (PDEs)." We explore the profound impact that the "platform economy" (Kenney and Zysman 2016; 2018) has upon the enormous number and variety of entrepreneurs (Aldrich & Ruef, 2018).

The economic centrality of platforms heralds a new reality for entrepreneurs. Digital platforms such as Amazon, eBay, Etsy, Google search and advertising, Instagram, and YouTube make it easier than ever for entrepreneurs to build a business and generate income. Yet, for entrepreneurs building businesses on the platform—that is, the "complementors"—any misstep, many of which can be identified by the all-seeing algorithms, can lead to summary judgment followed by Kafkaesque adjudication. Today, both entrepreneurs and existing businesses must navigate a world in which customers want to make their purchases online, so an online presence is necessary. As a result, participation in a platform's ecosystem has become vital for their existence and growth (Kenney & Zysman, 2016; Parker et al., 2016).

The broad shift in business-to-consumer activity online has led to a fundamental alteration in power, to the point that the digital platforms intermediating economy activity have transformed the market. As a result, the economy is being (re)structured by platform firms. Entire constellations of producers, sellers, and even specialized service providers have emerged around the largest platforms. Even firms that are not directly selling through a digital platform are affected by online services such as Google search and ranking algorithms, to the point that for many firms, not appearing in Google search results is tantamount to nonexistence. The importance of being discovered and well-ranked on Google's search results has resulted in the enormous business of search engine optimization, which… In large measure, the study of the impacts of platforms has concentrated on labor platforms, such as Uber (e.g., Berg and Johnston 2019; Cramer & Krueger, 2016) or Upwork (Popiel, 2017), crowdfunding (Sorenson et al., 2016), and retail (Khan, 2016). Despite its transformative impact, the implications on entrepreneurs has been studied less (for a few exceptions, see Nambisan, 2017; Sussan & Acs, 2017; Autio et al., 2018). Of course, platforms such as Amazon, eBay, Etsy, Facebook, Google, Lyft, and Uber are the result of venture capital–funded entrepreneurs. However, as Aldrich and Ruef (2018) demonstrate, these venture capital–financed entrepreneurial successes make up only a fraction of all entrepreneurial activity. Whereas studies have been conducted regarding the impact of digital platforms on entrepreneurs and the entrepreneurial process, most have been laudatory or have not considered the implications for businesses that have become dependent upon the platform.

This article explores the contradictory impact of platforms on entrepreneurship (Nambisan, 2017; von Briel et al., 2018; Autio et al., 2018). We show that the entrepreneurial process, which is already characterized by high risk, is both eased and made more precarious by being dependent upon a platform. The precarity is increased as the venture is vulnerable to unilateral, often irresistible, and difficult to appeal decisions made by platform owners. PDEs face not only risk that is incalculable as the platform has godlike powers ranging from complete visibility into the dependent entrepreneur's business to an

ability to unilaterally change the terms of participation, up to suspension and removal from the platform, which results in a loss of any and all equity that the entrepreneur has created (Zuboff 2019). As a result, PDEs suffer not only the normal risks and anxiety that come with building a firm but a new type of risk due to their dependence upon the platform. To understand the PDE, it is necessary to explore the pitfalls of using the "ecosystem" metaphor to describe the economic space created for complementors.

The paper begins by defining platforms and discussing their role in entrepreneurship. We then critique the ecosystem metaphor as problematic for understanding the relationship between the platform and its complementors, though, for lack of a better term, we continue to use "ecosystem" and "complementors." Section 4 describes the resources that the platform provides to members of its ecosystem and sets the bases for unraveling their dependence. Section 5 introduces the concept of PDEs and describes the powers that the platform owner wields over those in the ecosystem, arguing that entrepreneurship in such an environment is fundamentally different than normal concepts of entrepreneurship. In section 6, we describe some of the strategies that PDEs have developed to resist platform power. The discussion and conclusion explore the implications of our results for understanding entrepreneurship today.

## 2. Entrepreneurs and Platforms

Platforms have been defined in a variety of ways (Baldwin & Woodward, 2009; Parker et al. 2016; Evans et al. 2006). We adopt Gawer's (2014, p. 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." Our discussion is confined to online software platforms because they have powerful generative potential—that is, they enable the creation of new output, structure, or behavior,

often without direct input from the system originator (Zittrain 2008). This is accomplished by the provision to platform users of various social and technical boundary resources (Ghazawneh & Henfridsson 2013) that attract complementors to join and thereby constitute its ecosystem (Jacobides et al. 2018). Although it is true that complementors join a platform's ecosystems for various reasons (Boudreau & Jeppesen, 2015; Jeppesen & Frederiksen, 2006), the contributors of interest to us are those who do so with entrepreneurial intent.

Digital platforms facilitate and simultaneously shape the emergence of novel entrepreneurial opportunities. When conceptualizing the emergence of entrepreneurial opportunity, it is important to consider the role of contextual elements or enablers such as "single, distinct, external circumstances, which—by affecting supply, demand, costs, prices or payoff structures—can play an essential role in eliciting and/or enabling a variety of venture development attempts" (Davidsson, 2015, p. 684). Although contextual elements operate at the environmental level and can be actor independent, particular actors often influence or even have a central role as external enablers (Davidsson, 2015). By orchestrating entire ecosystems of value creation and exchange (Nambisan, 2017) and by providing resources for various stages of the entrepreneurial process (von Briel, Davidsson, & Recker, 2018), digital platforms not only are external enablers but also open new spaces where entrepreneurs can create new firms.[1] Effectively, they become the context for entrepreneurial activity.

Platform-based entrepreneurs may deviate from the stereotypical Silicon Valley high-growth startups and are often more mundane retail or service businesses (Barley, Bechky, & Milliken, 2017). They have great variety: opening a knitwear shop on Etsy, eBay, or Amazon, creating a YouTube channel, writing apps, creating a reselling business on Amazon, starting a business based on Google

[1] Joseph Schumpeter theorized that new technologies or other market changes could open new economics spaces to be occupied by entrepreneurs who construct new business models capable of exploiting the opportunities.

advertisement referrals are only some of the types of businesses that can be established on a digital platform (Haefliger, Jäger, & Von Krogh, 2010; Keinan et al. 2015; Kim, 2018). The enormous population of PDEs have received far less attention, as scholars have focused on the platforms. This relative lack of attention is noteworthy considering the sheer number of these entrepreneurs (Table 1 shows the number of entrepreneurs operating on the major platforms).

