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**DEPENDENT ENTREPRENEURS IN THE PLATFORM
ECONOMY: PLAYING IN THE GARDENS OF THE
GODS**

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Dependent Entrepreneurs in a Platform Economy: Playing in the Gardens of the Gods

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“The court (platform) maintains its power by remaining secretive about its operations. And since it is accountable to no one except itself, it does not have to make its actions public.”

“Since the court (platform) is a closed system that operates on its own rules, and since the court's (platform's) power is so absolute, it is effective at rebuffing any effort from outsiders (complementors) – including ambitious defendants (complementors) – to penetrate its mysteries.” (Apologies to Franz Kafka)

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ABSTRACT

Digital platform firms are among the most valuable firms 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 interdependencies among the members is intrinsically flawed because it obscures the god-like powers of the platform owners. In fact, complementors are dependent entrepreneurs whose businesses and existence is 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. And yet, businesses dependent upon digital platforms are extraordinarily precarious. The reasons for this precariousness include the extraordinary visibility that platform owners have over all participants, an ability to unilaterally change the terms and conditions of participation, and even become a direct competitor to entrepreneurs dependent upon the platform. We describe the limited strategies that dependent entrepreneurs can utilize in an attempt to mitigate their dependence. We suggest that the relegation of entrepreneurs to dependence requires a new way of thinking about entrepreneurship as platforms continue their march to centrality in the global economy.

1. Introduction

Digital platforms such as Amazon, eBay, Etsy, Google search advertising, Instagram, YouTube and many other platforms make it easier than ever for entrepreneurs to build a business and generate income. And yet, as Franz Kafka suggests for those entrepreneurs building businesses on the platform, that is the “complementors,” any misstep, many of which are identified by the all-seeing algorithms, can lead to summary judgement followed by Kafkaesque adjudication processes. Today, both entrepreneurs and existing businesses must navigate a world where customers want to purchase online, and an online presence is necessary. As a result, participation in a platform’s ecosystem has become vital for existence and growth (Kenney & Zysman, 2016; Parker et al., 2016). The economic centrality of platforms heralds a new reality for entrepreneurs.

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 Brynjolfsson and McAfee (2014) have hailed entrepreneurship as a vital response to the increasing concerns about digitization’s impact on the future of work. Platform researchers have emphasized the importance of platform complementors in providing variety and innovation that generates 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 by arguing enterprises dependent upon a platform are not independent, in the traditional sense of the term, but can be better understood as

“dependent entrepreneurs.” We explore the profound impact upon entrepreneurs that the “platform economy” is having upon the enormous number and variety of entrepreneurs (Aldrich & Ruef, 2018).

The remarkable shift of business-to-consumer activity online has led to a fundamental shift in power to the point that the digital platforms intermediating economy activity have transformed the market. As a result, vast swathes of the economy are being 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 running their business on digital platforms are affected by the online services such as Google search and ranking algorithms - for many firms, not appearing in Google search results is tantamount to non-existence. In large measure, the study of the impacts of platforms has concentrated up on labor platforms such as Uber (e.g., Cramer & Krueger, 2016) or Upwork (Popiel, 2017), crowdfunding (Sorenson et al., 2016) or retail (Khan, 2016). And yet, despite its transformative impact, the implications of the platform economy on entrepreneurs has been less studied (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, Uber, and others are the result of venture capital-funded entrepreneurs. However, as Aldrich and Ruef (2018) demonstrate, these venture capital-financed entrepreneurial successes are only a fraction of the total society-wide entrepreneurial activity. Where studies have been conducted regarding the impact of digital platforms on entrepreneurs and the entrepreneurial process, most studies have been laudatory or not considered the impact upon the businesses that become dependent upon the platform.

This article explores the contradictory impact that platforms have 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 more precarious when it is dependent upon a platform. The precarity is increased as their venture is vulnerable to unilateral, largely irresistible, and often unappealable decisions made by the platform owner for their benefit. Dependent entrepreneurs face risk that is incalculable as the platform has god-like powers that range from complete visibility into the dependent entrepreneur’s business to the ability to unilaterally change any terms of participation up to suspension and removal from the platform resulting in a loss of any and all equity in their business (Zuboff 2019). As a result, the dependent

entrepreneur suffers not only the normal risks and anxiety that come with building a firm, but an even greater uncertainty that comes to their dependence upon the platform. We also explore the pitfalls of using the ecosystem metaphor to describe the economic space created for complementors.

The paper begins by defining what platforms are and discussing their role in entrepreneurship. We then critique the ecosystem metaphor as being fundamentally misleading as to the true nature of the relationship between the platform and its complementors. While we continue to use the term ecosystem and complementors, the fourth section describes the resources that the platform provides to members of its ecosystem and sets the base for unraveling their dependency. The fifth section introduced the concept of dependent entrepreneurs 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 conceptualizations of entrepreneurship. In the sixth section, we describe some of the strategies dependent entrepreneurs 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) 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). While 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 that do so with entrepreneurial intent.

