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BREEDING GROUNDS OF DIGITAL PLATFORMS: EXPLORING THE SOURCES OF AMERICAN PLATFORM DOMINATION, CHINA'S PLATFORM SELF-SUFFICIENCY, AND EUROPE'S PLATFORM GAP

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Research paper

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Abstract

EU firms are largely dominated by American platforms in online consumer-facing markets as well as cloud computing services and are likely to face domination in further markets. In contrast, China has mainly escaped American domination and established a self-sufficient platform economy. This situation provides the opportunity to move beyond research on firm-level strategies of platform competitiveness and to assess national factors that foster the emergence and growth of digital platforms. Understanding different platform breeding grounds is essential to guide EU regulators toward a self-sufficient European platform economy and to help them protect EU firms from the risk of exploitation by dominant platforms. These insights are also important to develop a theory of platform regulation, especially as dominant platforms violate EU laws. To address this gap, this study builds upon 32 expert interviews across 7 EU countries and 19 industries. Our results indicate that in general, a fragmented market, risk-aversion, lack of local clusters, and lack of funding and, more specifically, late entrance, legacy systems, and historic dependence have led to the EU's platform gap. We discuss why and how EU regulators should intervene and propose a regulatory strategy that establishes a self-sufficient EU platform economy.

Keywords: Digital platforms, platform dominance, platform regulation, platform breeding grounds

1 Introduction

In recent years, the number and size of companies that draw upon digital platforms (Hein et al., 2019a) have increased substantially (Evans and Gawer, 2016). Their emergence has transformed the way people communicate (e.g. Facebook and WeChat), search for information (e.g. Google and Baidu), pay online (e.g. PayPal and Apple Pay), and utilize services (e.g. Spotify and DiDi). Digital platforms have also transformed the way organizations distribute products (e.g. Amazon and Alibaba), find human capital (e.g. UpWork), and store data (e.g. Microsoft and Google). American online platforms such as Google Search, Apple iOS, Facebook, Microsoft Azure or Amazon's Marketplace are becoming in-

creasingly important forms of infrastructure in the EU. They are not only critical to entire industries and societies, but they are also too expensive to replicate and may be inappropriate for competition due to the loss of value created by network effects. However, while EU firms are largely dominated by American platforms in online consumer-facing markets as well as cloud computing services and are likely to face domination in further markets, China has mainly escaped American domination and establish a self-sufficient platform economy (Evans and Gawer, 2016).

Digital platforms can outcompete traditional firms (Tiwana, 2013, Parker et al., 2017), are increasingly evolving into important forms of infrastructure (e.g. Facebook in elections, Google in consumer access, and Amazon in cloud services), and may abuse their power. Therefore, it is crucial for the EU to become a dominant host of digital platforms to remain competitive and sovereign in the emerging platform economy (Parker et al., 2016). Besides providing a fertile environment for digital platforms, it is also essential for the EU to build own critical platform infrastructure as illustrated by the EU Commission (2020): “EU-based cloud providers have only a small share of the cloud market, which makes the EU highly dependent on external providers, vulnerable to external data threats and subject to a loss of investment potential for the European digital industry in the data processing market. Service providers operating in the EU may also be subject to legislation of third countries, which presents the risk that data of EU citizens and businesses are accessed by third country jurisdictions that are in contradiction with the EU’s data protection framework.” Hence, from an EU perspective, it is important to move beyond niches as they do not protect firms from the risk of exploitation by dominant platforms and their ecosystem.

To establish platform competitiveness, the EU has begun to explore different strategies. These include fighting the abuse of power by American platforms (European Commission, 2019b, European Commission, 2017, European Commission, 2018, European Commission, 2019a), supporting European platform consortia (e.g. the European Mobile Payment Systems Association), passing the General Data Protection Regulation, or initiating the new Payment Service Directive. However, to the best of our knowledge, it remains unclear *which national factors led to American platform domination, China’s platform self-sufficiency, and Europe’s platform gap in the first place and which strategies might help the EU to develop its own platform infrastructure.* These insights are essential for understanding the breeding grounds on which digital platforms do and do not flourish. They enable us to assess the role of national environments in the competitive positions of digital platforms (Porter, 1990). Without this understanding, the EU will not be able to provide a fruitful environment to foster the emergence and growth of digital platforms. This empirical setting is particularly helpful to advance platform theory. To the best of our knowledge, the literature on digital platform leadership takes the firm as level of analysis and focuses on which problems to solve to launch and scale platforms (e.g. Caillaud and Jullien, 2003, Evans and Schmalensee, 2010, Parker et al., 2016, Tiwana, 2013) and how to improve the competitive position of platforms (e.g. Cusumano and Gawer, 2002, Hein et al., 2019b, Cennamo, 2019). However, the literature neglects the national breeding grounds that have led to the creation of digital platforms in the first place. The existing research stream further neglects to consider the perspective of “the dominated” and how dominated countries need to strategize to develop their own platform infrastructure. Related research streams such as technology management and its logic of dominant designs (Suarez et al., 2015, Suarez and Utterback, 1995), institutional entrepreneurship (Garud et al., 2002, Wade, 1995), and industrial economics (Katz and Shapiro, 1994, Rochet and Tirole, 2003) also do not address these issues. We, therefore, draw upon prior work in the domains of nations’ competitive advantage (Porter, 1990, Porter, 1998), internationalization (Rothaermel et al., 2006) and national innovation systems (Mowery, 1992, Nelson, 1993).