Table 1: Largest Transaction Platforms and Estimated Revenue of Ecosystem Complementors

| **Platform** | **Date established** | **Description or major activity** | **Revenue 2017/18** | **Number of entrepreneurs 2017/18** | **Source** |
|---|---|---|---|---|---|
| Apple iOS/App Store | 2008 | Marketplace | $46.6 billion | 2 million apps | Wikipedia |
| Amazon* | 1995 | Marketplace | $42.8 billion | About 100,000 sell more than $100,000 per year, 2 million total | https://www.entrepreneur.com/article/303532/ |
| Google Play | 2008 | Marketplace | $24.8 billion | 2.7 million apps | Wikipedia |
| eBay | 1995 | Marketplace | $10.7 billion | 6.7 million merchants in US, 2017; 25 million globally, 2018 | https://expandedramblings.com/index.php/ebay-stats/, https://smallbiztrends.com/2018/03/ebay-statistics-march-2018.html |
| YouTube | 2005 | Video sharing | $8.2 billion | 40,000 full-time creators, 12 million channels | https://medium.com/@Morjax/how-many-youtube-creators-could-be-full-time-6ecd1636bfc1/ |
| Etsy | 2005 | Marketplace | $3.9 billion | >2 million active merchants | https://investors.etsy.com/~/media/Files/E/Etsy-IR/annual-report-proxy-materials/etsy-ar2017.pdf |
| Shopify | 2004 | Software for online sales | $673 million | 600,000 merchants | https://en.wikipedia.org/wiki/Shopify/ |
| Instagram | 2010 | Video Sharing social media | N/A | 25 million active business accounts | https://techcrunch.com/2017/11/30/instagram-25-million-business-profiles/ |
| Amazon Publishing | 2007 | Marketplace | N/A | 639,149, in quarters 2, 3, and 4 in 2017 that sold at least one book | http://authorearnings.com/report/january-2018-report-us-online-book-sales-q2-q4-2017/#comment-299004/ |

* Amazon Marketplace third-party revenue

The preponderance of research on entrepreneurship focuses on extraordinary firms that are described as *gazelles* and *unicorns*, rather than studying the far more common, ordinary entrepreneurs (Aldrich & Reuf 2018). The dearth of research on entrepreneurs on digital platforms is even more problematic considering that essentially all entrepreneurship today is predicated upon being in a platform ecosystem. For example, the sale of consumer goods has been transformed by Amazon. Amazon and other digital platforms are where consumers learn about and search for goods (Dennis 2017). The growing centrality of platforms is evidenced by the need for even the most powerful established brands to establish a presence on Amazon: Nike had resisted selling through Amazon in part out of fear of undercutting their existing vendors, but in 2018, Nike capitulated and opened a small shop on Amazon (Galloway, 2018; Kelley, 2018).

To appreciate the impact of the platform economy, it is important to explore how entrepreneurial activity changes in the context of a platform ecosystem. The character of entrepreneurship depends on the context, which has its own rules, threats, and opportunities (Autio et al., 2014). In addition to market rules, which are a common factor regulating economic dynamics, other contextual features can facilitate, hinder, or have contradictory impacts on entrepreneurial success—for instance, the presence of venture capital locally or legal structures such as the existence of noncompete agreements (Marx et al., 2009).

## 3. The Platform Ecosystem and Complementor Metaphor: Concealing Dependent Entrepreneurship

The literature nearly always postulates that the complementors and platform owners in these ecosystems share similar objectives in relation to the value proposition to customers (Jacobides et al., 2018; Nambisan & Baron 2013). Wareham et al. (2014, p. 1198) refer to complementors as "autonomous actors, act as entrepreneurs, invoking the speed of market mechanisms while focusing

their own portfolio of domain expertise, sector knowledge, and relational capital to create locally relevant solutions."

This collaborative image in which platform owners and autonomous complementors "depend on each other and share a common fate" (Tiwana et al. 2010, p. 52), the flat power structures between the actors allows successful platform owners to have "hundreds if not thousands of partners [that] also participate in platform-based 'ecosystem' innovation" (Gawer & Cusumano 2014, p. 417). These authors never reflect upon what "partnership" or symbiosis means in markets controlled by a platform that has power to determine the rules of engagement or to unilaterally punish or even exclude its partners.

Platform owners are able to "impose rules and constraints, create inducements and otherwise shape behaviors" (Boudreau & Hagiu 2009, p. 3). More succinctly, as Nambisan & Baron (2013, p. 1073) observe, the other ecosystem actors must "surrender part of their autonomy and independence" to align their businesses with the desires of the platform leader (Tavalaei & Cennamo, 2018). Alignment may include the platform owners absorbing the businesses of their complementors (Gawer & Cusumano, 2002; Gawer & Henderson, 2007; Zhu & Liu, 2018). Decisions to absorb or eliminate their complementors' businesses is portrayed as a mechanism to defend the ecosystem, aimed at exercising better quality control (Zhu & Sun, 2018) or at stimulating innovation with a better customer experience (Gawer & Cusumano, 2002). In contrast to these benign interpretations, Zhu and Liu (2018) show that Amazon's entry into market segments created by independent merchants are aimed at its most successful complementors.

Because platform owners can impose rules, boundaries, and directions, complementors bear the risks of entrepreneurship, while lacking the freedom and security typical of an independent business (Nambisan & Baron, 2013). Scholars studying digital platforms have mostly embraced an ownership

perspective to look at the strategies and the dynamics put in place to generate and maintain value in the ecosystem (Gawer & Cusumano, 2002; Gawer & Henderson, 2007; Boudreau, 2010), hence the issues faced by complementors are under-investigated (Tavalaei & Cennamo, 2018). The effect of these power dynamics on the myriad small complementary businesses is explored only in passing.