The platform business model has demonstrated such disruptive power that many platform firms are among the world's most valuable corporations (Moazed & Johnson, 2016). With the forthcoming initial public offering for other digital firms such as Uber, Slack and Airbnb, in a few years it is possible that digital platforms may organize even greater swathes of the economy, thereby having even greater implications for entrepreneurs.

Digital platforms facilitate but also shape the emergence of novel entrepreneurial opportunities. When conceptualizing entrepreneurial opportunity emergence 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 environment-level and can be actor-independent, particular actors often influence or even have a central role as external enablers (Davidsson, 2015). Digital platforms, 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), are, not only external enablers, but also open new spaces within which entrepreneurs can create new firms¹. Effectively, they become the context for entrepreneurial action.

Platform-based entrepreneurs may deviate from the stereotypical Silicon Valley high-growth startup and are often more mundane retail or service businesses (Barley, Bechky, & Milliken, 2017). These enterprises are remarkable in their variety and establishing a knitwear shop on Etsy, eBay, Amazon, or any number of other platforms, creating a YouTube channel, writing apps, creating a reselling business on Amazon, starting a business based on Google advertisement referrals are only random illustrations of the endless typologies of businesses that can be established on a digital platform (Haefliger, Jäger, & Von Krogh, 2010; Keinan et al. 2015; Kim, 2018). This enormous population of entrepreneurs is largely unstudied as scholars have focused on the platforms. This omission is remarkable, if one considers the sheer number of these entrepreneurs (**Table**

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

One shows the number of entrepreneurs populating the major platforms).

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

| Platform | Date Established | Description | Revenue 2017/18 | Number of Entrepreneurs 2017/18 | Source |
|---------------------|------------------|----------------------------|-----------------|--|--|
| Apple iOS/App Store | 2008 | Marketplace | \$46.6 B | 2 million apps | Wikipedia |
| Amazon* | 1995 | Marketplace | \$42.8 | ~100,000 sell more than \$100,000 per year, 2 million total | https://www.entrepreneur.com/article/303532 |
| Google Play | 2008 | Marketplace | \$24.8 B | 2.7 million apps | Wikipedia |
| eBay | 1995 | Marketplace | \$10.7 B | 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 B | 40,000 full time creators / 12,000,000 total channels * 100% = 0.33% | https://medium.com/@Morjax/how-many-youtube-creators-could-be-full-time-6ecd1636bfc1 |
| Etsy | 2005 | Marketplace | \$3.9 B | >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 M | <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, Quarters 2, 3, 4, 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 of entrepreneurship focused on extraordinary firms that are described as *gazelle* 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 when we realize that essentially all entrepreneurship today is predicated upon being in a platform ecosystem. To illustrate, 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. To illustrate, Nike and Apple had resisted selling through Amazon in part for fear of undercutting their existing vendors, however in 2018 they capitulated and began selling on Amazon (Galloway, 2018; Kelley, 2018).

To appreciate the impact of platform economy, it is important to explore how entrepreneurial action changes when it is in the context of a platform ecosystem. The character of entrepreneurship depends on the context, which have their 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 may either facilitate, hinder, or have contradictory impacts on entrepreneurial success, e.g., the presence of venture capital locally or legal structures such as the existence of non-compete agreements (Marx et al., 2009).

The next section addresses the commonly adopted ecosystem framework and explains why it suffers from a suffers conceptual flaw that conceals the dependent nature of entrepreneurial dynamics in platform-organized markets.

3. The Ecosystem and Complementor Metaphor: Concealing Dependent Entrepreneurship

The ecosystem metaphor was imported into business in the 1990s and has become remarkably popular (Jacobides, Cennamo, & Gawer, 2018; Moore 1993). In ecology, an ecosystem is defined as an interdependent collection of plants and animals or a structured system of communities governed by general rules (Chapin et al. 2002). This definition was extended to describe how spatially proximate interdependent organizations interacted to create mutually shared benefits and, quite early, was introduced to describe the Silicon Valley industrial system (Bahrami & Evans 2000). In these situations, there is no organizing entity determining the rules of engagement for the other participants or with the power to unilaterally exclude, change terms of engagement, or absorb the functions of other ecosystem actors.