In this paper, we aim to understand the breeding grounds for digital platform by identifying which national factors led to American platform domination, China’s platform self-sufficiency, and Europe’s platform gap based on 32 expert interviews across 7 EU nations and 19 industries. We explored executives’ beliefs about how American platforms came to dominate the European online platform infrastructure to understand what American strengths and European weaknesses may have been. We also explored their beliefs about how China has escaped American dominance and successfully warded off

their envelopment practices. We explored Chinese exceptionalism to investigate lessons that may be relevant to the EU. This study extends our prior study (Clemons et al., 2019) by providing further empirical evidence, new insights about China, and a possible strategy for the EU to develop its own platform infrastructure. The remainder of this paper is structured as follows: first, we outline our theoretical lens and synthesize prior work on American platform domination and China's platform self-sufficiency; second, we describe our methodology of interview-based field research; third, we present the national factors that our interview subjects believe led to the emergence of American and Chinese platforms and the platform gap in the EU; and finally, we explore regulatory policies that might enable companies in the EU to establish competitive platforms as part of a self-sufficient platform economy at the EU level.

2 Theoretical Lens and Related Work

The Competitive Advantage of Nations. Our study draws on the work of Porter (1990) and Porter (1998) to conceptualize breeding grounds of digital platforms to systematically analyze their role for the emergence and performance of digital platforms. Porter (1990) outlined how national environments influence the way industries compete in a global context and thereby identified five factors: Factor conditions (skilled labor, infrastructure, cost and quality of inputs), demand conditions (nature of the home-market), related and supporting industries (absence or presence of national supplier industries), firm strategy and rivalry (nature and intensity of local competition), and the role of government as catalyst and challenger. In his later work, Porter (1998) focused on the role of clusters (geographic concentration of agents in a specific field) for production, innovation, and new business formation. He also emphasized local knowledge, trust relationships and culture as basis for competition (Porter, 1998). Taken together, we propose that breeding grounds of digital platforms comprise seven national/regional attributes: factor conditions, demand conditions, related and supporting industries, firm strategy and rivalry, government agencies, culture and institutions, and local clusters. These attributes determine the emergence and performance of digital platforms within a nation/region as well as their international performance in foreign markets.

American Platform Dominance. Online consumer-facing markets are largely dominated by American platform operators (Evans and Gawer, 2016). For example, Google dominates online search (Vynck and Roache, 2019, Statista, 2019b), digital advertisement (Enberg, 2019), and mobile operating systems (Khan, 2018) whereas Facebook dominates social networks (Statista, 2019a, StatCounter, 2019) and digital advertisement (Enberg, 2019). Amazon has achieved a dominant position in online shopping (Koch, 2019, Lipsman, 2019) and is continuously expanding into new domains such as smart home and voice-based shopping. Additionally, the market of cloud services is dominated by a small number of American platform operators including Microsoft, Apple, Google, Amazon, and Salesforce (Gartner, 2019, Riasanow et al., 2020).

Previous work on the national factors that led to the emergence of dominant American platforms highlighted multiple aspects. The work of Porter (1990) on the competitive advantage of nations indicates that the availability of **private risk capital** and equity funding and the presence of a **strong local rivalry** were critical factors for the uptake of the American computer and software industry. In addition, the work of Mowery (1992)—who investigated the U.S. national innovation system—outlined the **procurement activities of the US military** in the 1950s/1960s. This was a crucial driver of the growth of start-ups and technological spill-overs in microelectronics and computers. In contrast, the military procurement activity of European governments benefited established firms in traditional markets. Mowery (1992) also argued that **antitrust policies** during that time inhibited incumbents such as AT&T from entering the commercial production of microelectronics. This allowed new firms to commercialize new computer and semiconductor technologies. While these factors led to the establishment of new software and computer firms, cultural, and risk-related factors led to the successful market entry in the EU. Rothaermel et al. (2006) showed that 445 American internet firms had already entered the European market in 2001. Their results indicated that the market entry decision was based on **low**

political and economic risks in the EU, as well as on **low cultural distance** (Hofstede, 1984), which reduces uncertainty and the cost of conducting business

In addition to reviewing the American breeding ground, we also needed to illustrate how dominant American platforms sustain and extend their domination in the EU. That is, the dynamics in platform competition may create conditions under which the sheer provision of the right breeding ground might not be enough to foster the development of their own platforms. In other words, current platform practices indicate that breeding grounds may only be effective in combination with platform regulation. Table 1 illustrates the practices used by American platforms to sustain and extend their dominance.

Table 1: Examples of practices used by American platforms to sustain and extent dominance

Mechanism	Examples
Tying	Google ties additional services to search results and places them in highlighted positions (European Commission, 2017, Iacobucci and Ducci, 2019, Edelman and Geradin, 2016). Google grants these services free traffic and therefore reduces their start hurdles (Edelman, 2015).
Bundling	Microsoft bundled its operating system with a media player (Amelio and Jullien, 2012) and its browser (Clemons and Madhani, 2010). Google used its Mobile Application Distribution Agreement to force manufacturers to pre-install Search and Chrome (European Commission, 2018).
Vertical integration & self-preferencing	Amazon is currently under investigation for using third-party data to provide high-selling products on its own, enveloping their merchants (European Commission, 2019b). Similarly, Apple is under investigation for abusing its power of the AppStore to envelop Spotify (European Parliament, 2019).
Predatory pricing	Uber was sued for setting illegal predatory prices with the intention of eliminating actual and potential ridesharing competitors (Bamberger and Lobel, 2018, Khan, 2016).
Limiting interoperability	Apple broke compatibility with RealNetworks converter by upgrading iTunes to prevent Real's music store from working on iPods (Gawer, 2011). Apple is also under investigation for denying access to its NFC chip for mobile payment (CPI, 2019).
Privacy violation	Google and YouTube violated children's privacy (FTC, 2019). Google has been illegally bypassing privacy settings on Apple iPhones to assign people to categories for advertisers (Pettit, 2019).
Illegal revenue sources in the EU	Facebook generates revenues from the support of fake news and election manipulation (Clemons, 2018).
Network effects & installed user base	Same side network effects as in the cases of Facebook or Google Search (Parker et al., 2016, Orlikowski, 2007) create exponential value to users and increases their switching costs (Evans and Schmalensee, 2008). Indirect network effects occur when advertisers become increasingly attracted to Google Search the larger its installed user base gets (Gawer and Cusumano, 2014).

