A Taxonomy of Platform Envelopment: Revealing Patterns and Particularities

Sebastian Hermes
Technical University of Munich, sebastian.hermes@tum.de

Jonas Kaufmann-Ludwig
Technical University Munich, jonas.kaufmann-ludwig@tum.de

Maximilian Schreieck
Technical University of Munich, maximilian.schreieck@in.tum.de

Jörg Weking
Technical University of Munich, joerg.weking@in.tum.de

Markus Böhm
Technical University of Munich, markus.boehm@in.tum.de

A Taxonomy of Platform Envelopment: Revealing Patterns and Particularities

Completed Research

Sebastian Hermes
Technical University of Munich
sebastian.hermes@tum.de

Jonas Kaufmann-Ludwig
Technical University of Munich
jonas.kaufmann-ludwig@tum.de

Maximilian Schreieck
Technical University of Munich
maximilian.schreieck@tum.de

Jörg Weking
Technical University of Munich
joerg.weking@tum.de

Markus Böhm
Technical University of Munich
markus.boehm@tum.de

Abstract

Platform envelopment describes a competitive move whereby a digital platform enters an adjacent market. On one hand, it might enable to dethrone an established platform. On the other hand, it might give rise to the creation of platform conglomerates, which increases the concentration of private power. Therefore, platform envelopment has recently attracted significant attention from regulators and scholars. However, the traditional view of platform envelopment does not consider recent platform envelopment practices observed in research and practice. In this study, we aim to determine and structure the complexity of platform envelopment. We investigated 20 cases and developed a taxonomy of platform envelopment. We further encoded these cases into the comprehensive taxonomy and derived platform envelopment patterns and particularities. Our work contributes to research by establishing a foundation for the conceptual understanding of platform envelopment. Regulators can use this taxonomy to classify platform envelopment cases and determine potentially anti-competitive conduct.

Keywords

Digital platforms, platform envelopment, envelopment patterns, taxonomy, case study.

Introduction

"Platform envelopment," a term coined by Eisenmann et al. (2011), describes the competitive behavior of a digital platform whereby it enters an adjacent market already served by an established platform. By tying together services in the origin market with those offered in the adjacent market, the enveloper creates a multi-platform bundle and forcecloses user access to the established platform. Platform envelopment is, however, a double-edged sword. On the one hand, it enables a new platform to dethrone an established platform (Suarez and Kirtley 2012). The resulting changes in platform leadership might foster the development of technological discontinuities (Tushman and Anderson 1986) that allow new markets and services to emerge (Bower and Christensen 1995). On the other hand, platform envelopment can promote the creation of platform conglomerates, as witnessed by giant platform operators such as Amazon, Alibaba, and Google, which leads to the concentration of private power (Clemons et al. 2019; Moore and Tambini 2018; Wu 2018). This increases the likelihood that the interests of a few platform conglomerates will steer collective outcomes by becoming too big to fail and too big to regulate (Zuboff 2019). Such platform conglomerates also surround themselves with so-called "kill zones"—sectors not worth investing in, since defeat is guaranteed (Kamepalli et al. 2020)—thereby reducing venture capitalists' willingness to fund

competitive startups (Khan 2016), which ultimately reduces consumer choice and inhibits effective competition.

While platform envelopment as proposed by Eisenmann et al. (2011) helps to explain competition between rival platforms (e.g., Windows and Internet Explorer versus Netscape), it does not take into account the recent platform envelopment practices that have been observed in the literature as well as in practice. The theory neither incorporates the envelopment of orchestrated complementors, be it digital platforms (Kang 2017), physical products (Zhu and Liu 2018), or digital services (Foerderer et al. 2018), nor does it delve into the versatile role of, and the mechansmis used by, a core platform to interfere with its rivals—by rejecting updates (Kafka 2016), promoting its own platform through self-preferencing (Khan 2016), or supporting inter-platform integration (Li and Agarwal 2016). Moreover, this theory does not account for different digital platform types such as innovation and transaction platforms.

Besides increasing scholarly attention, these types of envelopment are also increasingly attracting regulatory scrutiny. For example, Amazon is currently being investigated for merchant mining and enveloping bestselling items (European Commission 2019) and Apple for enveloping music streaming (European Parliament 2019) and mobile payment (CPI 2019). Apple has for example rejected Spotify's updates in the AppStore multiple times (Kafka 2016) and only recently granted Spotify access to Siri, which is a crucial interface to reach customers (Spotify 2019). However, Apple is still blocking Spotify from being available as the default music player (Spotify 2019). Similarly, Apple is blocking access to the iPhone's contactless payments chip called the Near-Field Communication interface.