To conceptualize the interdependencies between the actors involved, their shared destiny and the complex architecture of their interactions, the literature on digital platforms adopted the concept of ecosystems (Iansiti & Levien, 2004a; Tiwana, Konsynski, & Bush, 2010; Gawer & Cusumano, 2014). While the literature recognizes

the prominent role of the ecosystem's "keystone" player (Iansiti & Levien, 2004b), increasingly, a private firm is responsible for the viability of the entire ecosystem. To illustrate, it would be laughable to suggest that the lions in the savannah can decide to expand their role to displace the gazelle or require the dung beetle to change its operations. Or, in sociological settings, such as Silicon Valley, for venture capitalists to decide to become law firms, or unilaterally dictate that the law firms contract-writing function be ceded to venture capital firms. In contrast to these ecosystems, the platform owner wields enormous asymmetric power over other ecosystem members.

The literature nearly always suggests that within these ecosystems the complementors and platform owners 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 where platform owners and autonomous complementors "depend on each other and share a common fate" (Tiwana et al, 2010, p.52) with flattened power structures existing between the actors leads to successful platform owners having "hundreds if not thousands of partners [that] also participate in platform-based 'ecosystem' innovation" (Gawer & Cusumano 2014, p. 417). These authors do not reflect upon what "partnership" means in markets controlled by a platform with power to determine the rules of engagement or to unilaterally punish or even exclude its partners.

A platform firm is a business interested in profits. The platform's owners are able to "impose rules and constraints, create inducements and otherwise shape behaviors" (Boudreau & Hagiu 2009, p. 3). The other ecosystem actors must "surrender part of their autonomy and independence" (Nambisan & Baron, 2013, p. 1073) to align their businesses with the desires of the platform leader (Tavalaei & Cennamo, 2018). As a remarkable example of the ambiguity surrounding these ecosystems, scholars recognize that platform owners can and do absorb the businesses of their complementors and identify the different motivations behind platform owners' decisions to compete against and often destroy their complementors (Gawer & Cusumano, 2002; Gawer & Henderson, 2007; Zhu & Liu, 2018). For them, the decision 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) confirmed, showing that Amazon entry patterns into market segments created by independent merchants are aimed at appropriating the value of its most successful complementors.

Because platform owners can impose rules, boundaries, and directions, complementors bear the risks of entrepreneurship, while lacking the freedom and independence 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 only explored in passing.

We have indicated that the “ecosystem” metaphor is problematic and yet it is not entirely incorrect. There is a growing recognition among scholars that more research should be devoted to the members of business ecosystems (Kapoor & Agrawal, 2018). Platforms provide significant resources to their ecosystem members, which is what we discuss in the next section, because paradoxically it is these resources that provide the asymmetric power to the platform owner who has a “god’s” view and the ability to unilaterally expel any complementor or customer, and/or change the rules that govern the community.

4. Entrepreneurs, complementors and resources

Joining a platform ecosystem as a complementor by definition is acceptance of the goals and general value proposition of the platform owner (Nambisan & Baron, 2013). To be successful, a digital platform requires complementors and consumers to populate its ecosystems. Therefore, platforms provide all manner of incentives to join their ecosystem. All things equal, the greater the number of complementors, the more robust is the platform and greater the total value created in its ecosystem (Gawer & Cusumano, 2014). Of course, it is possible as Boudreau (2012) finds that 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 since 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 modeled as subsidies (Boudreau & Hagiu 2009). In this section, we enumerate the most salient resources that are used to attract entrepreneurs to introduce complementary services.

4.1 Customer access

For entrepreneurs, the fundamental benefit is access to potential customers i.e., the platform's matching function. Taking advantage of connectivity, they reduce costs of discovery and transaction. This is true whether it is a market platform or an advertising supported platform. The scope of these markets can range from global for online sales to extremely local such as locating a Lyft driver. To illustrate, in 2018 Etsy marketplace hosted more than 2 million vendors and approximately 40 million buyers (Etsy & GfK, 2017). In this case, Etsy allows entrepreneurs who join as complementors access to customers globally. By aggregating large numbers of users, they make discovery possible, thereby creating new spaces for entrepreneurs.

4.2 Access to resources

All new ventures typically require a variety of resources, including capital, skilled employees, networks, and customers, to overcome the liability of newness (Stinchcombe, 1965). Platform ecosystems are organized to attract entrepreneurs by providing access interfaces, templates, manuals, and other technical support either gratis or at very low cost. Moreover, platforms must develop and offer these resources even though they may be losing money because they are dependent upon attracting complementors. Since these resources are meant to facilitate complementary product development, they act to lower entry barriers (Nambisan, 2017; Nambisan, Siegel, & Kenney, 2018). In **Table Two**, the variety of resources offered by Etsy are listed and described.

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

| Services | Free or Paid | Type of service | Description |
|---|---------------------|----------------------------|---|
| Application Programming Interfaces | 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 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. These address taxes, shipping, 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 complementor's business can be enormous, as it includes engineering for 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 co-investments with their complementors create sunk costs and lock-ins that increase the dependency of the entrepreneurs that use them.