We have indicated that the "ecosystem" metaphor is problematic, and yet it is not entirely incorrect. Recognition is growing among scholars that more research should be devoted to the members of business ecosystems (Kapoor & Agrawal, 2018). Platforms provide their ecosystem members with significant resources, which we discuss in the next section, and, paradoxically, it is these resources that give the asymmetric power to the platform owner who has an omniscient view and the ability to unilaterally expel any complementor or customer, and change the rules that govern the PDEs

**4. Entrepreneurs, Complementors, and Resources**

Enrolling in a platform ecosystem as a complementor, legally, through acceptance of the terms and conditions, means acceptance of the goals and general value proposition of the platform owner (Nambisan & Baron, 2013). To be successful, there is a fundamental contradiction faced by every platform as an intermediary -- it requires complementors and consumers to populate its ecosystems. Therefore, platforms provide significant incentives, in the economics literature, subsidies, to sides of the platform, to actors, to join their ecosystem. All things being equal, the higher the number of complementors, the more robust the platform is and higher the total value created in its ecosystem (Gawer & Cusumano, 2014). Of course, as Boudreau (2012) finds, there may be a limit to the number of complementors able to join a platform ecosystem. To attract entrepreneurs, platform owners must provide access, opportunities, resources, and even subsidies because the provision of tools lowering the costs of connecting to the platform and accessing customers encourages platform adoption. In the

economics literature, these resources are considered subsidies (Boudreau & Hagiu 2009). In this section, we enumerate the most salient resources used to attract complementors.

### *4.1. Customer Access*

The fundamental benefit of using a platform for those providing goods or services, whether it be advertisers paying for advertising, or Etsy sellers, or Uber drivers, is customer access. This refers to the platform's ability to match customers and buyers. In size these markets range from global (online sales) to extremely local (locating a Lyft driver). As Table One shows, the differences in scale can be enormous. Whether a market or an advertising-supported platform, the purpose is to reduce discovery and transaction costs. make discovery of this far-flung sellers on the possible, thereby creating new spaces for entrepreneurs.

### *4.2. Access to Resources*

New ventures require a variety of resources, including capital, skilled workers, networks, and customers, to overcome the liability of newness (Stinchcombe, 1965). To attract participants, platforms provide a remarkable array of resources, including interfaces, templates, manuals, and other technical support, either gratis or at low cost. Platforms must offer such resources, even at a loss, to lower entry barriers (Nambisan, 2017; Nambisan, Siegel, & Kenney, 2018). In Table 2, the variety of resources offered by Etsy are listed and described.

Table 2: **Selected Resources Provided to Entrepreneurs by Etsy**

| Services | Free or Paid | Type of service | Description |
|---|---|---|---|
| Application programming interfaces (APIs) | Free | Auxiliary resources | Etsy APIs allow the creation of apps to manage listings, analyze sales history and feedback, control shop appearance, and access certain customer information. In 2019, 70 APIs were available on the website. |
| Etsy Handbook | Free | Training | Educational resources, such as articles, webinars, and posts that teach sellers how to start, manage, and scale their Etsy businesses. They focus on taxes, shipping, and marketing, with updates every week. |
| Etsy Craft Entrepreneurship | Free | Training | Educational program for underserved communities |
| Etsy Payment | Paid | Auxiliary resources | Dedicated system provided by Etsy to streamline payments for sellers and buyers |
| Etsy Training Videos | Paid | Training | Online videos to improve sales |
| Etsy Forums | Free | Community Building | Advice, discussion of changes, etc. |
| Etsy Stats | Free | Site Analytics | Information on traffic, listings, and customers |

The scale of investment in these resources to lower entry barriers and facilitate the PDE's business can be enormous, as it includes engineering for application programming interfaces (APIs) and data analysis, marketing and sales information, training, and other resources. Platforms such as YouTube have permanent facilities (YouTube spaces) in key cities globally. These investments are meant to attract PDEs by creating sunk costs and locking in the PDEs.

*4.3. Platform Legitimacy and PDEs*

The anonymity of online transactions between parties means that there is little intrinsic trust between parties as they do not know each other and their transactions are unlikely to be repeated (Jøsang et al., 2007). Platforms have developed a number of features meant to mitigate this primordial condition, which makes transactions possible. Effectively, the platform is the guarantor that the transaction will not result in fraud by either side. This legitimacy is created by a number of mechanisms for ensuring sufficient satisfaction to ensure repeat usage (Grabner-Kraeuter 2002). The first and most widely recognized feature for increasing trust is a seller and buyer ranking and commenting systems that provides ex ante information for previous parties to a transaction (Forman et al. 2008).[2] Further, these ranking and comment systems provide an automatic form of monitoring and disciplining errant transaction parties (Bucher, 2012; Scott and Orlikowski 2012). This is reinforced by the ample research suggesting that buyers prefer more highly ranked sellers (Luca 2017), which further channels PDEs to conforming with the platform's norms.

The second platform feature that increases legitimacy is the employment of both algorithmic and human curation to identify dishonest or undesirable participants. These curators can ban or remove

[2] In China, which suffers from even greater distrust of strangers, Alibaba implemented an escrow system in which the buyer would place the money in escrow with Alibaba and only release it when the transaction was satisfactorily completed (Yu and Shen 2015).

products such as counterfeits or those violating copyrights or posting offensive material on YouTube.[3] Such curation validates that the PDEs in the ecosystem are legitimate and can be trusted. Without such curation, the platform would be likely to lose the users and in extreme situations could collapse completely.

*4.4. Low Entry Barriers*

Costs of entry have long been understood as an entry barrier for entrepreneurs (Amit, Muller, & Cockburn, 1995). In the case of digital platforms, entry barriers are often very low. For example, new entrants can begin with part-time activities, and many YouTubers began in their bedroom or dorm room, some YouTubers have outsourced fulfillment to either Amazon or independent vendors (McGinnis 2019), and eBay sellers began by selling miscellaneous items from their home or garage. In all of these cases, for some these amateur activities evolved into full-time professional businesses (Demetry, 2017; Kim, 2018).

The success of a digital platform is predicated upon attracting users and complementors. It does this by lowering entry barriers and reducing risk, and, when successful, these resources can foster ecosystems within which these entrepreneurs operate as the platforms' complementors (Eckhardt, Ciuchta, & Carpenter, 2018; Nambisan et al., 2018). The eased entrance into the ecosystem has the contradictory effect over time of creating a lock-in effect due to the asset-specific nature of the investment and the lack of portability of the cumulative investment by the complementor in terms of reputation, transaction history, and repeat customers. The next section explores the features of a

[3] We are not arguing that these systems are flawless, only that they exist and provide some reassurance regarding the bona fides of the product.

platform that transform entrepreneurial activity from an assertion of independence to a state of dependence.