Our objective is, therefore, to capture and synthesize the versatility of platform envelopment and systematically identify its distinct characteristics and conceptual strucutures, augmenting the explanatory power of platform envelopment theory and initiating further theory-building. This is particularly important because taxonomies enable deeper understanding and analysis of complex domains (Nickerson et al. 2013), such as platform envelopment dynamics. For research purposes, a taxonomy provides an organizing structure for a body of knowledge. Specifically, in the case of platform envelopment, a taxonomy provides the groundwork for better understanding the strategic behavior of, and dynamics among, the different types of entities involved and the mechanisms used in platform envelopment. Policy scholars can use this proposed taxonomy to develop new regulatory policies for platforms, economists can investigate the welfare gains and losses of different envelopment practices, and strategy scholars can develop strategies on how established platforms can defend themselves against different types of envelopment. In practice, the proposed taxonomy offers an analytical framework for policymakers, envelopers, and defenders. The decomposition of complex envelopment practices allows policymakers to more fully understand where and in which form different types of envelopment become anti-competitive conduct. The taxnomy supports envelopers strategizing about different trade-offs, such as interfering with *versus* taking a *laissez-faire* approach to a target platform and defenders can use it to assess enveloper threats and derive competition-driven repositioning.

Therefore, this paper aims to answer the following research question: *What dimensions and characteristics distinguish the various types of platform envelopment?* This study contributes to the call for developing a taxonomy for the purpose of distinguishing between digital platform types (Constantinides et al. 2018; de Reuver et al. 2018). To fill the existing void in the literature, this article creates a taxonomy for platform envelopment and establishes its characteristic patterns and particularities. In the next section, we outline the theoretical background upon which this taxonomy is based. Subsequently, we present a three-step research approach that consists: of (1) creating a case base, (2) developing a taxonomy based on the identified cases and extant literature, and (3) empirically deriving platform envelopment patterns and particularities by applying the taxonomy to the selected cases. Finally, we discuss the anti-competitive outcomes and practices promoted by platform envelopment and potential regulatory remedies

Related Work

Types of Digital Platforms. In general, digital platforms encompass two types: transaction platforms and innovation platforms (Cusumano et al. 2019; Schreieck et al. 2016). **Transaction platforms** operate as intermediaries between two or more user groups and facilitate transactions for users to share, trade, or access a variety of goods and services (Cusumano et al. 2019). These platforms create

value by enabling the interactions of distinct user groups (Hermes et al. 2019; Rochet and Tirole 2003). Usually, the value of users increases with the number of users on the other side of the platform (Caillaud and Jullien 2003), a phenomenon referred to as *indirect network effects* (de Reuver et al. 2018). While the concept of transaction platforms can be found in various non-digital business models, digital technology enables the efficient scaling of such platforms. By contrast, **innovation platforms** "consist of common technological building blocks that the owner and ecosystem partners can share in order to create new complementary products and services, such as smartphone apps […]" (Cusumano et al. 2019). Innovation platforms leverage three key features: the platform core, boundary resources, and complements. Along with users and complementors, these features refer to the *platform ecosystem*. The *platform core* is usually owned by the platform leader and described as an extensible code base that provides basic functionality to modular services (Tiwana et al. 2010). Each *modular service* is a software sub-system capable of extending the functionality of the platform core (Baldwin and Woodard 2009). *Boundary resources* (Ghazawneh and Henfridsson 2013) are interfacing and supporting resources, such as application programming interfaces (APIs), software development kits, and online marketplaces, that allow the platform leader to orchestrate complementary innovation by co-creating value with external complementors (Hein et al. 2019b). While *complementors* are the actors that develop, for example, applications or hardware, *complements* refer to the individual apps or hardware themselves (Hein et al. 2019a).

Platform Envelopment. Eisenmann et al. (2011) proposed platform envelopment as a new approach to how platforms can overcome barriers to entry and conquer other platform-mediated markets. Eisenmann et al. (2011) define platform envelopment as the "entry by one platform provider into another's market by bundling its own platform's functionality with that of the target's so as to leverage shared user relationships and common components." Hence, the enveloper ties its services in the origin market with those offered in the targeted market and creates a multi-platform bundle that leverages shared user relationships. In the next step, the enveloper forecloses the target platform access to the core platform and users and thereby captures the network effects of the target platform (Cennamo 2019).

A related stream of platform envelopment research extends Eisenmann et al.'s (2011) original conceptualization to explore the envelopment of complementary platforms (Foerderer et al. 2018; Kang 2017; Li and Agarwal 2016; Wen and Zhu 2019). This stream understands platform envelopment as platform owners entering their ecosystem by either developing applications on their own or acquiring third-party applications, thereby competing directly with their complementors. Kang (2017), for example, studied the coopetitive dynamics between Google's launch of Google Fit and complementary health tracking applications on Android and defines such intra-platform envelopment as "the platform owner's action of releasing a product whose functionality overlaps with that of the products already offered by platform complementors." Similarly, Li and Agarwal (2016) investigated the effect of Facebook's acquisition and integration of Instagram on complementary markets and revealed the trade-off of intra-platform envelopment. On the one hand, it allows integration efficiency between the core platform and the new platform. On the other hand, it discourages third-parties from contributing to the ecosystem as they fear the platform owner will capture their rents.