4.3 Platform-derived complementor legitimacy

Digital transactions because of their anonymity are marred by inherent lack of trust between parties that do not know each other and whose transactions are unlikely to be repeated (Josang et al., 2007). Complementors benefit from the systems that platforms have put in place to address this fundamental fact. The first and most widely recognized feature for increasing trust is seller and buyer ranking and commenting systems that provide ex ante information from previous users to both transaction parties. Moreover, ranking systems can be used to monitor and discipline ecosystem members. The second feature for overcoming lack of trust is that the platform uses both algorithmic and human curation searching for dishonest or undesirable listings, such as, for example, counterfeited products on sales platforms or copyright violations on YouTube.² The third feature is customer service representatives that make final decisions in dispute resolution. As a package, these features provide legitimacy and value to platform entrepreneurs and facilitate transactions.

4.4 Lower opportunity costs

Opportunity costs are an entry barrier to entrepreneurs (Amit, Muller, & Cockburn, 1995). In the case of digital platforms, these barriers are often very low and can begin with part-time activities. For example, many YouTubers began in their bedroom or dorm rooms, eBay sellers began by selling miscellaneous items. There are many anecdotes about how amateur activities evolved into full time professional businesses

² We are not arguing that these are flawless, only that they exist and provide some reassurance regarding the appropriateness of the product.

(Demetry, 2017; Kim, 2018). The low-entry allows amateur action to evolve into more professional activities and, as we described earlier, the platform actively provides resources to encourage such actions.

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, they foster ecosystems where entrepreneurs become the platforms' complementors (Eckhardt, Ciuchta, & Carpenter, 2018; Nambisan et al., 2018). The eased entrance into the ecosystem has the contradictory effect of, over time, 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 platform that transform entrepreneurial action from an assertion of independence to a state dependence.

5. Mechanisms for Creating Dependency

Entrepreneurs establishing their business on a platform face a fundamentally different context (Autio et al., 2014) from traditional entrepreneurs that establish firms in the physical world. To attract them the conditions for engagement must be attractive -- often so attractive that the platform will lose money to achieve lock-in. This is particularly the case when the entrepreneurs must make significant asset-specific investments. These asset-specific investments integrate the dependent entrepreneur, from now DE, into the platform's ecosystem. The greater the investment, and often these are cumulative, the greater the dependence on the platform. *Ceteris paribus*, the more successful an entrepreneur is on a platform, the more dependent they are.

Of course, all entrepreneurs face remarkable challenges. However, a business built upon a platform faces a unique set of risks that emanate from the platform itself. In a recent study, Wen and Zhu (2018, p. 16) found that app developers responded to the threat and subsequent entry of Google into 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 a God's eye view of the actions of the other ecosystem participants (Boudreau & Lakhani, 2009). The term "asymmetric information access" under-estimates this power (Shapiro & Varian, 1998). The platform not only can observe all the activities, but it also decides what information the complementors are given. In multi-sided platform markets the owner rations the specific information the various sides receive; all of which is optimized for the benefit of the platform owner.

This power is illustrated in an interview with a former Amazon employee who stated that it retained "the most valuable data for itself; provides less valuable data to marketplace sellers." They 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 allowed Amazon to "target their private label products with perfect precision" (Capitol Forum, 2018). On these platforms, the DE has only the knowledge about the customer that platform provides. The ability to see all actions of the platform, while providing only carefully selected data to the complementors (and customers) ensures maximum leverage to the platform owner.

5.2 Entry into the dependent entrepreneur's business

The platform is central to all interactions and has the ability to direct traffic. This centrality and the panoptic endowment enable the platform to identify vendors or market segments that are particularly lucrative. This combined with centrality of the platform allows the introduction of a competitive product or establishment of a "tax" to appropriate the surplus. For example, when threatened with the browser as a new killer application, Microsoft destroyed the new entrant, Netscape and its business model, by introducing a "free" Internet Explorer that was bundled into the operating system (Yoffie & Cusumano, 1998). Effectively, Microsoft leveraged the Windows operating system to absorb functions developed by its ecosystem member, Netscape (Eisenmann, Parker, & Van Alstyne, 2011). Of course, the platform owner may not always be successful in absorbing the functions of complementors. To illustrate, assisted by the Department of Justice's blockage of Microsoft's acquisition on antitrust grounds, Intuit resisted Microsoft and its Money software

program and remained the market leader (Newman, 1997).³

For online digital platforms, there is greater visibility into the ecosystem than in the PC era. For example, Amazon can identify independent third-party vendors whose products are selling well in its marketplace, examine the product and decide whether the profit margins are attractive. It can then enter the market through 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).

Dominant platforms can survey activities on their platform, research the opportunity, and decide whether it is economically viable to enter that specific market -- whether it was pioneered by an entrepreneur or an established firm. Effectively, for the DE the business that they have built is vulnerable to expropriation without recourse.