## 5. Mechanisms for Creating Platform Dependence

Entrepreneurs establishing their business on a platform operate in fundamentally different context (Autio et al., 2014) from traditional entrepreneurs that establish firms in the physical world. To attract entrepreneurs, the conditions for engagement must be attractive—so attractive that the platform can initially subsidize complementors to achieve lock-in. This is particularly the case when the entrepreneurs must make significant asset-specific investments, which integrate the dependent entrepreneur (DE) into the platform's ecosystem. The higher the investment is (often it is cumulative), the greater is the dependence on the platform. Ceteris paribus, the more successful entrepreneurs are on a platform, the more dependent they are.

Platform owners act as private regulators who are expected to reduce negative externalities created by complementors 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 "complementors" may degrade the ecosystem and even result in the platform's failure (Täuscher & Kietzmann, 2017). Platforms thus are strongly incentivized to perform their regulatory role, and they can rely on a large set of enforcement instruments, including exclusion (Strahilovetz, 2006).

All entrepreneurs face challenges, those who build a business on a platform face unique risks that emanate from the platform. In a recent study, Wen and Zhu (2018, p. 16) found that app developers responded to Google's threat of market entry and subsequent competition with their app by undertaking "no entry deterrence behavior, such as price reduction and additional innovation . . . because of the platform owner's power, its entry is unlikely to be deterred." This response suggests that they

understood that resistance was futile. In this section, we describe the characteristics of platform-based markets that contribute to this competitive asymmetry.

*5.1. Platform as Panopticon*

The platform owner has an encompassing view of the activities of other ecosystem participants (Boudreau & Lakhani, 2009). It is important to note that the platform's perspective is not complete in that it can be gamed or spoofed in many ways ( ). The term "asymmetric information access" underappreciates this power (Shapiro & Varian, 1998). In platform markets, the owner rations the specific information to the various sides—of course, the information provision is optimized to benefit the platform owner.

Platform power is illustrated by the case of Amazon. Where a former Amazon employee stated 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." This allows Amazon to "target their private label products with perfect precision" (Capitol Forum, 2018). The PDE only has the knowledge about its customer that the platform provides. The ability to observe all activities on the platform, while providing only curated data to the complementors (and customers) ensures the platform owner maximum leverage.

*5.2. Entry into the Dependent Entrepreneur's Business*

As the intermediary, the platform not only brokers relationships, it can also direct traffic. This centrality enables the platform to identify vendors or market segments that are particularly lucrative. This market "intelligence" facilitates the identification of opportunities and facilitates the introduction of a competitive product, the establishment of a "tax" to appropriate surpluses or even the acquisition of the complementor. For example, after recognizing the potential for the browser to be a new killer application, Microsoft destroyed the new entrant, Netscape, and its business model, by introducing

Internet Explorer that was bundled into the operating system (Yoffie & Cusumano, 1998). In effect, Microsoft redesigned the Windows operating system platform to absorb functions developed by its ecosystem member, Netscape (Eisenmann, Parker, & Van Alstyne, 2011).

A platform owner may not always be successful in absorbing the functions of complementors. To illustrate, Intuit was the target of acquisition by Microsoft, which the Department of Justice blocked on antitrust grounds. After the attempt failed, Intuit remained the market leader in consumer accounting software (Newman, 1997).

Compared to the PC era where platforms like Microsoft dominated the scene, online digital platforms have far greater visibility into their ecosystems. For example, Amazon can identify independent third-party vendors whose products sell well in its marketplace, examine the product, and decide whether the profit margins are attractive (Zhu & Liu, 2018). It can then enter the market any of its 136 private label brands and 373 exclusive brands (TJI, 2019). This process 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, p. 3)

Online platforms can survey activities on their platform, research the opportunity, and then decide whether it is economically viable to introduce a targeted competitive product.

*5.3. Input Control*

As the ecosystem curators, platform owners must manage their complementors—a necessity to prevent the platform ecosystem from becoming dysfunctional (Thies, Wessel, & Benlian, 2018; Jacobides et al. 2018). Input control ensures that complementors abide by the terms and conditions for participation (Tiwana 2015, 2014). Although this is not the typical principal-agent problem, it has similarities. Input control is a vexing issue for PDEs because they must invest prior to the product (often digital) being accepted for sale/distribution. Because the platform may change acceptance criteria at any time and without warning, the DE's business model is precarious. For example, recent decisions by Google, YouTube, and Facebook to demonetize, ban, or demote various websites are based upon policy changes in regarding what content is acceptable. Because platform-organized markets are largely winner-take-all, the PDE's products often cannot be easily shifted to another platform or channel.

*5.4. Changing the Terms of Participation*

For rational actors the market entry decision is made on the basis of a cost-benefit analysis, based upon an understanding of market rules. In an offline business, the most salient terms are leases, supplier, customer, and competitor relationships, and government regulation. To participate on a platform, users must agree to the terms and conditions for participation, which is a contract. The key clause in all of these contracts is that all other clauses can be changed unilaterally at the discretion of the platform owner. The terms have two components: first, "hard" components that are the core of the platform, i.e., the software or algorithms, the software development kits (SDKs) and application programming interfaces (APIs). These literally frame what can be done. Second, "soft" components, such as rules, principles of community, etc. that determine, for example, what can be sold or said on the platform. Both the hard platform components can be changed. To illustrate, the number of pictures that can be used on an eBay listing or the method of communicating between buyer and seller. In contrast, a "soft" change could be a decision to ban or demonetize a certain point of view. An illustration of this is

YouTube's decision to demonetize various channels – our point is not whether the content should be sanctioned – the point is that it could be.

Product price and profit margins are existential decisions for any business. For PDEs, core issues such as the share of revenue accruing to the platform and the complementor is invariably set solely at the platform owner's discretion. To illustrate, in fall 2018, eBay unilaterally announced an increase in its commission fees in the Books, DVDS, and Movies categories to 12%, while removing the fee discount that eBay Store owners enjoyed (Steiner, 2018), thereby unilaterally affecting profit margins. Even prices can be determined. For self-published books in the Kindle marketplace priced from $2.99 to $9.99, Amazon pays the author 70% of the retail download price, but only 35% for those priced above or below this range. In this respect, Amazon arbitrarily forced its complementors to accept its preferences.

The terms of participation are of critical importance as they speak directly to entrepreneurial independence. Entrepreneurs conducting business through their own website are not vulnerable to the abrupt changes in their business context that are the conditions for the PDE. Put differently, terms of participation require the PDE to surrender many of the attributes of being an entrepreneur.