All in all, platform owners leverage the synergies of the core and the new platform by generating super-additive (Schreieck et al. 2019) and super-modular value (Jacobides et al. 2018) for consumers. Thus, after envelopment, the value of a multi-platform bundle becomes greater than the sum of the values of the individual constituent platforms. These interactions not only increase value for the consumer, they also enable the collection of a vast amount of data, which empowers the platform to leverage data across business lines to further expand its competitive position (Khan 2016; van Dijck et al. 2019).

Methodology

Since the theory on platform envelopment (Eisenmann et al. 2011) does not take into account contemporary envelopment practices, a case-based approach with various platform envelopment cases is most fitting (Yin 2017). Multiple, qualitative case studies provide an opportunity to gain an in-depth understanding (Yin, 2014) as well as conduct generalizable, cross-case analyses (Larsson 1993). Our methodology has three phases. First, we set up a case base comprised of 20 platform envelopment cases. The unit of analysis for these cases is the platform, not the platform company itself. Second, we developed a taxonomy in three iterations: (1) developing a preliminary taxonomy based on extant literature, (2) finalizing the taxonomy

based on the empirical cases, and (3) evaluating the taxonomy based on additional cases. In the last step, we derived platform envelopment patterns and particularities *via* qualitative cluster analyses as a cross-case analysis (Yin 2017) using constant comparison (Eisenhardt 1989; Weking et al. 2019b).

Creating a Case Base. Our method for case collection built upon the work of Larsson (1993). First, we identified cases with which we were already familiar. Second, we conducted a case search to identify new cases. The case search consisted of different search strategies and sources, which helped to reduce case collection bias (Larsson 1993). We relied on extant literature (e.g. Edelman and Lai 2016; Eisenmann et al. 2011; Foerderer et al. 2018; Iacobucci and Ducci 2019) as well as on business reports, news articles, and websites. To find these potential sources, we used web searches and scientific databases. We considered all active cases that involved platform envelopment and for which sufficient information was available. We aimed to capture a variety of platform envelopment practices such as internal development *versus* acquisition (Li and Agarwal 2016), envelopment of complementors (Zhu and Liu 2018) *versus* competitors, intervening with the target (Spotify 2019) *versus* taking a *laissez-faire* approach, and enveloping by leveraging control over an operating system (European Commission 2018) *versus* an online service (European Commission 2017). We identified 20 cases in total. We stored all data in a central case base (Yin 2017) and tried to find additional sources for each case. When possible, we triangulated the data by synthesizing the findings from all sources for a case, which helped us to build a more profound understanding. Such data triangulation helps to increase the construct validity of a case study (Yin 2017). Table 1 provides a list of all cases.

Table 1: Overview of Cases Analyzed

Iteration	Core Platform	New Entity	Analyzed Sources
Second Iteration: 14 relevant envelopment cases	Airbnb	Airbnb Adventures	4
	Amazon Marketplace	Third-party products	6
	Android	Google Photos	6
	LinkedIn	Job Listings	5
	Windows	Internet Explorer	7
	Android	Google Fit	6
	Android	Google Chrome	4
	Google Search	Google Hotel	5
	Google Search	Google Shopping	7
	Facebook	Instagram	6
	App Store	Apple Music	4
	iPhone	Apple Health	5
	Facebook	WhatsApp	4
	Spotify	Ringer	5
Third Iteration: Six relevant envelopment cases	Android	Google Search	6
	Uber	Uber Eats	4
	Google Search	Google Flight	5
	iPhone	Apple Pay	5
	iOS	Apple Music	4
	Fire OS	Prime	4

Developing a Taxonomy. We applied the iterative method of Nickerson et al. (2013) for the purpose of taxonomy development. This method has proven in several information systems studies to derive valuable knowledge about underlying organizing structures (e.g. Weking et al. 2019a). Moreover, it follows a holistic approach to successfully combine theoretical knowledge and empirical insight. In the first step, we defined two meta-characteristics (MCs) based on the concept of platform envelopment proposed by Eisenmann et al. (2011): core platform and new platform. Next, we used the eight objective and five subjective ending conditions utilized by Nickerson et al. (2013) for terminating the iterative method. For example, Nickerson et al. (2013) proposed checking after each iteration if "at least one object is classified under every characteristics of every dimension" (objective) and if "the number of dimensions allow the taxonomy to be meaningful without being [...] overwhelming" (subjective). Then, we iteratively developed the taxonomy. In the first iteration, we applied the conceptual-to-empirical approach and derived dimensions and characteristics based on extant literature. The second iteration consisted of the empirical-

to-conceptual approach whereby we applied the taxonomy to 14 case studies and conducted a qualitative structured data analysis (Miles et al. 2013). We coded the case information and empirically derived characteristics (within-case analysis) (Yin 2017). Then, we classified the cases within the taxonomy and, if necessary, added further characteristics and dimensions to the taxonomy until all cases were included. For example, we reframed the MC "new platform" to "new entity" to deal with the fact that it is not only platforms that get enveloped but also physical products and digital services. Table 2 provides an overview of how qualitative raw data were aggregated into the taxonomy.

