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Michael Kemmerling

Business Power in Digital Capitalism

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Abstract

Each historical configuration of capitalism produces a specific form of corporate power. Changes in capitalist means of production, business models, and the organizational form of economic interactions, lead firms to control different power resources, pursue different goals, and use different political strategies. The central question of this dissertation is how business power is constituted in capitalism's most recent historical configuration – digital capitalism.

I argue that the political preferences and strategies of business in digital capitalism are grounded in a firm's position in digital ecosystems. This position, in turn, is determined by a firm's control of digital power resources. Digital power resources describe the ownership of the central raw material (data), the means of production (digital technologies), and the infrastructure (standards and platforms) of digital capitalism. The relations of production and exchange in digital capitalism take place in digital ecosystems, in which some firms control the core inputs (hubs) and some own the digital infrastructure on which the ecosystem runs (ties). Being a hub and/or owning the ties puts firms in an upstream position, because they can control access to the central inputs and infrastructures of the ecosystem – access on which the economic fate of downstream firms depends. I find that firms' position in digital ecosystems shapes their political preferences and influences their lobbying strategies. In short, how firms generate profit and how they interact with each other in the digital economy determines which means they have (digital power resources), what they want (preferences), and what they do politically (strategies).

About the author

Michael Kemmerling was a doctoral researcher at the IMPRS-SPCE from 2019 to 2023. He completed the program in conjunction with his PhD studies at the University of Cologne, Faculty of Management, Economics and Social Sciences

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Introduction

> "These social relations into which the producers enter with one another, the conditions under which they exchange their activities and participate in the whole act of production, will naturally vary according to the character of the means of production. […] The relations of production in their totality constitute what are called the social relations, society, and, specifically, a society at a definite stage of historical development […]. Ancient society, feudal society, bourgeois society are such totalities of production relations, each of which at the same time denotes a special stage of development in the history of mankind." – (Marx 1978, 207)

Each historical configuration of capitalism produces a specific form of corporate power. Rooted in differences in the specific means of production, business models, and the organizational form of economic interactions, firms control different power resources, pursue different goals, and possess different means to realize their goals. The central question of this dissertation is how business power is constituted in the most-recent historical configuration of capitalism – digital capitalism. What are the material bases of business power in digital capitalism? And how do they shape the political preferences and lobbying strategies of firms?

Past periods of capitalism each produced specific types of firms and business power. Detroit capitalism relied on vertically integrated firms backed by patient capital and a coalition of highly unionized workers and powerful managers (Boix 2019; Davis 2015). Central elements of corporate power were the physical capital that firms possessed and the workers they employed (Korpi 1985; Lindblom 1982). The collapse of wage-based growth (Baccaro and Pontusson 2016) and the advent of financialization the led to a turn to financial profits and a restructuring of firms towards the shareholder value model of corporate governance (for an overview: Van Der Zwan 2014). Since the 1980s, financial instruments have increasingly become the central means of profit generation for financial and non-financial firms (Krippner 2005). At the same time, corporate ownership became more concentrated and control more dispersed. The shift away from patient capital and toward short-term profits to satisfy inpatient stock markets and prevent hostile takeovers led to corporate restructuring. Firms became disintegrated and production was organized in a nexus-of-contracts (Davis 2015). This allowed firms to sell-off unprofitable parts and outsource production, which reduced their employment footprint and allowed firms to "rapidly scale up or down" their production capacity (Davis 2015, 15). Financial assets, control over financial infrastructure and the availability of exit options in international markets became central elements of corporate power (Braun 2020; Culpepper and Reinke 2014; Young and Pagliari 2017).

Against this backdrop, capitalism is once again being reinvented. Data, its collection and processing through digital technologies, and the digital infrastructures that underpin data collection and processing form the material basis of digital capitalism. As the means of production have changed, so have the organizational models of firms and their interactions. The dominant firms in digital capitalism are intellectual monopolies and platforms. They centralize the ownership of data and digital

technologies (intangible assets) and control the backbone for interactions in the digital world. They are the hubs around which production and exchange are organized, and they own the ties on which it takes place. Thus, inter-firm relations in digital capitalism increasingly take place in digital ecosystems which are "group[s] of interacting firms that depend on each other's activities" (Jacobides, Cennamo, and Gawer 2018, 2256) and are structured around data and digital technologies and run on digital infrastructures. This dissertation examines how the digital transformation of capitalism affects the political power of business.