*5.5. Platform Access*

Although exclusions can be for undesirable behavior (Evans, 2012), they 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, p. 8). The literature suggests that platform owners should be a neutral or, at least, a trusted party. However, this need not be the case. 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 (Kelley, 2018). In this case, Amazon sacrificed the independents in return for the Apple account, thereby violating the assumption of neutrality. Effectively, mechanisms necessary to protect the

ecosystem can be used to pursue other goals that advantage the platform. The power of exclusion poses a threat to PDEs, and such decisions can occur without warning.

*5.6. Customer Relationships*

The most fundamental relationship in capitalism is between a vendor and their customer. It is fundamental for learning what the customers' needs are etc. However, in platform-organized markets the platform is the intermediary through which a transaction is consummated. It is vitally important for the platform to keep the PDE estranged from its customer, if they were in direct contact, they would have little need for an intermediary. For this reason, the platform does everything in its power to ensure that transitions are oceddf-force to ensure The DE depends upon the platform to maintain the connection, and, if the entrepreneur loses platform access, then the customer access is also lost. To illustrate, YouTubers actively cultivate their community by interacting with their fans to build their followers. When YouTube blocks creators, they immediately lose access to their fan base and have no way of contacting them to move their customer base to a new platform. eBay uses machine learning to identify violations of its policy forbidding the exchange of contact information between buyers and sellers (Meldner 2017).

The separation of providers from customers is normal for most platforms. For example, in 2019 Apple launched Apple News+, a magazine and newspaper subscription service on which publishers could provide their content to Apple, which would then aggregate and provide it to Apple users for a $10 per month fee, of which Apple would retain 50%. As with many other platform services, this one separates the producer from their customers (Sloane, 2019). Once established, this separation would be difficult to reverse. Separation from one's customers gives "ownership" of customers to the platform. After which the platform can unilaterally set the conditions for customer engagement.

*5.7. Ranking Systems as a Control Mechanism*

Ranking systems are essential features of many platforms because they function as mechanisms to foster trust, identify better vendors, and direct aiding discovery and reducing transaction uncertainty (Jøsang et al., 2007; Tadelis, 2016).[4] Not surprisingly, ceteris paribus, users are more likely to select a higher-ranked item—whether in search results or a ranking system (Ghose et al., 2014). Further, they directly influence customer preferences, as Luca (2011) found that a one-star increase in a Yelp rating led to a 5-9 percent increase in a restaurant's revenue and visibility. Effectively, the ranking systems are meant to and do shape behavior (Scott and Orlikowski 2012). For the PDE, the ranking systems are both vital for discovery and success, and perilous as they can change suddenly and are nearly impossible to contest (Taylor 2019).[5]

The algorithms and the data used to generate the rankings are invariably hidden. For the platform owner, there is little incentive to provide any transparency. The standard reason is that revealing the algorithms could open them to manipulation and opportunistic behavior. As a result, the PDE can only speculate on what behavior will satisfy the algorithm. Psychologically, the PDE is embedded in a system, not only of risk, but more seriously, profound uncertainty. Moreover, algorithmically-generated results are often accepted as objective and not the result of human programming. The status of the results as objective deflects the questions regarding the potential for bias or self-serving in the rankings. This can conceal the platform's agenda, as the algorithms can be engineered to provide results that are beneficial to the firm's goals, while appearing to be objective. As a result, the ranking system and

[4] In China, where interpersonal trust among those outside one's personal networks is particularly low, Alibaba's innovation was to hold the payments in a trust account until the purchaser accepted the product and authorized payment.

[5] Many of the ranking systems are based on anonymous customer reviews. One problem is that the reviewers are not vetted and competitors can give their rivals bad reviews and rankings as a competitive strategy. Unfortunately, it is nearly impossible to prove such frauds and the platform has minimal incentive to invest resources in vetting the reviewers.

changes can in it appear to be capricious (Scott & Orlikowski, 2012). To illustrate, the scores that determine rankings are often driven in part by monetary considerations provided to the ranker by the organization being ranked. These non-organic ranking systems include, for example, a weight for whether the ranked organization advertises with the platform can generate extra income beyond the normal sales fees that a platform might charge.[6]

Ranking systems and the reviews so critical to their effectiveness, are critical for the operation of platforms, since they provide a low-cost, trust creation, monitoring, and conformity-enforcing mechanism. The knowledge that advertising on the platform can impact the ranking and thus product placement on the website places great pressure on the PDE to invest in advertising regardless of whether it provides actual benefits. Moreover, if advertising on the platform affects ranking and thus sales, then PDEs that are competitors will bid until their profits are driven to their lowest acceptable profit margins.

*5.8. Delisting*

Platforms are private marketplaces and thus access and delisting is solely at the discretion of the owner. And, as such, participation can be terminated for any activities deemed to violate the current terms and conditions that can be altered unilaterally without prior notice. For a PDE, the decision has immediate financial repercussions. Delisting can be triggered by user complaints, or by the algorithms that monitor the platform. The platform is not required to provide sufficient information to understand the reasons for suspension or its reversal. While most platforms have appeal mechanisms, their operations may take time – even though the PDE is not receiving income. Appeal is complicated by the cryptic information regarding the reasons for suspension compounded by the unclear criteria for adjudicating the appeal. Moreover, even in the case of successful appeals, the PDE does not return to

[6] For a description of this in the case of Expedia, see (Maher 2016).

the status quo ante, as competitors will have displaced them in the rankings. In fact, the infractions reported to the platform may actually be the product of unethical competitor behavior (Luca & Zervas, 2016; Woollacott, 2017). Effectively, the possibility of delisting means that the PDE's entire business is at risk of destruction at any moment.

### *5.9. Concluding Thoughts*

For entrepreneurs, platforms have a contradictory character. First and particularly initially, platforms offer PDEs many resources. In return, platforms benefit from their innovations and entrepreneurial effort, which attract users, and often the platforms share in the income produced. As these platforms and ecosystems grow and mature, the importance of the individual complementor decreases. Platform owners are running a business, so they seek to increase revenues and profits. Figure 1 shows a stylized representation of this process, in which non-DEs will have greater difficulty and higher cost in entering the market because they have to produce or secure access to resources that a platform provides. However, assets such as reputation and customers belong to non-DEs, who neither benefit from a platform nor are immediately vulnerable to its decisions. Thus, as the business of non-DEs matures, they face fewer risks than platform complementors.