Table 2: Exemplary Coding Extract

Source	Relevant paragraph	Taxonomy dimension	Taxonomy characteristic
(Li and Agarwal 2016)	• "After the acquisition, Facebook continued to run Instagram as an independent application […]." • "[…] a partial integration was made […] between Instagram and Facebook."	• Origin • Availability • Relationship with the core	• Acquired • Outside of core platform ecosystem • Simple integration

We dropped and synthesized characteristics and dimensions to keep the taxonomy lean without losing discriminative power. The third iteration also applied the empirical-to-conceptual approach. We used the taxonomy to code an additional six cases (Miles et al. 2013). Again, we used multiple sources and triangulated the data to corroborate results (Yin 2017). The analysis and comparison of the cases did not require adding or modifying any of the characteristics or dimensions. All of the other ending conditions were met. We, therefore, stopped the process as the resulting taxonomy can be applied to all cases.

Derivation of Platform Envelopment Patterns. The platform envelopment patterns have been derived using a qualitative analysis approach. First, we encoded the cases in a matrix in which each row of the matrix represented a case and each column represented a dimension in the taxonomy. Each cell, then, represented the specific characteristic of each case for a chosen dimension. Based on the matrix, we performed a qualitative cluster analysis as a cross-case analysis (Yin 2017) using constant comparison (Eisenhardt and Graebner 2007). The analysis of similarities and differences across cases revealed three platform envelopment patterns and four sub-patterns as well as two platform envelopment particularities.

Results

Taxonomy. The derived taxonomy for platform envelopment actors consists of four MCs and 11 dimensions with two to four distinct characteristics for each. Table 3 illustrates the taxonomy structure.

Table 3: A Taxonomy of Platform Envelopment

MC	Dimension	Characteristics			
Core platform	*Type of platform*	Innovation platform		Transaction platform	
	Envelopment direction	Vertical		Horizontal	
	Position in layered architecture	Hardware and Operating System	Operating System	Online Service	
	Target	Competitor		Complementor	
	Interaction with target	Interference		Laissez-faire	
	Market dominance	Yes		No	
New entity	*Type of entity*	Innovation platform	Transaction platform	Digital service	Physical product
	Origin	Self-developed		Acquired	
	Part of platform conglomerate	Yes – exponential super-additive value		No – limited super-additive value	
	Availability	Inside of core platform ecosystem	Outside of core platform ecosystem	Inside and outside of core platform ecosystem	
	Relationship with core platform	Simple Integration	Self-preferencing	Pure Bundle	

Platform Envelopment Patterns. We identified three patterns and four sub-patterns for platform envelopment. At the highest level, we differentiated between horizontal envelopment of platform competitors (Pattern 1), vertical envelopment of platform competitors (Pattern 2), and vertical envelopment of platform complementors (Pattern 3). We refer to competitors as entities that are not orchestrated through boundary resources by the enveloper. Vertical envelopment refers to enveloping entities that represent one side of a transaction platform (e.g., moving from general search to specialized search) or that are part of the ecosystem of an innovation platform (e.g., moving from mobile operating systems to apps). In contrast, horizontal envelopment refers to enveloping entities outside of the platform's direct network. For Pattern 1 and Pattern 3, we identified two sub-patterns. For Pattern 1 we differentiated between internal and external envelopment and for Pattern 3 between soft and radical envelopment.

1. Horizontal Envelopment of Platform Competitors (n = 5). The first pattern refers to platform competition between the new platform and the target platform. No specific relationship exists between the core platform and the target platform. The core platform thereby moves into the space of horizontally competing platforms by integrating a new platform to offer the same value proposition to the targeted market. This type of envelopment does not comprise self-preference or bundling practices and follows a *laissez-faire* interaction with the target platform. *Internal Envelopment* refers to the phenomenon in which a new platform is only available inside of a core platform. Airbnb, for example, aims to envelop TripAdvisor's platform by integrating similar platform functionality of Airbnb Adventures into its core accommodation-sharing platform. Similarly, Spotify is acquiring The Ringer to integrate additional podcasts into its core music streaming platform. *External Envelopment* refers to the phenomenon whereby a new platform is only available outside of a core platform. Facebook, for example, acquired WhatsApp and offers it independently of its own app center and social network. Similarly, Uber built UberEats and operates it as a standalone platform independent of its core ride-hailing platform.

2. Vertical Envelopment of Platform Competitors (n = 4). The second pattern refers to platform competition between the new platform and the target platform as well. The core platform is used by the target platform to reach users. The core platform thereby moves into the space of vertically competing platforms by self-preferencing a self-developed or an acquired platform in order to offer the same value proposition to the targeted market. This type of envelopment uses self-preferencing practices (such as higher rankings and prominent placements) as well as interference mechanisms (such as demoting rivals, algorithmic opacity, and limiting interoperability) to envelop vertical platform competitors. A typical example is Google Search and Google Shopping (European Commission 2017; Iacobucci and Ducci 2019). In this case, Google Search, as a dominant entry point for consumers to online information, is leveraged for prominent Google Shopping placement and to demote rivals in its search results. According to the European Commission (2017), Google abused the algorithmic black box of Google Search and included criteria to deliberately demote competing services such as Foundem (Manne 2018).