5.3 Input control

As the ecosystem curator, platform owners must manage their complementors in the ecosystem – a necessity or the platform ecosystem can become dysfunctional (Thies, Wessel, & Benlian, 2018; Jacobides et al. 2018). On all platforms, input control ensures that complementors abide by the terms and conditions for participation (Tiwana 2015; 2014). While this is not the typical principal-agent problem, there are similarities. For the DE, input control is a vexing issue, because for consignment-based platforms the content-creation investment must be made prior to acceptance of the product (often digital) for sale/distribution. Because the platform may change acceptance criteria at any time and without warning, the DE’s business model is

³ Microsoft did not offer the Money program for free, something it could have done to destroy Intuit.

precarious. For example, recent decisions by Google, YouTube, and Facebook to demonetize, ban, or demote various websites are based upon a change in direction in what content should be allowed. Because platform-organized markets are largely winner-take-all, the DE' products cannot simply be shifted to another market and sold -- there is often only one market.

5.4 Changing the terms of participation

The decision to enter a market is based upon understanding the operative rules for participation. In an offline business, these terms include leases, supplier and customer relationships, and government regulation, to name the most salient. To participate on a platform, users must agree to the terms and conditions. One key clause in all of these is that they can be changed unilaterally at the discretion of the platform owner. Terms of participation have two components: First, "hard" components that are the core of the platform, i.e., the software, algorithms, etc., and including the software development kits (SDKs), application programming interfaces (APIs) etc. These are boundary resources provided to the complementors. Second, there are "soft" components, which are included in the platform's contractual terms and conditions. Such rule changes can jeopardize not only the profits but also the survival of the complementor (Nambisan, 2017).

The price of a product and the entrepreneur's profit margins are existential decisions and fundamental to being an entrepreneur. For entrepreneurs using a digital platform, 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). Even prices may be set by the platform. For example, for self-published books in the Kindle marketplace for books 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. Amazon arbitrarily forced its complementors to accept its desires. In some cases, DEs cannot even control their pricing.

5.5 Platform access

Platform owners act as private regulators that 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 failure of the platform itself (Täuscher & Kietzmann, 2017). Platforms then are strongly incentivized to perform their regulatory role, and they can rely on a large set of enforcement instruments, including exclusion (Strahilovetz, 2006). Although exclusions can be for bad behavior (Evans, 2012), it 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). Platform owners are meant to be a neutral or, at least, a trusted party. As an example, Apple agreed to sell on Amazon; the quid pro quo was that the unauthorized independent Apple resellers had their listings removed (Kelley, 2018). The mechanisms required to protect the ecosystem can be used for exclusion to pursue other goals of advantage to the core firm. The risk of anti-competitive exclusions poses a potential threat to any entrepreneur using a platform.

5.6 Complementor and customer relationships

For a platform to be an intermediary, it is essential that the vendor be separated from their customer. 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. If YouTube blocks a creator, 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 at most platforms. For example, in 2019 Apple launched a magazine 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%. This service separated publishers from their readers (Sloane, 2019). Most importantly, once established, this separation would be difficult to reverse. Separation from one’s customers gives “ownership” of customers to the platform. Once the platform owns the customer, it can unilaterally set conditions of customer engagement.

The ownership of the customer shifts enormous power to the platform owner.

5.7 Ranking Systems as Control Mechanism

Ranking systems are essential features of many platforms because they function as mechanisms to foster trust, identify lower prices, and to direct traffic (Jøsang et al., 2007). As such, ranking systems can aid discovery and reduce transaction uncertainty (Tadelis, 2016).⁴ Further, there is a correlation between ranking and click-through behavior (Ghose et al., 2014). Indeed, users are more likely to select a higher ranking item -- whether in search results or a ranking system. Ranking scores can be used to discipline complementors. They can directly influence customer preferences: Luca (2011) found that a one-star increase in Yelp rating led to a 5-9 percent increase in a restaurant revenue and visibility.

The power of the ranking systems is that those doing the ranking are most often anonymous and the platform makes it difficult to appeal negative rankings. As important, invariably the algorithms generating the rankings, the data and the weighting system are opaque. It is in the platform owner's best interest to not reveal the algorithms to prevent manipulation and opportunistic behavior. An aura of objectivity can conceal the platform's agenda, which can be designed to provide results beneficial to its goals. As a result, the ranking system and particularly changes can appear to be capricious (Scott & Orlikowski, 2012). Since these algorithms are proprietary and evolve over time, complementors' only avenue of recourse is to appeal to the platform itself. While most studies have seen these as a form of decentralized labor control (Scott & Orlikowski, 2012; Schor & Attwood-Charles, 2017), the DE experience the same uncertainty.