While existing research has studied lobbying against digital regulation and theorized platform power (e.g. Collier, Dubal, and Carter 2018; Culpepper and Thelen 2020), it has not systematically explored how business as a political actor is rooted in the material and organizational specificities of digital capitalism. The strong focus on platforms and their coalition with consumers is an important contribution, but it neglects important aspects of business power. Digitalization cuts across economic sectors and also changes the dynamics of business power among non-platform firms in digital and increasingly digitalized sectors. Moreover, within business conflict and unity in digital capitalism cannot sufficiently be explained when only focusing on platform firms but is an important determinant of firm influence. Importantly, focusing on ad hoc coalitions in specific lobbying battles does not reveal how preferences, coalitions, and strategies are structurally determined. Only by understanding the actors and coalitions that politically reproduce digital capitalism can we understand how digitalization is changing the political institutions and growth strategies at the core of political economies.

The central argument of my dissertation is that the political preferences and political strategies of business in digital capitalism are grounded in a firms' position in digital ecosystems, which in turn is determined by a firms' control of digital power resources (DPR). Digital power resources describe the ownership of the central raw material (data), the means of production (digital technologies), and the infrastructure (standards and platforms) of digital capitalism. Digital ecosystems are the relations of production and exchange in digital capitalism. In these relations, some firms control the core inputs to digital ecosystems (hubs) and some own the digital infrastructure on which the ecosystem runs (tie-onwers). Being a hub and/or owning the ties puts firms in an upstream position vis-à-vis other firms, because they can control access to the central inputs and infrastructures of the ecosystem – access on which the economic fate of downstream firms depends. As I will outline below I find that the position in digital ecosystems – being inside (disruptors) or outside (incumbents) and being downstream or upstream – shapes the political preferences of firms and enables their instrumental strategies to influence regulation and legislation. In short, how firms generate profit and how they interact with each other in the digital economy shapes which means they have (DPR), what they want (preferences), and what they do (strategies) politically.

The three empirical chapters of this dissertation (chapters 2-4) form the building blocks of this theory of business power in digital capitalism. First, we propose new indicators to measure **digital power resources** and apply them to large firm from five different sectors in France, the USA, the UK, and Germany (chapter 2). We find not only that DPR are held by firms from all sectors in the economy, including manufacturing, but also that their sectoral distribution is shaped by national political-economic contexts.

Second, I use some of the indicators we proposed to study the strategic **preferences** of firms, i.e. their rank-order of outcomes in a given context (chapter 3). I find that the relative position of firms in digital ecosystems, either more downstream or more upstream shapes the likelihood of similar preferences. I identify two logics of the *downstream-upstream dimension* of preference formation in digital capitalism. The first logic is the *exploitative-dependency logic,* i.e. the more upstream a firm is relative to another and the more it uses this upstream position to appropriate profits the less likely is preference similarity with a firm further downstream. This is likely due to the different costs and benefits government intervention to level the playing field would impose. The second is the *community-of-fate* logic, i.e. preference similarity in light of regulatory costs imposed on the entire ecosystem. Additionally, I identify an *incumbency-disruptor dimension* of preference formation in digital capitalism that becomes evident in some of the conflicts described in chapter 2 and 4.

Third, I study whether their business model equips platforms with unique tools to pursue outside lobbying **strategies**. I find that despite an initial alignment of frames (and likely preferences) between twitter users and platforms on copyright legislation, platforms need to actively reframe the debate and increase issue salience to mobilize the wider public. They are in a unique position to do so because of the reach, frequent access, and targeting possibilities that comes with infrastructure ownership. However, the scope conditions for successful outside lobbying are the absence of strong counterframes and the existence of a unified public sphere. The consumer-platform alliance identified by previous literature thus needs to be actively created and has important contextual limitations. More in passing, I also find that intellectual monopolies and platforms pursue substantial inside lobbying strategies (chapter 4) and are unavoidable members of standard-setting consortia (chapter 2). I hypothesize in the conclusion of this chapter that this might be related to their ability to appropriate profits and knowledge from digital ecosystems.