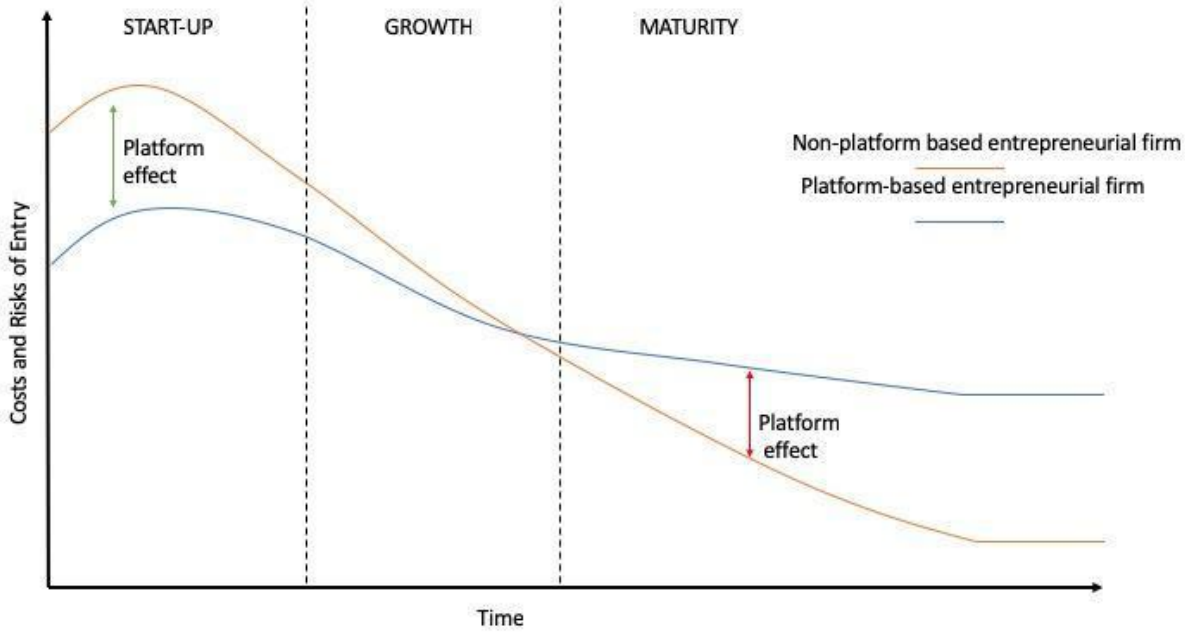


Figure 1: A Stylized Representation of the Risk Profile of a Non-Platform-Based and Platform-Based Entrepreneurial Firm

## 6. Strategies Developed by Platform-Dependent Entrepreneurs

PDEs understand their status and have developed responses, the most salient of which are described in this section. Most of these activities are problematic because they take place within the ecosystem of a platform that controls the nexus of communication and has a vested interest in ensuring the failure of such activities to create countervailing power. Given the platform's omniscient view of activity, detection of DE responses meant to weaken the platform's power elicit a powerful counter attack by the platform, and PDEs normally have little recourse. Their responses, however, deserve greater study.

*6.1. Multihoming*

Multihoming refers to the possibility that a product or service can be offered on multiple platforms (Kenney & Pon, 2011). Multihoming can increase the PDE's power and resiliency, because diversification reduces dependence on a single source. There are three general types of multihoming that are relevant for PDEs. The first is the classical case where the PDE can easily use multiple platforms. The second type of multihoming is more profound, as a PDE can use different channels, i.e., sell on a platform, but also operate their own website, or, even a own physical shop. The final type of multihoming is discussed in the next section, namely diversification of types of income, for example, a YouTuber receiving advertising income for their YouTubes, but also deriving income from product placement. Moreover, PDEs use innovative combinations of all three of these strategies.

Platform multihoming

Multihoming can be easy and nearly frictionless or the costs can be very high. For example, many drivers (and users) use Uber and Lyft, interchangeably, as the multihoming costs are trivial even for drivers as the costs of on-boarding appear to be low (and largely born by the platform). Similarly, for hotels, multihoming with the online travel agencies seems to be quite low. In contrast, porting software from iOS to Android or vice versa is more expensive/technically difficult. To illustrate, when for Snapchat's app which was ported from iPhone was downloaded by Android users, it was buggy compared to the corresponding update on iOS, and the botched update had a significant negative impact on revenues (Constine, 2019). For example, in the personal computing era, many PC game firms did not port their games to Apple Macs. The market was so small that it was not economically justified. The fact that PDE must customize its offering to each platform's specifications is a powerful force for winner-take-most outcomes as they are frequently unwilling to do so for large numbers of platforms. Therefore, multihoming is affected by a tradeoff between cost and potential market size (Bresnahan et al. 2014). In

platform competitions, the weaker platform very often encourages or even provides resources to simplify multihoming as it seeks to attract complementors.

When feasible, in most cases, a dominant platform will use a variety of tactics to discourage multihoming. These tactics can include the technological architecture that may be designed in such a way as to increase the difficulty of multihoming (Cenammo et al. 2018). Similarly, it is possible to alter the interfaces such as APIs to create incompatabilities, such as Apple did to make the iOS incompatible with Adobe Flash (Heisler 2016). There are business model tactics. As many platforms seek to prevent the PDEs from, for example, informing their audience/customers that they that they offer the same or different content on another platform. To illustrate, without warning YouTube terminated the accounts of creators that used YouTube to promote their streams on the competitor platform, Twitch (Vincent, 2018). Another tactic is for the platform to contract with developers for exclusive content, such as, is the case when gaming platforms contract with particular developers. Provider multihoming threatens the platform and it can respond to the threat by technological means or by using contract provisions, or finally by decreasing costs or increasing benefits to retain PDEs.

Channel multihoming

Another strategy for PDEs is to develop other non-platfrom channels through which to transact. While there likely are many different channels, the two most prominent are: First, for the PDE to establish their own website through which customers can purchase goods or services. Second, the PDE can establish their own physical store. For both of these strategies to work the PDE must have the ability to direct traffic to their site. One Amazon seller we interviewed said that they did a significant percentage of their fulfilment personally so that they could insert a leaflet into the package with contact information and the offer or a discount if they bought on their website. Other possibilities include buying online advertising from Google or Facebook and using it to direct customers to their website,

thereby disintermediating the platform. Of course, in these cases, the PDE takes higher risks as they must invest more upfront capital. These are not hypothetical strategies as PDEs can use the influence and visibility that they develop through their platform-based shop to appeal directly to their customers.