5.8 Business Suspension

Complementors' access can be suspended for any actions deemed as an infraction of rules that can change with no prior notice. Often, suspension is governed by algorithms that constantly monitor actions on the platform. The difficulty is that algorithms and even human agents can be wrong and thus access may be

⁴ In China, where inter-personal trust was particularly low, Alibaba's innovation was to hold the payments in a trust account until the purchaser accepted the product and authorized payment.

unjustifiably interrupted. In some cases, infractions reported to the platform may actually be the product of unethical competitor behavior (Luca & Zervas, 2016; Woollacott, 2017).

For the DE, suspension has immediate financial repercussions. There is no possibility of immediate appeal and the platform need not provide sufficient information to understand the reasons for suspension. As a Kafkaesque result, DE are forced to appeal a decision which was made for unexplained reasons. The frequency of sanctions on platform entrepreneurs has grown to the point that there are now consulting companies that specialize in dealing with platform decisions (Dzieza, 2018) and even firms such as InsuraTech, that offer insurance to cover lost sales and additional costs triggered by a suspension -- of course, all of these are costs borne by the DE.

5.9 Concluding thoughts

For the entrepreneurs, the platform has a contradictory character. First and particularly initially, the platform provides many resources for the DE. In return, the platform benefits from their innovations and entrepreneurial effort, which attract users and often the platform shares in the income produced. As the platform and ecosystem grows and matures, the importance of the individual complementor decreases. Of course, as a business, the platform owner seeks to increase its revenues and profits. In **Figure One**, we provide a stylized representation of this process. As we show, a non-DE will have greater difficulty entering the market, because they have to produce or secure access to resources that a platform provides. Therefore, entry is more difficult and expensive. However, assets such as reputation, customers etc. belong to the non-DE who neither benefits from the platform nor is immediately vulnerable to its decisions. Thus, as the non-DE's business matures, it faces fewer risks than does the platform complementor.

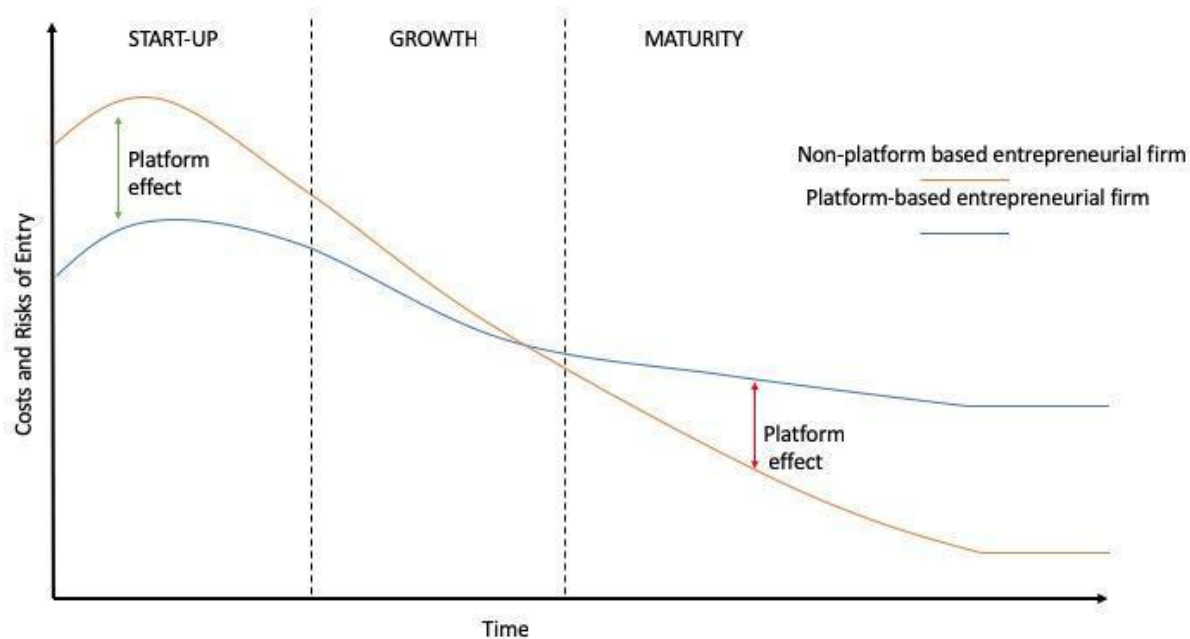


Figure One: A Stylized Representation of the Risk Profile of a Non-Platform-Based and Platform-Based Entrepreneurial Firm

6. Responses of Dependent Entrepreneurs

DEs understand their status and have developed responses. This section describes the most salient responses. Most of these actions are problematic because they take place within a platform's ecosystem where it controls the nexus of communication and has a vested interest in ensuring that actions to create countervailing power are defeated. Given its god's eye view of activity, detection of DEs' responses meant to weaken the platform's power will elicit a powerful response and there is normally little recourse. However, DE have developed responses that deserve greater study.