Platform markets are prone to tip toward a winner-takes-all or a winner-takes-most market outcome (Cusumano et al., 2019) and to create super-additive value (Schrieck et al., 2019, Jacobides et al., 2018). This allows users to derive additional value through the interactions of their applications (e.g., the value of Android plus YouTube plus Google Maps plus Search is greater than the sum of their values as standalone offerings.) These interactions not only enhance value for users but enable the collection of vast amounts of data, which provides the advantage of using data across business lines to improve platform competitiveness (Khan, 2016, van Dijck et al., 2019). This may affect new entry because new companies do not enjoy the positive feedback loops of multiple, interacting applications. Hence, when firms compete for network effects and platform envelopment it may inhibit new firms to enter markets and to erode the advantages of dominant platforms. Therefore, technological discontinuities may not be an effective market mechanism to level the playing field (Suarez, 2004).

China's Platform Self-sufficiency. In contrast to the EU, China's firms are not dominated by American platforms. China has its own online market place (Alibaba), its own messaging and social network (WeChat and its mini programs (Cheng et al., 2020)), its own search engine (Baidu), its own ride sharing (DiDi), its own ecommerce (Taobao) (Clemons et al., 2012) and its own cloud (Alibaba and Tencent) (Wang and Rhen, 2012, Cusumano et al., 2019, Jia et al., 2018). Previous work on the national factors that led to the emergence of self-sufficient Chinese platforms investigated how foreign firms fail to cope with national factors during market entry and less on how national factors contributed to the success of Chinese platforms (Li, 2019). However, one significant factor that contributed to China's success is **government censorship**. The government blocks website content and monitors indi-

viduals' internet access and has blocked international rivals from its market (Wang and Rhen, 2012, Zeng and Glaister, 2016).

On the other hand, the literature mentions multiple aspects of why early movers in software and platform-based business models failed to cope with China's environment. First, there were **informal constraints** such as cultural distance and diverging norms (Zeng and Glaister, 2016). Second, new entrants largely ignored **subnational differences** within China, which hampered being able to achieve a critical mass of users (Zeng and Glaister, 2016). Third, **western business models** have not been modified to the Chinese market (Yang, 2019, Wang and Rhen, 2012); rather, they managed customer expectations and exploited existing practices. Fourth, foreign firms underestimated the **extreme competition** that emerged during China's late entrance (Li, 2019). Fifth, there were **problems with local partners**. On one side, closed networks with only direct partners isolated new entrants from the local market, creating a barrier for innovation (Zeng and Glaister, 2016). On the other side, foreign firms were concerned about sharing their intellectual property with Chinese partners, which impeded the creation of a domestic network in the first place (Froese et al., 2019). Sixth, **attracting and retaining talented labour** has been a major problem for foreign firms (Froese et al., 2019). Finally, foreign firms have been unable to manage **China's regulatory environment**, which changes quickly, is less transparent, and preferentially supports domestic firms (Froese et al., 2019, Li, 2019).

3 Research Design

Our exploratory and explanatory research questions resulted in a research design that combined a set of semantically rich case studies (Yin, 2017, Eisenhardt, 1989) with a partial portfolio approach to the grounded theory methodology (Strauss and Corbin, 1990, Fendt and Sachs, 2008). We, therefore, take an interpretivist stance (Conboy et al., 2012) to discover new content and fresh perspectives instead of testing theory (Locke, 2011). This seemed appropriate given the lack of theory about the national factors influencing American platform domination, Chinese platform self-sufficiency, and the European platform gap. We further argued that different interviewees were likely to perceive different factors as having different relevance, which made an iterative interplay of data collection and analysis therefore suitable. Moreover, the theory gap we identified is worth researching with an explorative, inductive approach. Due to the heterogeneousness and youth of platform theories, developing a theoretical framework and formulating hypotheses upfront was hardly feasible (Urquhart et al., 2010).

Expert Selection and Data Collection. The selection of experts represented an essential decision because their explanation of the phenomenon constitutes the subject of this study (Miles et al., 1994). We relied on different criteria to select the experts and to determine a suitable sample. We focused on experts at the executive level. If none were available, we shifted to middle management. All executives worked for European companies headquartered in the EU and had previous experience with platform domination. Hence, interviewees had experience in building platforms and/or defending against platform leaders. Multiple European nations were required in the final sample to derive generalizable conclusions, and various industries were included to control for industry specifics.

We conducted semi-structured interviews with these experts following the guidelines of Gläser and Laudel (2009). To embrace the depth and richness of the data, we construct the interviews following the exploratory stance of the grounded theory methodology (Strauss and Corbin, 1990). Hence, we iteratively revised our interview guidelines based on the insights of interviews that we had already conducted. For example, we decided to explore Chinese platform self-sufficiency in batch 4 after the data suggested that this phenomenon provides additional lessons for EU firms and EU regulators (Table 1). We also chose subsequent interview partners based on the saturation of our constructs from the data that we had already collected. For example, we continuously explored new industries and countries and, we also shifted toward interviewing consultants, academic experts, and regulatory employees that were experienced in digital platforms. We ended the interviews once new insights stopped emerging. In total, 32 interviews were conducted between May 2018 and September 2019 (Table 1). The interviews were conducted in seven European countries and include 19 different industries.