3. Vertical Envelopment of Platform Complementors (n = 9). The third pattern refers to platform competition in a coopetitive setting. While the target platform complements the core platform, it competes with the new platform at the same time. The core platform thereby moves into the space of a vertically complementing platform to offer the same value proposition to the targeted market. This can happen in two ways. *Soft Envelopment* refers to the phenomenon by which the enveloper offers a new platform but does not use its core platform to self-preference or bundle its new platform, nor does the core platform interfere with complementary platforms. Hence, the platform company launches the new platform and simply integrates it with its core platform without further using its core to jump start its new platform. Google's launch of Google Fit provides an example of this sub-pattern (Kang 2017). *Radical Envelopment* refers to the phenomenon by which the enveloper offers a new platform and uses its core platform to self-preference or bundle its new platform and interfere with target platforms. Hence, the core platform deliberately privileges its new platform and deliberately aims to block target platforms. The current battle between Apple and Spotify illustrates this pattern (European Parliament 2019). Apple, for example, pre-installs Apple Music on its iPhone operating system (iOS), sets Apple Music as the default for Siri, and disregards its own App Store rules (Spotify 2019). At the same time, Apple uses its App Store policies to reject updates from Spotify and uses control over its iOS to delay Spotify's access to Apple's smart watch and smart speaker (Spotify 2019).

Platform Envelopment Particularities. We identified two platform envelopment particularities that support the finding that not only are digital platforms being enveloped, but so are physical products

and digital services. The **envelopment of physical products (n = 1)** refers to the phenomenon wherein a digital transaction platform enters into a third-party sellers' product space to compete against them directly. Thus, the platform itself resells third-party products in its own marketplace. This form of envelopment allows the enveloper to leverage economies of scale, which it can use to reap higher profits or lower costs for consumers (Zhu and Liu 2018). The related case stems from Amazon, which uses its marketplace to envelop the product spaces of its complementors (European Commission 2019; Zhu and Liu 2018). In contrast, the **envelopment of digital services (n = 1)** refers to the phenomenon in which a digital innovation platform enters its ecosystem to envelop existing digital services already provided by its complementors. Therefore, the platform itself now offers the service that had previously been solely offered by its complementors. This approach also reflects vertical envelopment, but targets a different type of complementor than traditional platform envelopment. This form of envelopment allows the enveloper to leverage new data streams to improve its competitiveness. The related case stems from Google, which released its photo app in 2015 (Foerderer et al. 2018).

Discussion, Limitations, and Future Research

Our findings suggest two interdependent areas for regulatory discussion: vertical envelopment and anti-competitive envelopment practices. While vertical envelopment reduces the revenue of complementors and can, therefore, induce them to leave the platform, it also offers multiple advantages to the platform owner. Vertical envelopment offers the possibility of capturing the rents of complementors and competitors, increasing integration efficiencies (Li and Agarwal 2016), creating super-additive and modular value (Jacobides et al. 2018; Schreieck et al. 2019), and controlling platform evolution. By leveraging vertical envelopment, platform owners are increasingly converging towards platform conglomeration. Platform conglomerates not only profit from network effects and winner-take-all dynamics, they also profit from self-reinforcing data feedback loops, meaning that they can leverage data from one platform to improve another platform or to build a superior platform. Such *platform conglomerate advantages* enable platform owners to sustain market dominance in their core platform(s) and easily establish new dominant platforms, harnessing even more data and reinforcing the feedback loop (Khan 2016; van Dijck et al. 2019). As a result, traditional incumbents as well as startups that do not profit from these advantages lack critical consumer and market knowledge and big data sets to leverage new technologies such as artificial intelligence. Hence, platform conglomerate advantage impedes new market entry, creates immense barriers to entry, increases the concentration of private power, and restricts effective competition.

Aside from the problems of vertical envelopment, our results also illustrate how envelopment practices can be anti-competitive. From the perspective of the core platform, two types of envelopment practices should be considered: first, how to treat complementors and competitiors, and second, how to treat the new platform. Amazon, for example, uses standard agreements with independent sellers on its platform to collect and analyze their transaction data (European Commission 2019). This allows Amazon to identify successfully selling products or products that Amazon could help to improve by integrating them with complementary Amazon services. At the same time, Amazon can use its control over the marketplace to easily promote these products and demote competing ones. Since Amazon is also one of the largest marketplaces, it can sell large amounts of these products and thereby builds up significant bargaining power towards the suppliers of these products (Foerderer et al. 2018). By exploiting its bargaining power, Amazon can sell these products at a lower cost, outcompeting the product complementors and further strengthening its market dominance. While Amazon is under regulatory scrutiny for such practices (European Commission 2019), Google has already been fined for similar practices such as tying, prominent placement, and demotion of rivals (European Commission 2017; European Commission 2018) and Apple is also under investigation for limiting interoperability (European Parliament 2019) and denying access to its NFC chip for mobile payments (CPI 2019).