Beyond the findings on the power resources, political preferences, and political strategies of business in digital capitalism, my dissertation contributes to the literatures on business power and digital capitalism. First, I propose the power resource approach as a novel way to link the fundamental role of business in capitalism to its political strategies. This allows for the analysis of how changes in capitalist production and exchange relations translate into a reshuffling of power relations. It

addresses the treatment of business as just another interest group in much of the literature on instrumental power and the oversight of agency in studies of structural power. Second, by rooting the preferences and strategies of business within their material ownership of infrastructure and structural means and factors of production, I account for infrastructural and structural dimensions of business power. When studying business power in digital capitalism, this results in a focus beyond the often-studied digital platform firm. I also study how intellectual monopolies and non-digital but digitalized companies are (dis)empowered by the digital transformation. Third, I contribute to the literature on digital capitalism by conceptualizing it as politically embedded. Instead of understanding the digital transformation as an exogenous and structural economic force triggering changes across political economies, I provide a theoretical framework to understand how the structural changes triggered by digitalization shape the dynamics of coalition formation and empower certain firms while disempowering others.

I derive these insights by using a combination of qualitative and quantitative methods Instead of criticizing "the other camp", I follow a rich tradition in multimethod research and demonstrate that pragmatically combining multiple methodologies utilizes their complementary strengths. In chapter 2 we develop measurements of DPR. As the quantitative operationalization of DPR is not straightforward given existing accounting standards and statistical databases, we apply our newly developed indicators in an extreme case to illustrate their usefulness and validity. In chapter 3 I combine a quantitative statistical analysis with a quantitative text analysis of firm testimonies in hearings on platform regulation and a qualitative screening of illustrative debates. This enables me to triangulate statistical findings and establish the need for more nuanced measures of how a policy imposes regulatory costs on actors. The community-of-fate logic of preference formation in digital ecosystems only became evident when using topic models and reading illustrative hearings – not statistical analyses at the bill level. In this case, quantitative text analysis and a qualitative screening of debates added important flesh to the bones of the statistical model. Finally, in chapter 4 I combined theory-testing process tracing with time-series analysis. I argue that these methods are not only compatible as they both utilize within-case evidence but also possess complementary strengths. While process-tracing allows for a detailed conceptualization of causal mechanism and the central actors and activities translating a cause into an outcome, time-series analysis allows for the collection of sequential evidence involving many actors and the operationalization of concepts such as framing and salience on a collective level. Further, I collect this within case evidence in two cases and use a cross-case comparison between a deviant and a typical case to arrive at conclusions on the scope conditions of platform outside lobbying.

Finally, a note on the limitations of this thesis and the avenues for further research that arise from it. First, I only focus on the material foundations of business power. However, many studies on ideational business power highlight the importance of ideas. Thus, further research should examine the

interaction between ideas and material factors in shaping power in digital capitalism. Second, my deliberate focus on the firm as the actor who is most directly affected by the digital transformation of capitalism neglects how digitalization affects the power relations of firms with other actors such as workers, financiers, states, or other interest groups. Third, my focus on power relations as the underpinning of politics in digital capitalism neglects how power interacts with, challenges, and reinforces political-economic institutions and growth models. Studying how the changed coalitional dynamics and power relations between actors in digital capitalism translate back to the macro-level is an important area of future research. It is to these issues I will return at the end of chapter 1.