Table 2: Overview of the interviewees

ID	Batch	Industry	HQ ¹	Market	Size ²	Position ³	Duration	Documentation
26	1	Electronic engineering	Germany	B2B	Large	CIO*	around 1h	Verbatim
27	1	Insurance	Germany	B2C	Large	Group IT Governance	around 1h	Verbatim
28	1	Mobility Research	Germany	non-profit	Small	Institute chief*	around 1h	Verbatim
29	1	Telecommunication	Germany	B2C	Large	Senior Project Field Manager*	around 1h	Verbatim
30	1	Open Source Community	Germany	non-profit	Large	Division Manager Public Affairs	around 1h	Verbatim
31	1	Enterprise Software	Germany	B2B	Large	Cloud Manager*	around 1h	Verbatim
21	2	Manufacturing	Denmark	B2B	Large	CIO*	01:10:33	Transcript
22	2	Food and Beverage	Denmark	B2B	Large	Senior VP of IT*	01:02:33	Transcript
23	2	Medical Equipment	Denmark	B2B	Large	VP of Corporate IT	01:00:57	Transcript
24	2	News Publishing	Denmark	B2B/B2C	Medium	CIO*	00:57:41	Transcript
32	2	Academia	Denmark	non-profit	Medium	Professor	around 1h	Verbatim
16	3	Telecommunication	France	B2B/B2C	Large	Senior Manager for Strategic Partnerships	around 1h	Verbatim
17	3	Banking / Finance	France	B2B/B2C	Large	CIO*	around 1h	Verbatim
18	3	Broadcasting	France	B2B	Large	CIO*	around 1h	Verbatim
19	3	Aerospace	France	B2B	Large	Head of Data Governance*	around 1h	Verbatim
20	3	Ophthalmic Optics	France	B2C	Large	CIO*	around 1h	Verbatim
1	4	Fashion and Media	Germany	B2C	Small	CEO*	00:46:31	Transcript
2	4	Digital Consultancy	France	B2B	Large	Client Service Director	00:51:29	Transcript
3	4	Strategic Communications	Austria	B2B	Small	CEO	00:44:36	Transcript
4	4	Distributor of Steel and Metal Products	Germany	B2B	Large	Head of Corporate Office*	00:45:12	Transcript
5	4	Messenger Application	Germany	B2B	Small	CEO*	00:55:30	Transcript
6	4	Graduate Recruiting	France	B2C	Medium	Team Manager DACH*	00:37:13	Transcript
7	4	Sales Automation	United Kingdom	B2B	Small	CEO*	00:30:07	Transcript
8	4	Platform Advisory	Netherlands	B2B	Large	Senior Manager*	00:47:19	Transcript
9	4	Management & Strategy Consultancy	Germany	B2B	Small	CEO*	00:53:52	Transcript
10	4	Mechanical Engineering	Germany	B2B	Medium	Head of Performance Marketing	00:57:54	Transcript
11	4	Strategic and Technical Consultancy	United Kingdom	B2B	Small	Principal Consultant*	00:58:17	Transcript
12	4	Advice Community	Germany	B2C	Small	COO*	00:56:29	Transcript
13	4	Digital Service Provider, Technology Consultancy	Germany	B2B	Small	CEO	00:55:14	Transcript
14	4	Financial Software	France	B2B	Medium	General Manager DACH and CEE*	00:36:49	Transcript
15	4	Car Manufacturer	Germany	B2C	Large	Developer Infotainment Systems*	00:33:32	Transcript
25	4	Regulator	Belgium	non-profit	Large	Policy Officer - Lawyer	00:36:04	Transcript

¹ HQ = Headquarter; ² Number of Employees: small = 0 – 99; medium = 100 – 999; large = 1000+, ³ * = first-hand experience with platform domination

The interviews lasted around 1 hour on average. The interview questions covered the general background of the company, the sources within the US that lead to American domination, the sources within each country and Europe more broadly that lead to American domination and European failure, Chinese sources of platform self-sufficiency, and strategies for the EU to bridge the platform gap. To

prevent capturing stereotypes and generalization, interviewees were asked to provide specific examples. We tried to verify claims by reviewing press articles and literature. Discussed platform companies included Google, Amazon, Facebook, Uber, Airbnb, Microsoft, Apple, Baidu, Tencent, TripAdvisor, Alibaba, Twitter, SAP, Dropbox, Bosh, IBM, Slack, Spotify, and Netflix.

Coding Process. Based on our interpretivist stance, the data analysis follows open, axial and selective coding as proposed by Strauss and Corbin (1990). We started with open coding and created 210 open codes associated with the sources of American platform domination, China’s platform self-sufficiency, and Europe’s platform gap.

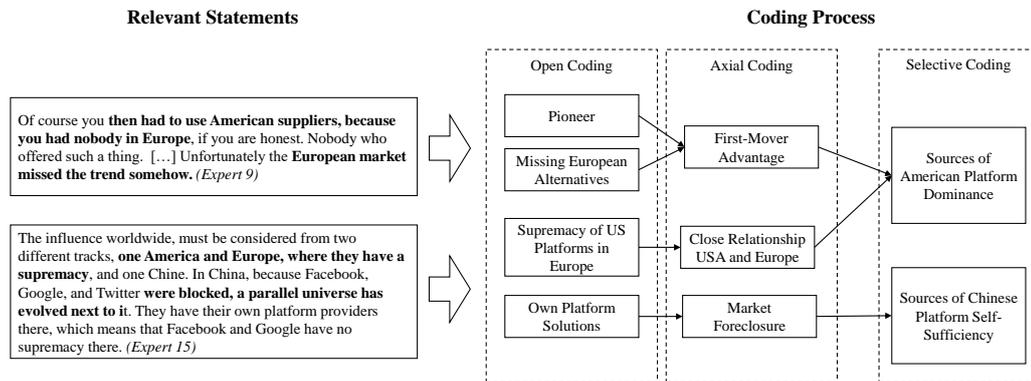


Figure 1: Illustration of the coding scheme

In axial coding, we identified 10 main categories of codes that included more than 18 subcategories. Subsequently, we conducted selective coding to relate the categories to our theoretical pre-understanding. Following the principle of constant comparison (Urquhart et al., 2010), we examine additionally collected data in light of other developed codes and extant literature.