6.1 Multi-homing

Multi-homing refers to the ability for DE to offer their product or service on multiple platforms (Kenney & Pon, 2011). Multi-homing comes with a cost, as the entrepreneur must customize their offering to each platform's specifications. Multi-homing can increase platform entrepreneurs' power, though due to

network effects, the platforms often are either monopolies or oligopolies, such as is the case for smartphones, ride sharing, search, and social media, etc. In the case of smartphone operating systems and their respective app stores, the platform duopoly offers minimal alternatives for complementors. In other cases, such as search advertising, the alternatives to Google are nonexistent.

For the DE, offering their product or service on multiple sites is desirable, but it may not be simple. To illustrate, after introducing a new app update, Snapchat's Android app, when compared to its iOS app, was buggy and this had a significant negative impact on revenues (Constine, 2019). In other cases, uploading videos to both YouTube and Instagram is easy due to various software applications. However, even when easy, the platform's goals, payment algorithms, audiences, and formatting are different and thus successful porting requires optimization – an additional cost.

To remain successful, a platform must retain its complementors and therefore implement measures to make multi-homing difficult. For example, e-books purchased for use upon Amazon's Kindle cannot be easily ported to other viewing devices. Another tactic is to prevent entrepreneurs from informing their audience/customers that they are moving to another platform, or even that they offer content on another platform. For example, YouTube cracked down on creators that promoted their streams on the competitor platform, Twitch. Creators that did such promotions had their accounts terminated with no warning (Vincent, 2018). Multi-homing is a common response for DE, but almost always is resisted by the platform.

6.2 Diversification of income sources

Diversification of income sources is another strategy to ease dependence. On certain platforms it is possible to establish a variety of income streams. For example, YouTubers that have large followings can leverage them to create income sources beyond those generated by advertising. As **Figure two** illustrates, YouTubers leverage their audience to generate income from personal appearances, merchandise sales, in-video product placements, offer paid content such as classes, etc. Because advertising income is low, for all but the most successful YouTubers, some combination of other income sources are vital. Not surprisingly, this can expose a tension between the DEs' intent upon diversifying their income streams and the platform aiming to

increase income and prevent detection. 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 the YouTubers' appeals 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).⁵

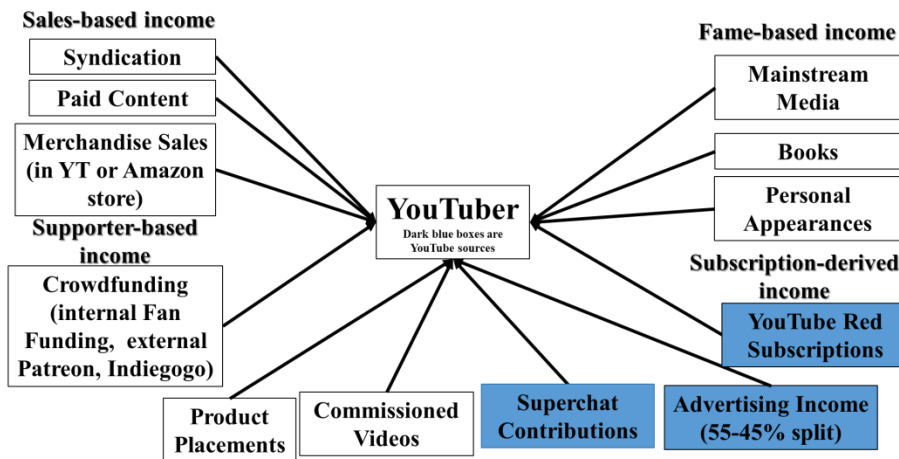


Figure Two: The Diversified Income Streams for YouTubers

The ultimate problem for owners is when the complementor develops alternative sources of income to the point at which 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 self-publishing to launch their careers and the most successful can move to traditional publishers. A final example are the successful online brands that establish physical stores, in part, to diversify due to the fact that their online operations are entirely dependent upon platforms such as Amazon or Instagram. Cultivating alternative income sources can counterbalance platform dependency.

6.3 Collective action

Collective action by DEs can include a wide range of actions. These range from complementors

⁵ To better control sponsorships, in 2016 YouTube acquired FameBit, a firm that connects creators with brands and sponsorships. Here, YouTube created a direct competitor with the larger ecosystem where 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 better visibility into the success rates of advertisements.

forming user forums where they can 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, DE may leave 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, despite the fewer organizing tools 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 particular case, the DEs had alternatives, were tightly networked, and there was little prospect of replacements, such as would occur if, for example, YouTubers withheld videos en masse.