Despite efforts by the platform to limit multihoming it is a powerful strategy for mtigating a particular platform's power. In some markets, due to the winner-take-most network effect dynamics, there are often few alternative platforms reducing the utility of multihoming. Perhaps, the most effective multihoming strategy is the attraction of customers to one's own website, which, if effective, provides the PDE with control, predictability, and the possibility of interacting with and learning from one's customers/followers. Of course, even with an independent website discoverability is still often dependent on Google Search or influencer recommendations.

*6.2. Income Diversification.*

Income diversification is another strategy PDEs use to generate income. On some platforms such as YouTube, Instragram, and Pinterest, to name a few salient platforms, where a successful PDE might build a large following of complementors, it may be possible to create extra-platform income sources or auxiliary income. For example, the main source of income for a YouTuber is a share of advertising generated by viewers of the their website . However, with their fame, illustrates, YouTubers can leverage their audience to generate income from a remarkable variety of sources. These sources include: personal appearances, merchandise sales, in-video product placements, and subscriber content such as classes. Of course, on platforms such as Uber or Craigslist are not as capable of being extended in ways to generate a significant stream of income.

Not surprisingly, this can expose a tension between the PDEs who need to diversify their income streams and the platforms aiming to increase own income. YouTube introduced new rules meant to capture either a portion of the alternative income or, at least, direct it through YouTube. In 2017,

YouTube began blocking YouTubers who were appealing for their followers to pledge funds to their Patreon sites and, instead, forced them to route the funds through YouTube's Channel Memberships (Kulp, 2017).[7]

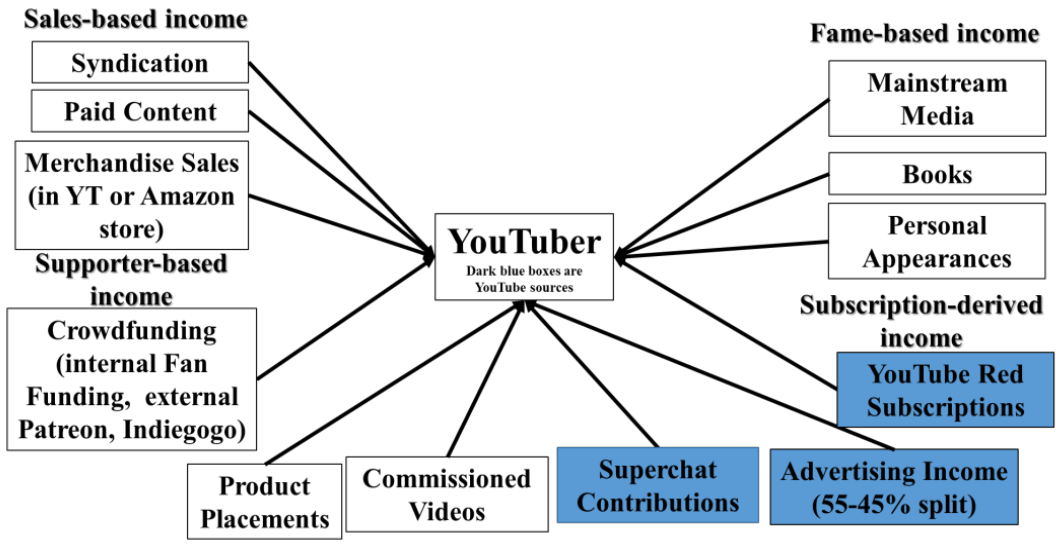


Figure 2: The Diversified Income Streams for YouTubers

The ultimate problem for owners is when the complementor develops sufficient alternative sources of income that they no longer need the platform, such as was the case with Justin Bieber, who initiated his career on YouTube but became a mainstream star and left the platform. Similarly, authors can use Amazon's self-publishing platform to launch their careers, and the most successful often move to traditional publishers. A final example is successful online brands that establish physical stores, in

[7] To better control sponsorships, in 2016 YouTube acquired FameBit, a firm that connects creators with brand sponsorships. Here, YouTube created a direct competitor with the larger ecosystem in which a cottage industry of firms that connect creators with sponsors had emerged. As part of YouTube, FameBit can provide superior information to complementors (Weiss 2018), thereby having an advantage over competitors and, as importantly, further "capturing" the ecosystem complementors. It also means that YouTube will have even greater visibility into the success rates of advertisements.

part to diversify because their online operations are entirely dependent upon platforms such as Amazon or Instagram. Cultivating alternative income sources can counterbalance platform dependence.

### *6.3. Collective Action*

Collective action by PDEs can be wide ranging, from complementors forming user forums to discuss the platform's actions and, perhaps, develop self-help strategies, e.g., Turkopticon (Silberman & Irani, 2015), to withholding their products or services from the platform. Finally, if the platform rules or ecosystem become sufficiently difficult to live with, PDEs may abandon it, with the ultimate result being the demise of the platform. Thus far, most collective action has been confined to complaints regarding changes in the terms and conditions (Dunphy, 2017) and has not progressed further.

Collective action can be effective, even though fewer organizing tools are available in virtual environments, where the "public space" is, in fact, owned by the platform. For example, in November 2018, AbeBooks (owned by Amazon) banned several antiquarian booksellers because their countries did not have acceptable banking institutions. In solidarity with their competitors, hundreds of booksellers removed their listings. Given the strong response, AbeBooks reversed its decision (Flood, 2018). In this case, the PDEs had alternatives and close networks, and the platform had few substitutes, unlike if, for example, YouTubers withheld videos en masse.

In general, PDEs face the platform as individuals, often as competitors. Collective action is normally confined to protesting rule changes and requesting that the platform reconsider its actions. In most cases, providers are scattered globally and cannot even identify one another. Moreover, when websites are established for interacting and discussing various issues, they have no way of excluding platform representatives from participating incognito. Thus, the conditions for solidarity, such as a common workplace or community, that exist in the physical world are far less prevalent in the virtual world.