4 Results

In the introduction, we stressed the fact that national factors are crucial aspects in assessing where dominant platforms emerged. This insight resulted completely from the interviews. Interestingly, the mechanisms for sustaining dominance were not—or were only marginally—mentioned by the interviewees.

4.1 General Sources for the Emergence of Dominant American Platforms and Self-Sufficient Chinese Platforms

Entrepreneurial and Digital Mindset. As mentioned by the expert interviews, the American work attitude is characterized by a high level of risk tolerance and entrepreneurial orientation. No matter how bizarre an idea or business model might seem, Americans will take the risk and try to make it work. Failure is therefore rather understood as gaining additional experience, instead of signaling incompetence and defeat. Executives believe that besides taking high risks, American platforms have been fully committed to their work and eager to destroy competition, no matter the sacrifices. Americans did not wait until they knew something was going to be legal; they just made sure that it was not already illegal. Such a mindset constituted a general greater openness toward innovations and, thus, promoted a digital mindset. In other words, the American openness toward innovation resulted in faster adoption and spread of new technologies without much adherence to traditional values and structures.

In terms of China, executives stated that the Chinese mindset is also characterized by a great willingness to push things forward, to focus on results, and to implement things quickly. This fostered a high acceptance and fast spread of new technologies and services such as mobile payment, social media, and e-commerce. While a digital mindset is also firmly rooted in Chinese society, there are significant differences from the US concerning failure. In China, failure is more related to public disapproval than

to the process of learning. In contrast to both the United States and China, a conservative mindset prevails in Europe. This different mindset becomes particularly apparent in the perception of new opportunities because in Europe there is a tendency to focus on the downside rather than the upside, as illustrated by Interviewee 23: *“If you talk to a German, he will tell you 1,000 good reasons why you should not start your own business: Your building savings contract, your rent, and think about your pension.”* Another difference is the attitude toward perfection, referring to the phenomenon of “engineering thinking.” Traditionally, mechanical engineering is one of the largest industries in Europe, making Europe the largest producer and exporter of machinery worldwide (Vieweg et al., 2012). This heritage has led to a mindset that always strives for perfection and never accepts solutions that are just good enough. However, such a mindset contrasts with the process of developing modern software like platforms. It also hampers new approaches, such as the minimum viable product.

Single Market. Executives agreed that the size of the single market is a major factor in creating the right breeding ground for platforms to emerge. Interviewee 12 illustrates how scalability is limited by national borders and perceived market size: *“If we think in millions of users, then we are cool; the Americans think in tens of millions of users, and in China, they are already thinking in billions of users. Because they just have the people. The scaling there is simply amazing.”* The quote highlights the importance of a large user base to facilitate the scalability of a platform and to leverage positive network effects. Otherwise, platforms might not tip toward a dominant position and establish themselves as winner-takes-all. Moreover, the American and the Chinese single market are homogenous, meaning that the languages, legislation, standards, and laws are unified. This allows platforms to easily address an extremely large potential user base without the need for regional adjustments. A large single economy, therefore, enabled platforms to create an enormous momentum, mature their technologies, and build economies of scale. As a result, American platforms were able to crush global competitors and establish a dominant position, whereas China created and sustained self-sufficient platforms. In contrast, the interviewees regarded Europe as a very fragmented market. Europe is a region with multiple languages, heterogeneous laws, differing trade and tax laws, and various national preferences. Therefore, European platforms must conduct individual rollouts for each country. This impedes their growth and speed of expansion. Furthermore, Europe lacks a unified technological ecosystem. For example, card payments are processed differently in each country. As a result, European platforms must create different nation-specific versions to adjust to local technological ecosystems. This increases cost and complexity.

State Financing. Some interviewees highlighted that the American government, more precisely the US military, was the main driver of innovation from the 1970s to the '90s, for example by laying the foundation for the internet. Even nowadays, the US government's defense- and security-focused investment firms, for example the Army Venture Capital Initiative (Army Venture Capital Initiative, 2015), are funding American technology companies that are related to a political agenda. In China, the state plays an even more important role as it substitutes conventional venture capital firms to a large extent. Hence, the government has been and continues to be a significant financier and driver of innovation. Due to the lack of democratic processes, the government can also make faster political decisions and has to cope with fewer personal rights and data protection laws. In contrast, European decision making is slow due to high bureaucracy burdens, lack of consensus on the EU level, and the limited stability of national governments. Interviewee 3 stressed this as follows: *“What annoys me is [...] that we do not get those things right in Europe; it is ‘too little too late’ what we are doing in Europe so far. This is due to our decision-making processes and also due to our political processes.”*

Local Cluster. The executives emphasized the fact that the geographic concentration of platform companies, suppliers, complementors, and venture capitalists played a key role in the successful development of digital platforms in the USA and China. Interviewee 9 described such clusters and their advantages as follows: *“On one side of the street are the platform providers and on the other side of the street are the applications providers. In other words, you try to keep the distances short and simplify the networking.”* These local clusters allow digital platforms to operate more productively and to innovate continuously (e.g. by accessing information, technology, and partners). More importantly,

new platforms such as Uber or Twitter have been growing within Silicon Valley, which may have been more difficult in isolated locations. In contrast, interviewee 13 stressed that *“I can't think of a European Silicon Valley around the year 2000”* and interviewee 8 indicated that nowadays *“in Europe it's more scattered.”* Thus, indicating that every nation aims to build its own hotspot instead of joining forces.