Instead of scrutinizing and regulating single anti-competitive practices, we propose reevaluating the concept of vertical envelopment. Our findings suggest that vertical envelopment leads to conflicts of interest, for example, Amazon owning and participating in its own marketplace, Google owning general search and participating in specialized search, or Apple owning the App Store and participating in its own ecosystem. These vertical envelopments create tensions that often involve anti-competitive conduct, either between the core platform and the target or the core platform and the new entity. Related industries, such as American banking, faced similar challenges in the past. As a result, banking laws were changed to require

the separation of banking and commerce (Shull 1999) and prohibit banks from entering markets other than those in the business of banking. The laws are maintained to ensure the fair and efficient allocation of credit, prevent the concentration of power in the banking industry and counteract possible anti-competitive banking practices (Khan 2016). Similar to banks, platform conglomerates are prone to concentration and conflicts of interest. Moreover, their core platforms can be considered critical infrastructure (e.g., Amazon's marketplace or Google Search). Therefore, in order to limit these issues, it might be worth drawing on related laws and considering banning or restricting vertical envelopment practices.

Our work contributes to platform research by extending the original theory on platform envelopment by integrating: (1) the view of intra-platform envelopment and (2) how a core platform interacts with new and target platforms. Our taxonomy, thereby, augments the boundaries of platform envelopment and eases the differentiation between other platform entry strategies (Karhu and Ritala 2020). Regulators can use our taxonomy to classify platform envelopment cases for the purpose of deriving potential anti-competitive conduct. While this taxonomy cannot be used to identify anti-competitive conduct *per se*, it can enable the early identification of cases that might be prone to anti-competitive behavior. For example, the taxonomy's patterns reveal that radical platform envelopment and vertical envelopment of platform competitiors is, for the most part, accompanied by anti-competitve conduct. In addition, this taxonomy can assist in the determination of whether potentially anti-competitive conduct is occurring between the core platform and the new platform or between the core platform and the target platform. Envelopers can this the taxonomy to formulate strategies and make decisions regarding various trade-offs and the associated risks, such as acquiring a target platform (integration risk) *versus* building its own platform (risk of late entry), or interfering with a target platform (risk of regulatory scrutinity) *versus* taking a *laissez-faire* approach to the target platform (risk of single-homing and failing to solve the chicken-and-egg problem). Defenders can use the taxonomy to assess the threat of platform owner entry (e.g., soft *versus* radical envelopment) and derive competition-driven repositing (Wen and Zhu 2019).

This study has several limitations. First, we use products/platforms as unit of analysis which reflects our framing of vertical and horizontal envelopment. We regard for example the move from a core platform (e.g. iOS) into its complementary market (e.g. music streaming apps) as vertical envelopment. Other conceptualizations are possible. For example, Apple's selling of the iPhone (including Hardware, iOS, and the AppStore) can be regarded as one line of business and Apple's move into music streaming as another line of business. Thus, it is possible to argue that Apple is horizontally integrating and only uses one line of business (iPhone) to distribute and sell another horizontal line of business (music streaming). Second, the taxonomy has not been externally validated by confirmatory expert interviews or focus groups. Third, the taxonomy has been developed with the aim to theoretical understand the versatility of platform envelopment and therefore incorporates as diverse cases as possible. Changes to corporate conduct (such as Google unbundling its shopping service from search) are not reflected in the cases. Finally, platform envelopment is a dynamic interplay whereas the taxonomy is limited to a static point of view.

Our review of existing literature reveals that most scholars take the perspective of the enveloper. Within this perspective, future work can draw on the three patterns identified herein and investigate their performance. Previous envelopment cases have indicated that not all envelopment attacks are successful so it is fruitful to better understand why some envelopment strategies succeed and others do not. Since platform envelopment is dynamic in nature, the author's call for longitudinal studies to reveal how changes in strategic behavior influence envelopment performance. Besides extending our understanding of the enveloper, we propose future research to take the perspective of policymakers, consumers, and defenders in addition to envelopers. Future work on platform regulation can use our taxonomy and patterns to derive new policies such as restricting vertical envelopment and prohibiting interference. Future work should thereby assess which policy interventions might limit potentially anti-competitive conduct without reducing the efficiencies generated by platform conglomeration. Future work taking the consumer perspective into account is encouraged to explore the impact of platform envelopment on consumer welfare. While recent work indicates that platform envelopment can reduce innovation and increase prices as well as shift innovation to new apps (Wen and Zhu 2019), the question remains whether the welfare gain is larger than the welfare loss. Lastly, we encourage an exploration of the target's perspective to analyze their strategic defensive moves against envelopment attacks. Case studies and configurational analyses might reveal which interplay of factors is most suitable to fending off envelopment attacks.

References

Baldwin, C.Y., and Woodard, C.J. 2009. "The Architecture of Platforms: A Unified View," in *Platforms, Markets and Innovation*, A. Gawer (ed.). Cheltenham, UK: Edward Elgar Publishing, pp. 19-44.