*6.4. Disintermediation*

By definition, platforms function as intermediaries between various parties. If the parties are able to identify one another, then it may be possible for them to disintermediate the platform in future transactions. Such disintermediation is most likely to occur when repeated interactions build trust. With sufficient trust, through an off-platform communication medium, PDEs can connect directly with their customers, thereby excluding the platform and sharing the platform's fees. Disintermediation is an existential threat for a platform, because circumvention unequivocally reduces the platform owner's power (Zhu & Iansiti, 2019).

*6.5. Legal Action*

Because the relationship between the platform and its PDEs has largely been the province of contract law, comparatively little litigation by complementors has occurred, as they joined the platform voluntarily and can leave freely. This may be changing, as the competition authorities in the European Union have investigated and fined some platforms for violations. In the US, greater attention has been paid to platforms such as Amazon (Khan 2016). Actions have been taken in other countries—for example, in India, small retailers successfully pressured the government to promulgate new rules that make it difficult for retail platforms, such as Amazon and Walmart-controlled Flipkart, to sell directly to consumers and operate an online marketplace. This action would prevent a platform from competing directly with its complementors. In the case with Uber and Lyft, whose complementors may be viewed as workers, some court cases have argued that the drivers are not contractors (or micro-entrepreneurs) but, rather, should be classified as employees. Recently, the music platform Spotify argued that the 30% fee Apple charges for all downloads to the iPhone presents unfair competition, because of the newly introduced Apple Music (Ek, 2019). In response, Apple argues that the fee is reimbursement for its

vetting function that protects the ecosystem (Apple, 2019). How far legal action will progress to protect PDEs is unknown.

*6.6. Summary*

As we have shown, PDEs actively implement strategies aimed at weakening the platform's grip. The strategies to counterbalance the platform's power can be effective, but they are costly, especially for smaller firms. Not unexpectedly, the platform opposes attempts, either passively or actively, to weaken its grip over its complementors. The conundrum is that the platform is expected to curate the ecosystem, because if it is uncurated, it is likely to experience a tragedy of the commons (Hardin 1968). However, in the case of platform firms, the curation role is played by an interested party and therefore may lead to judgments in its own favor.

## 7. Discussion and Conclusion

Platforms have been acknowledged as having a profound effect upon labor and labor relations (Kenney & Zysman, 2018) and the nature of competition (Khan 2016; Parker et al. 2016). Research on entrepreneurial dynamics in platform ecosystems has concentrated upon the ease of entry, market access, and other such technical conditions. With very few exceptions, the unequal power relationship between the platform owner and the ecosystem complementors has been ignored. When the relationship between owners and complementors is discussed, it is in terms of commensalism or mutual benefit. Clearly, the platform owner as the provider of tools and ecosystem curator is necessary and deserves compensation. But the power asymmetries are so stark that complementors are best understood as dependent entrepreneurs whose very existence depends upon the platform.

Consider again entrepreneurs in the pre–internet platform era. Certainly, Microsoft could destroy ecosystem complementors, as Netscape discovered to its peril. However, for a variety of reasons, including enforcement of US antitrust laws, Microsoft was limited in its use of platform dominance to

enter the business of its various complementor firms that were either other software vendors or PC producers. Today, all kinds of economic activities are being organized by platforms, offering greater consumer choice. In retailing, the production of music, news commentary, or software, the provision of rides or accommodations, and all sorts of other products and services, both entrepreneurs and existing businesses are being integrated into platform ecosystems. Platforms provide the entrepreneurs with various boundary resources to ease their market entry, access to customers, and legitimacy. In return, entrepreneurs' businesses are vulnerable in ways that they were not in the offline world. Entrepreneurs whose business is dependent upon a platform face a level of precarity now that is far greater than during the pre-platform era. The DE's business is entirely exposed to the platform owner's panoptic gaze.

Entrepreneurship and building a business have always been fraught with risk. However, the willingness to bear this risk has been coupled with the belief that success is based on one's own efforts—a world in which most capable entrepreneurs can build a sustainable business (Sarasvathy, 2008). Dependence upon a platform challenges such assumptions, as this risk extends to the basic tools for doing business, as platform owners can control access to customers, prices, profit margins, and thereby survival of the business.

Awareness of the encompassing power of these platforms is growing, as is the precarity of entrepreneurs who depend upon these systems. To illustrate, a business that is not discoverable through a Google search can effectively be said to not exist. This demonstrates that current discussions of regulating platforms still have not grasped the dynamics of the new business environment, in which platforms have acquired godlike powers to banish errant complementors from the garden, can see all activities within their realm, separate parties to a transaction, and unilaterally change the conditions for any and all users—either in very granular fashion or comprehensively.

Governments have gradually gained awareness that these platforms are using their god-like powers in their own interests and against the dependent entrepreneurs. In response to the growing number of grievances against unfair treatment, policy makers have been increasingly concerned with the appropriateness of current policy frameworks to promote sustainable and healthy environment for platforms' entrepreneurs. For example, the Indian government recently required Amazon and the Walmart-owned-Flipkart to choose between being online retailers and sales platforms because that they could not both have their own inventory and be online marketplaces. And the European Commission reached a political deal on the adoption of a regulation that applies to the entire platform economy, including online marketplaces, app stores, social media for business, and search engines, aimed at reinforcing trust and promoting fairness and transparency in the relationship between platforms and entrepreneurs (European Commission, 2019).

Reconceptualizing entrepreneurs in a platform economy as dependent is particularly useful when we consider that an increasing number of scholars have proposed that entrepreneurship is an effective response to the evolution of work to be more contingent, fluid, and uncertain (Barley et al., 2017; Brynjolfsson and McAfee 2014). What we have shown is that the platform's provision of resources to entrepreneurs is a poisoned chalice, because it also locks in the entrepreneur. Therefore, what is the meaning of entrepreneurship in a platform ecosystem? Under these circumstances, how can PDEs enact the "emancipatory potential of entrepreneurship" (Rindova et al., 2009)? To what extent do entrepreneurs understand this dependency when developing their business on a platform and how does this awareness influence their actions? Finally, what are entrepreneurs' degrees of freedom in developing their business when the platform can identify those creating Schumpeterian rents and act to appropriate them?

What is certain is that entrepreneurship researchers must also study the power asymmetries inherent in the platform economy, if they want to understand the dynamics of these markets and provide a more compelling picture of entrepreneurship in the digital era.

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