4.2 Specific Sources for the Emergence of Dominant American Platforms

First Mover Advantage. The executives agreed that American firms entered the market first and that early adoption of computer technology helped platform companies such as Apple and Microsoft. First-mover advantage allowed American platforms to create lock-in effects, achieve network effects, and economies of scale, gain a reputation among consumers and firms, and mature their technologies. This enabled them to establish high entry barriers for potential competitors and to exploit the winner-takes-all characteristics of platform ecosystems. Interviewee 9 emphasized that even nowadays American platforms keep exploiting first-mover advantages: *“Of course, you had to choose American [cloud] providers, because you had no one in Europe, I have to say quite honestly. No one has offered something like this.”* Moreover, American regulations were slow to adapt to platform-based business models, which could, therefore, scale quickly and cheaply. These platforms accumulated financial and human capital, and they could then compete more easily against new entrants, which faced stricter regulations, especially in the EU.

Renowned Technical Universities. According to the interviewees, early on, the United States had renowned universities in the technical areas of computer science and information systems. As a result, *“many of the big companies in Silicon Valley, they came out of the Stanford and Berkeley University network”* (Interviewee 12), as is witnessed by the fact that Stanford alumni founded Google, Yahoo, and Cisco, for example (Lebret, 2017). The close ties between the universities and the start-ups allowed emerging platforms to quickly and continuously access talent. This head start in knowledge helped to create superior technology, which in turn created new challenges and new knowledge, triggering a positive feedback loop

Historic Partnership. American platform dominance has been encouraged by the historically strong ties between Europe and the United States. This implies that the EU had little concern about American software providers. Interviewee 23 described Europe's relationship to the United States and China as follows: *“It's being perceived that the US is our friend and the Chinese are more like, you know, the threat coming in.”* Since Americans had provided technology for Europe for quite a long time, for example IBM provided espionage tools to Denmark during the Cold War, the executives emphasized that it is the norm to use American software in Europe (see also Macrakis et al., 2009). The long history of relying on American technology was also mentioned by Interviewee 24 as one reason that prevented European companies from building their own products: *“The Danes kind of gave up on building their own stuff since [...], I think the last time we did something was in the 1950s.”*

Access to Venture Capital. All the executives agreed that the immense scaling of American platforms was first and foremost due to high amounts of venture capital funding. These funding rounds were achieved because the American investors focused less on key performance indicators, such as profitability, but rather on the rapid growth of the platform and the potential behind the ideas such as controlling online gateways or harvesting big data. They were not as concerned about losing on many investments as they were on winning big on a few. Venture capital firms have been around longer in the United States than in Europe or China, and they have gathered more experience, established efficient investment structures, and built venture capital hotspots like Silicon Valley. Europe, however, lacks the willingness to invest in platform-based business models. Investors tend to avoid risky software-based business models that have global objectives. They prefer instead to invest in industry-specific solutions. This behavior might be attributed to the lack of successful European platforms. However, if this attitude remains, a vicious circle is created that impedes future investments.

4.3 Specific Sources for the Emergence of Self-Sufficient Chinese Platforms

Rivalry. As the interviewees stated, the mindset in China is heavily influenced by its rivalry with the United States over becoming the most powerful nation in the world. The Chinese government has realized that economic and technical domination, including in the realm of digital platforms, is a good way to increase its worldwide power and influence. This competition with the United States for global technological supremacy is an immense incentive and provides the motivation for China to catch up with American platforms and push them off the throne. Due to this rivalry, there is generally a lower willingness to use American software in China.

Market Foreclosure. The most evident reason for Chinese players to thrive in their domestic markets is outlined by Interviewee 15: *“In China, as a result of blocking Facebook, Google, and Twitter, a parallel universe has evolved alongside.”* Because platform dominance is sustained by limiting access to unauthorized sources of information, a parallel universe of self-sufficient Chinese platforms has evolved: Alibaba (“China’s Amazon”), Weibo (“China’s Twitter”), Baidu (“China’s Google”), QQ and WeChat (“China’s Facebook”), and Youku Tudou (“China’s YouTube”). Even though American platforms initially did not refuse to support the Chinese government’s efforts strengthen local censorship and control over society, public disapproval, and political pressure caused American platforms to change their strategy. Therefore, China engaged more thoroughly in protectionism to sustain its objectives.

Greenfield Approach. While European firms faced major issues in trying to convert their existing business models into platform-based business models, China’s less developed infrastructure provided the following advantage according to Interviewee 4: *“The market was simply not as mature as in Europe and the USA. Therefore, structures were not as fixed and perhaps not too rigid, instead, it was just a young market, which was completely open to incorporate the improvements associated with digitalization and platforms [...]”* Hence, the greenfield approach has the major advantage of being able to fully incorporate all improvements associated with digitalization and platformization, instead of taking legacy systems and rigid structures into account. This allowed China to leap for radical innovations in contrast to most European firms, which were and are mainly restricted to incremental innovations. For example, China skipped desktop computing. Once mobile computing gained momentum, the Chinese could directly leverage this trend, which enabled China to quickly adopt new approaches to software development and user experiences, as can be seen in online finance.

5 Discussion and Conclusion - The European Path to Platform Self-Sufficiency

In this section, we first summarize the historic breeding grounds of digital platforms in the United States, China, and the EU based on the interviews and related work. We use the theoretical lens of competitive advantage of nations to systematically compare the three breeding grounds. The summary is shown in Table 3. Second, we discuss why regulatory intervention is necessary for Europe’s platform self-sufficiency. Finally, we outline how regulators should intervene and propose a regulatory strategy to establish a self-sufficient platform economy at the EU level. Our recommendations are based partially on the interviews and partially on desk research because the interviewees had few suggestions for regulation and lacked economic and legal frameworks to create recommendations.