Bower, J.L., and Christensen, C.M. 1995. "Disruptive Technologies: Catching the Wave," *Harvard Business Review* (73:1), pp. 43-53.

Caillaud, B., and Jullien, B. 2003. "Chicken & Egg: Competition among Intermediation Service Providers," *RAND Journal of Economics* (34:2), pp. 309-328.

Cennamo, C. 2019. "Competing in Digital Markets: A Platform-Based Perspective," *Academy of Management Perspectives* (In-Press).

Clemons, E.K., Krcmar, H., Hermes, S., and Choi, J. 2019. "American Domination of the Net: A Preliminary Ethnographic Exploration of Causes, Economic Implications for Europe, and Future Prospects," *Proceedings of the 52nd Hawaii International Conference on System Sciences*, Hawaii, USA.

Constantinides, P., Henfridsson, O., and Parker, G.G. 2018. "Introduction—Platforms and Infrastructures in the Digital Age," *Information Systems Research* (29:2), pp. 381-400.

CPI. 2019. "Eu: Regulator Looking into Applepay over Antitrust Concerns." Retrieved 19.02., 2020, from https://www.competitionpolicyinternational.com/eu-regulator-looking-into-applepay-over-antitrust-concerns/

Cusumano, M.A., Yoffie, D.B., and Gawer, A. 2019. *The Business of Platforms: Strategy in the Age of Digital Competition, Innovation, and Power*. New York, NY: HarperCollins Publishers.

de Reuver, M., Sørensen, C., and Basole, R.C. 2018. "The Digital Platform: A Research Agenda," *Journal of Information Technology* (33:2), pp. 124-135.

Edelman, B., and Lai, Z. 2016. "Design of Search Engine Services: Channel Interdependence in Search Engine Results," *Journal of Marketing Research* (53:6), pp. 881-900.

Eisenhardt, K.M. 1989. "Building Theories from Case Study Research," *Academy of Management Review* (14:4), pp. 532-550.

Eisenhardt, K.M., and Graebner, M.E. 2007. "Theory Building from Cases: Opportunities and Challenges," *Academy of Management Journal* (50:1), pp. 25-32.

Eisenmann, T., Parker, G., and Van Alstyne, M. 2011. "Platform Envelopment," *Strategic Management Journal* (32:12), pp. 1270-1285.

European Commission. 2017. "Antitrust: Commission Fines Google €2.42 Billion for Abusing Dominance as Search Engine by Giving Illegal Advantage to Own Comparison Shopping Service." Retrieved 01.05., 2019, from http://europa.eu/rapid/press-release_IP-17-1784_en.htm

European Commission. 2018. "Antitrust: Commission Fines Google €4.34 Billion for Illegal Practices Regarding Android Mobile Devices to Strengthen Dominance of Google's Search Engine." Retrieved 01.05., 2019, from http://europa.eu/rapid/press-release_IP-18-4581_en.htm

European Commission. 2019. "Antitrust: Commission Opens Investigation into Possible Anti-Competitive Conduct of Amazon." Retrieved 23.10., 2019, from https://europa.eu/rapid/press-release_IP-19-4291_en.htm

European Parliament. 2019. "Official Complaint by Spotify against Apple for Discrimination and Apple Music's Unfair Advantage over Spotify: The Power of Digital Platforms." Retrieved 19.02., 2020, from https://www.europarl.europa.eu/doceo/document/E-9-2019-002996_EN.html

Foerderer, J., Kude, T., Mithas, S., and Heinzl, A. 2018. "Does Platform Owner's Entry Crowd out Innovation? Evidence from Google Photos," *Information Systems Research* (29:2), pp. 444-460.

Ghazawneh, A., and Henfridsson, O. 2013. "Balancing Platform Control and External Contribution in Third-Party Development: The Boundary Resources Model," *Information Systems Journal* (23:2), pp. 173-192.

Hein, A., Schreieck, M., Riasanow, T., Setzke, D.S., Wiesche, M., Böhm, M., and Krcmar, H. 2019a. "Digital Platform Ecosystems," *Electronic Markets* (30:1), pp. 87-98.

Hein, A., Setzke, D.S., Hermes, S., and Weking, J. 2019b. "The Influence of Digital Affordances and Generativity on Digital Platform Leadership," *Proceedings of the 40th International Conference on Information Systems*, Munich, Germany.

Hermes, S., Böhm, M., and Krcmar, H. 2019. "Business Model Innovation and Stakeholder Exploring Mechanisms and Outcomes of Value Creation and Destruction," *Proceedings of the 14th International Conference on Wirtschaftsinformatik*, Siegen, Germany.

Iacobucci, E., and Ducci, F. 2019. "The Google Search Case in Europe: Tying and the Single Monopoly Profit Theorem in Two-Sided Markets," *European Journal of Law and Economics* (47:1), pp. 15-42.

Jacobides, M.G., Cennamo, C., and Gawer, A. 2018. "Towards a Theory of Ecosystems," *Strategic Management Journal* (39:8), pp. 2255-2276.