Generally, DE 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 each other. Moreover, when there are websites established for interacting and discussing various issues, they have no way of excluding platform representatives from participating incognito. Effectively, 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 each other, then it may be possible for them to disintermediate the platform for future transactions. Such disintermediation is most likely to occur when repeated interactions build trust. With sufficient trust, through an off-platform communication medium, DE can connect directly with their customers, thereby excluding the platform and sharing the platform's fees. Disintermediation is an existential threat for a platform, since circumvention unequivocally damages the platform owner's power (Zhu & Iansiti, 2019).

6.5 Legal Action

Because the relationship between the platform and its DE has largely been the province of contract law, there has been comparatively little litigation by complementors as they joined the platform voluntarily and can leave freely. This may be changing as the European Union competition authorities have investigated and fined some platforms for violations. In the U.S., there has been some greater attention to platforms such as Amazon (Khan 2016). In other countries, there have been actions. In India, for example, 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 their complementors. Where the complementors may be viewed as workers such as is the case with Uber and Lyft, there have been a series of court cases arguing 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 are 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 DEs is unknown.

6.6 Summation

As we have shown, DEs actively prosecute strategies aimed at weakening the platform's grip. The strategies to counterbalance the platform's power can be effective, but they are costly especially from smaller firms. Not unexpectedly, the platform will either passively or actively oppose attempts 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 commons (Hardin 1968). However, the curation role, in the case of platform firms, is conducted by an interested party and therefore may lead to judgements in its own favor.

7. Discussion and conclusion

Platforms have already 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 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 owner and complementor is discussed, it is in terms of commensalism and mutual benefit. Clearly, the platform owner as the provider of tools and ecosystem curator is necessary and deserves compensation. And yet, the power asymmetries are so stark that complementors are best understood as dependent entrepreneurs whose very existence depend upon the platform.

Consider again entrepreneurs in the pre-Internet platform era. Certainly, Microsoft could destroy ecosystem complementors, as Netscape discovered to its chagrin. However, for a variety of reasons including US antitrust enforcement, Microsoft was limited in its use of platform dominance to enter the business of its various complementors that were either other software vendors or personal computer producers. Today, due to consumer choice, all manner of economic activities are being organized by platforms. Whether in retailing, the production of music, news commentary or software in their infinite variety, the provision of rides or accommodations, and all manner of other products and services; both entrepreneurs and existing businesses are being integrated in platform ecosystems. Platforms provide the entrepreneurs various boundary resources to ease of market entry, access to customers, and legitimacy. In return, the entrepreneur's business is vulnerable in ways that simply were not the case in the offline world. An entrepreneur whose business is dependent upon a platform experiences a level of precarity that is far greater than the entrepreneur in the pre-platform era. The DE's business is entirely exposed to the platform owner's panoptic gaze.

Entrepreneurship and building a business has always been an undertaking fraught with risk. However, the willingness to bear this risk has been coupled with the notion that success can substantially be shaped by one's own actions -- a world within which most capable entrepreneurs build a sustainable business (Sarasvathy, 2008). Dependence upon a platform challenges such assumptions as precarity extends to the actual foundations of the business itself, as platform owners can control access to customers, prices, profit margins and even survival.

Reconceptualizing entrepreneurs in a platform economy as dependent is particularly useful when we

consider that increasing numbers of scholars are proposing that entrepreneurship is an effective response to the evolution of work to be more contingent, fluid and uncertain (Barley et al., 2017). The platform's provision of resources to entrepreneurs is a poisoned chalice, because it also locks in the entrepreneur. What is the meaning of entrepreneurship in a platform ecosystem? How can dependent entrepreneurs enact the 'emancipatory potential of entrepreneurship' (Rindova et al., 2009)? What are the entrepreneur's degrees of freedom in developing their business when the platform can identify entrepreneurs reaping Schumpeterian rents and envelope them?

Awareness of the encompassing power of these platforms is increasing and the precarity of entrepreneurs dependent upon these systems appears to be growing. A business that is not discoverable through Google's search effectively does not exist, suggesting that current discussions of regulating platforms still has not grasped the dynamics of the new business environment within which platforms are taking on god-like powers able to banish complementors from the garden, are able to see all actions in 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 only begun to become aware that these platform gods only now are beginning to act upon their powers. For example, recently the Indian government required that Amazon and Walmart-owned-Flipkart decide whether they were online retailers or sales platforms, but that they could not have both their own inventory and be an online marketplace. Our work thus contributes to the debate on the regulation of digital platforms. 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. Recently the European Commission have 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 also search engines, aimed at reinforcing trust and promoting fairness and transparency in the platform-to-entrepreneur relationship (European Commission, 2019).

What is certain is that entrepreneurship researchers must also study the power asymmetries that are inherent in the contemporary economy, if they want to understand the dynamics of these platform-organized

markets and provide a more compelling picture of entrepreneurship in the digital era.

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