In the following section, we discuss **why regulatory intervention is necessary** for Europe’s platform self-sufficiency. Regulatory intervention becomes necessary when two conditions are met. First, when technological discontinuities do not reduce entry barriers or when changes in consumer preferences do not weaken the competitive advantage of dominant firms and second when dominant firms abuse their power and engage in illegal conduct. Hence, when markets fail to remain competitive and when firms disregard laws, dominant firms can (1) easily defend their dominant position as new entry encounters high barriers to enter and high barriers to dethrone the dominant firm and (2) dominant firms can more easily enter and conquer markets of competitors as well as completely new markets. Dominant firms

thereby expand their lines of business which increases their market power and architectural control (Cennamo, 2019). We argue that both conditions are met in the European platform economy.

Table 3: Summary of the Historic Breeding Grounds of Digital Platforms

Breeding Ground	USA	China	EU
Factor condition	<ul style="list-style-type: none"> ▪ Knowledge through skilled labor and local cluster ▪ Infrastructure through early access to computer and telecommunication technology 	<ul style="list-style-type: none"> ▪ Knowledge through local cluster and heavy investment in research and education 	
Demand condition	<ul style="list-style-type: none"> ▪ Single market ▪ Military procurement ▪ Western requirements 	<ul style="list-style-type: none"> ▪ Single market ▪ Chinese requirements 	<ul style="list-style-type: none"> ▪ Fragmented market ▪ Western requirements
Related and supporting industries	<ul style="list-style-type: none"> ▪ Venture capital ▪ Suppliers in computer telecommunication technology 		
Firm strategy and rivalry	<ul style="list-style-type: none"> ▪ Domestic rivalry ▪ Entrepreneurial and digital mindset ▪ First mover ▪ Western business practices ▪ Superior technology 	<ul style="list-style-type: none"> ▪ Entrepreneurial and digital mindset ▪ Chinese business practices ▪ High competition ▪ Greenfield approach 	<ul style="list-style-type: none"> ▪ Engineering thinking ▪ Western business practices ▪ Low competition ▪ Legacy systems
Government	<ul style="list-style-type: none"> ▪ Antitrust protected new entrance ▪ State financing 	<ul style="list-style-type: none"> ▪ Censorship ▪ Blocked foreign entry ▪ Support of domestic firms ▪ Changing and opaque environment ▪ State financing 	<ul style="list-style-type: none"> ▪ Benefited established firms
Local cluster	<ul style="list-style-type: none"> ▪ Early and concentrated 	<ul style="list-style-type: none"> ▪ Late and concentrated 	<ul style="list-style-type: none"> ▪ Late, small and scattered
Culture and Institution	<ul style="list-style-type: none"> ▪ Western culture and institutions ▪ Historic partnership with EU 	<ul style="list-style-type: none"> ▪ Chinese culture and institutions ▪ Rivalry towards the US ▪ Subnational differences 	<ul style="list-style-type: none"> ▪ Western culture and institutions ▪ Low political and economic risk ▪ Historic partnership with the US

The reason why a technological discontinuity (Suarez, 2004) may not help resides in the nature of information technology. New information-based technology such as artificial intelligence strongly builds upon large amounts of data. Such big data can easily be harvested by offering free services in exchange for personal information. The continuous increasing flow of information is then used to develop better services, which again increases the flow and scope of incoming information, generating a positive feedback loop (Zuboff, 2019, van Dijck et al., 2019). Although simplified, this model describes how American platform giants continuously develop superior technology. European firms did not engage - and are now unable to engage - in this data harvesting to the same extent as American and Chinese platforms. European firms may now be strongly limited in building up big data databases. European firms may, therefore, be hampered in their ability to exploit new technologies and to offer novel services.

At the same time, we observe that consumer preferences have not largely changed. In contrast, consumers mainly prefer convenience and targeted advertisements over privacy and security. Consumers also prefer the super-additive value creation of platform conglomerates and would lose value if they switched to less integrated platform operators. Hence, consumer willingness to prefer dominant platforms over new, small, and clean alternatives does not help new entrance. Finally, we argue that dominant platform operators are abusing their power and engage in illegal conduct to sustain and extend their dominance in Europe. Table 1 provides an overview of illegal mechanisms penalized by European regulators such as tying, bundling, vertical integration, privacy violations, and predatory pricing. Consequently, dominant platforms can harvest revenues that are not available to European firms that allow them to cross-subsidize new services and even offer them for free, foreclosing on European competition. Taking both conditions into account, we argue that regulatory intervention is necessary to create a self-sufficient platform economy in the EU.

Finally, we outline **how regulators should intervene** and propose the following regulatory strategy to establish a self-sufficient platform economy at the EU level: (1) provide a fertile breeding ground, (2) leveling the playing field and (3) cooperate and build own critical European platform infrastructure. First, the EU needs to engage in *regulatory support* by providing a fertile breeding ground to foster the emergence and growth of digital platforms. Based on the general findings from the US and China, we argue that the EU needs to provide a greater amount of financial support, either by private venture funds or state governments. Although the EU has partially resolved the critical issue of single market, it further needs to reduce the perception of risk, build digital capabilities, build European platform clusters, and foster an entrepreneurial and digital mindset.