Kafka, P. 2016. "Spotify Says Apple Won't Approve a New Version of Its App Because It Doesn't Want Competition for Apple Music." Retrieved 19.02., 2020, from https://www.vox.com/2016/6/30/12067578/spotify-apple-app-store-rejection

Kamepalli, S.K., Rajan, R.G., and Zingales, L. 2020. "Kill Zone," *University of Chicago, Becker Friedman Institute for Economics Working Paper* (2020-19).

Kang, H.Y. 2017. "Intra-Platform Envelopment: The Coopetitive Dynamics between the Platform Owner and Complementors," *Academy of Management Proceedings* (2017:1).

Karhu, K., and Ritala, P. 2020. "Slicing the Cake without Baking It: Opportunistic Platform Entry Strategies in Digital Markets," *Long Range Planning* (In-Press).

Khan, L. 2016. "Amazon's Antitrust Paradox," *Yale Law Journal* (126:3), pp. 710-805.

Larsson, R. 1993. "Case Survey Methodology: Quantitative Analysis of Patterns across Case Studies," *Academy of Management Journal* (36:6), pp. 1515-1546.

Li, Z., and Agarwal, A. 2016. "Platform Integration and Demand Spillovers in Complementary Markets: Evidence from Facebook's Integration of Instagram," *Management Science* (63:10), pp. 3438-3458.

Manne, G.A. 2018. "The Real Reason Foundem Foundered," *ICLE Antitrust & Consumer Protection Research Program, White Paper* (2018-02).

Miles, M., Huberman, A., and Saldana, J. 2013. "Qualitative Data Analysis: A Methods Sourcebook." Thousand Oaks, CA: Sage Publications.

Moore, M., and Tambini, D. 2018. *Digital Dominance: The Power of Google, Amazon, Facebook, and Apple*. Oxford, UK: Oxford University Press.

Nickerson, R.C., Varshney, U., and Muntermann, J. 2013. "A Method for Taxonomy Development and Its Application in Information Systems," *European Journal of Information Systems* (22:3), pp. 336-359.

Rochet, J.-C., and Tirole, J. 2003. "Platform Competition in Two-Sided Markets," *Journal of the European Economic Association* (1:4), pp. 990-1029.

Schreieck, M., Clemons, E.K., Wiesche, M., and Krcmar, H. 2019. "Competing with Giant Platform Operators: An Analysis of Which Traditional Manufacturing Companies Are at Risk from Strategic Dependence on Other Companies' Platforms in the Emerging Era of the Internet of Things," in: *Platform Strategy Research Symposium*. Boston, USA.

Schreieck, Maximilian, Manuel Wiesche, and Helmut Krcmar. 2016. Design and governance of platform ecosystems–key concepts and issues for future research. In *Twenty-Fourth European Conference on Information Systems* (ECIS). Istanbul, Turkey.

Shull, B. 1999. "The Separation of Banking and Commerce in the United States: An Examination of Principal Issues," *Financial Markets, Institutions & Instruments* (8:3), pp. 1-55.

Spotify. 2019. "Time to Play Fair." Retrieved 19.02., 2020, from https://timetoplayfair.com/timeline/

Suarez, F.F., and Kirtley, J. 2012. "Dethroning an Established Platform," *MIT Sloan Management Review* (53:4), pp. 35-41.

Tiwana, A., Konsynski, B., and Bush, A.A. 2010. "Research Commentary—Platform Evolution: Coevolution of Platform Architecture, Governance, and Environmental Dynamics," *Information Systems Research* (21:4), pp. 675-687.

Tushman, M.L., and Anderson, P. 1986. "Technological Discontinuities and Organizational Environments," *Administrative Science Quarterly* (31:3), pp. 439-465.

van Dijck, J., Nieborg, D., and Poell, T. 2019. "Reframing Platform Power," *Internet Policy Review* (8:2), pp. 1-18.

Weking, J., Mandalenakis, M., Hein, A., Hermes, S., Böhm, M., and Krcmar, H. 2019a. "The Impact of Blockchain Technology on Business Models–a Taxonomy and Archetypal Patterns," *Electronic Markets*.

Weking, J., Stöcker, M., Kowalkiewicz, M., Böhm, M., and Krcmar, H. 2019b. "Leveraging Industry 4.0–a Business Model Pattern Framework," *International Journal of Production Economics* (In-Press).

Wen, W., and Zhu, F. 2019. "Threat of Platform-Owner Entry and Complementor Responses: Evidence from the Mobile App Market," *Strategic Management Journal* (40:9), pp. 1336-1367.

Wu, T. 2018. *The Curse of Bigness: Antitrust in the New Gilded Age*. New York, NY: Columbia Global Reports.

Yin, R.K. 2017. *Case Study Research and Applications: Design and Methods*. Thousand Oaks, CA: Sage Publications.

Zhu, F., and Liu, Q. 2018. "Competing with Complementors: An Empirical Look at Amazon. Com," *Strategic Management Journal* (39:10), pp. 2618-2642.

Zuboff, S. 2019. *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. New York, NY: PublicAffairs.