Second, the EU needs to engage in *regulatory ban* by leveling the playing field to establish and sustain fair and transparent competition. While we have already illustrated some illegal practices that have been banned or are currently under investigation in table 1, we argue that platform regulation needs to move beyond penalizing single practices ex-post and to move towards more general frameworks that constrain platforms ex-ante. This is particularly important as banning ex-post often comes too late in the sense that dominant platforms will have already conquered a new market and new entry might have already been forced out. For example, the EU Commission forced Google to mitigate its Mobile Application and Development Agreement after Google had abused the contract to extend its dominance in web search to mobile search (European Commission, 2018). Although Google now offers European Android users to choose their default search engine when setting up their phones (Gennai, 2019), it might not restore fair competition as users might prefer the search engine with which they are most familiar with and might prefer high quality and personalized search results (technological superiority derived through prior dominance). At the same time, Google has provided financial incentives to manufacturers to circumvent the EU ruling (Amadeo, 2018). It, therefore, remains uncertain whether this ex-post regulatory ban helps European firms to develop apps for preferred locations. In contrast, constraining ex-ante provides the opportunity for setting a level playing field early on. For example, banking laws 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 fair and efficient allocation of credit, to prevent concentration of power in the banking industry and to counteract possible anticompetitive banking practices (Khan 2016). Similar to banks, dominant platforms are prone to concentration and subject to conflicts of interests when competing with their complementors. Hence, to limit these issues, it might be worth drawing on related rulings and prohibit platforms ex-ante from vertical envelopment.

We also argue that regulators need to consider the worth of unprecedented areas for regulation, such as data monopolization, information asymmetries, and data sharing. We propose that the EU might also enforce data sharing and ban the monopolization of data. While the General Data Protection Regulation allows data portability, this may only be useful once the EU has developed American platform counterparts. Otherwise, users do not have a better alternative to port their data to. Enforcing data sharing, however, goes one step further, forcing platform operators to open up their database to some extent to the public. We argue that this would not impede their competitive position; in contrast, it would diminish entry barriers for new entrants and provide more opportunities for innovation and competition.

Third, the EU needs to engage in *regulatory relief* by cooperating and building critical European platform infrastructure to gain digital sovereignty. In contrast to the findings from China, however, we do not see digital sovereignty as digital protectionism. This is not a matter of excluding foreign platforms, but rather of ensuring that European alternatives exist. Building European platform infrastructure (such as operating systems, cloud services, social media, and search) is crucial because European firms will have fewer opportunities to capture new markets in the future compared to their American counterparts. Future customer-facing online applications will call for integration into existing platforms, and European solutions could be denied access or encounter limited interoperability, whereas applications developed by American platforms themselves would be preferred. The resistance of individual European firms seems therefore unlikely, for example for competing against Alexa and Siri in

new smart home or smart assistant platforms. In contrast, European incumbents are likely to join American platforms like Volvo, which has already decided to adopt Google's Assistant (Svahn et al., 2017, Volvo Cars, 2018), and Mercedes, which is working with Apple's iOS (Mercedes-Benz, 2019).

We, therefore, encourage to continue calling and supporting joint consortia as in the case of the European Processor Initiative or Gaia-X, an initiative for a European cloud. However, the support also needs to provide regulatory relief. For example, if a consortium is required to gain a critical mass of apps, the EU must ensure that if Mercedes, BMW, and Audi cooperate in Germany, and if FIAT and Volvo join, this will not be viewed as a cartel or restraint of trade. This would directly benefit companies by reducing their dependence on American platforms, reducing their strategic vulnerability, and reducing their expense. Consumers would benefit from lower prices and from greater interoperability, allowing European firms to create increasingly integrated services. Although the EU would end up with a single platform for a specific domain, instead of dozens of small specialized platforms, this would be a single viable and relevant platform that could compete effectively and globally with dominant platforms. It would increase the number of European competitors from zero to one. Regulators would need to ensure that access was fair and inexpensive for all companies, but this would increase rather than decrease the number of viable alternatives preserving competition.

6 Contribution, Limitation, and Future Research

Our study makes several **theoretical contributions** to prior work. We confirmed that American platforms gained dominance through military support, renowned technical universities, access to venture capital, first-mover effects, local clusters, and an entrepreneurial and digital mindset (Rothaermel et al., 2006, Porter, 1990, Mowery, 1992). We extended these insights by illustrating that the large size and homogeneity of the American market, as well as its historic partnership with the EU, allowed American platforms to scale their business in their home market and to leverage network effects and benevolent relationships to quickly enter the European market. We confirmed that China's platform self-sufficiency has been achieved through market foreclosure, local clusters, state financing, and its entrepreneurial and digital mindset (Li, 2019, Zeng and Glaister, 2016, Froese et al., 2019). We augmented these factors by demonstrating that the lack of legacy systems and the political and economic rivalry with the United States have been further drivers of China's self-sufficiency. Most importantly, by drawing on Porter (1990) concept of national competitive advantage, we identify the national factors that have led to the platform gap in the EU. We further contributed to the current discussion in IS research to regulate platforms (Bazarhanova et al., 2019, Hermes et al., 2019, Mantovani et al., 2019) by discussing why and how EU regulators should intervene.

Our **contribution to practice** is three-fold. First, we outlined which national factors EU regulators need to support to foster the emergence and growth of digital platforms in the EU. Second, we discussed the role of platform regulation and encouraged regulators to move beyond penalizing single practices ex-post and to move toward more general frameworks that constrain platforms ex-ante. Third, we illustrated that the EU businesses need to cooperate with each other and build an EU critical platform infrastructure. We argue that such platforms are critical to establishing digital sovereignty in the EU and that regulators need, therefore, to provide regulatory relief for extensive industry cooperation.

Our study has multiple **limitations**. First, it is of a qualitative nature; therefore, it is limited by its small sample size and its causal power. Second, we didn't reach out to American and Chinese platform operators to triangulate our results. Third, interviewer bias may be significant. We propose two avenues for **future research**: exploring the consequences of American platform domination for the EU and further analyzing the European platform gap by conducting comparative analysis about American, European, and Chinese platform equivalents like Facebook, WeChat, and SchülerVZ.

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