The remainder of this chapter proceeds as follows: In section 1, I will first give a brief overview of why it is important to consider firms as a political rather than a mere economic actor. I will introduce to the concepts of power and power resources and summarize the critique on instrumental a structural understandings of business power. Finally, I will propose the power resource approach as a means to tackle these critiques. Section 2 reviews the literature on digital capitalism and outlines how digitalization transformed value creation and inter-firm relations. I introduce data and digital technologies as the core inputs and digital infrastructure as the backbone of the digital economy. Control of these DPR determines the position in digital ecosystems. Section 3, in turn, reviews the existing literature on power in digital capitalism and summarizes how my central findings on the relative digital power resources of firms, their political preferences, and their political strategies contribute to it. Section 4 outlines avenues for further research and section 5 gives the mandatory summaries of the papers included in the dissertation.

Power Resources, Preferences, and Strategies of Business

Throughout the dissertation I focus on the firm as my unit of analysis. Firms are the central actors in capitalism and are therefore at the center of political economies (e.g. Hall and Soskice 2001). Yet, "political scientists have been more focused on understanding the institutional structures and political environments in which firms operate than on understanding the actions and strategies of firms themselves" (Coen, Grant, and Wilson 2010, 12). Firms are most immediately affected and benefitting from the reorganization of capitalist production and exchange. Thus, many of the processes triggered by the digital transformation converge within the firm and firm decisions on how to approach digitalization affect also workers, consumers, financiers, and the state. A broader understanding of digital capitalism, both as an economic and political phenomenon, has to start with the firm.

Power and Power Resources

Before turning to the power of firms, however, the concept of power needs to be defined. Defining power is inherently complex as it is "[o]ne of the most controversial concepts in the social sciences" (Korpi 1985, 31). As Dür (2008) points out this contestation evolves around two dimensions. First,

power has three faces (Lukes 1974; see also: Pierson 2016). The first face of power is the open conflict between actors to influence certain decisions. The second face of power is the ability of actors to keep issues of the agenda (Bachrach and Baratz 1963). The third face of power is discursive and ideational and keeps actors from realizing their true interest (Lukes 1974). Second, power can be understood either as the bases of power or as the exercise and impact of power (Korpi 1985; Lowery 2013; Simon 1953; Young 2015). Implicitly power assumes a causal relationship where an actor has the ability to influence the behavior of others (Young 2015). Depending on which aspect of this relationship is emphasized in a specific conceptualization of power, researchers focus on the sources (why has an actor the ability to influence?) or the exercise and effects of power (i.e. influence).

Korpi (1985) argues that these controversies in the study of power can be overcome by combining an "intentional mode of explanation" with an initial focus on the bases of power. His *power resource approach* takes "the desires and beliefs of actors […] into account and […] [sees] action as rational and directed to bring about some goal" (Korpi 1985, 31). That is, power for Korpi becomes not only evident in what an actor has (*power resources*) or what she achieves (*influence*), but also in what she wants (*preferences*) and what she (not) does to get what she wants (*strategies*). Using an actors' relative control of power resources in a specific situation, thus, does not only allow for the analysis of the exercise of power (first face of power) but also to explain preference and strategy formation and therefore the hidden faces of power (Korpi 1985, 32–33). Korpi (1985, 33) defines "power resources as the attributes (capacities and means) of actors (individuals or collectives), which enable them to reward or punish other actors." Interestingly, power resources cannot only be used as a stick to coerce, but also as a carrot to incentivize other actors (Korpi 1985, 35). Further, "power resources can have important consequences even without being activated" (Korpi 1985, 33), such as leading to strategies of acquiescence when an actor anticipates punishment from an insurmountably more powerful opponent or adjustments in preferences when the ideal goal seems utopic in light of current power relations (Korpi 1985, 35).

While the debate on the different faces of power seems like a debate from the past, much of political science literature on business power still only focuses on the instrumental exercise of power in open conflict - although this was slowly supplemented by the revival of structural power theories after the financial crisis of 2008 (Culpepper 2015). After reviewing the literature on structural and instrumental business power in the next section, I will elaborate how the power resource approach can be usefully applied to bridge between these two largely separated concepts of business power.

Structural, Instrumental, and Infrastructural Power

The literature on business power distinguishes three types of power: instrumental, structural, and infrastructural power (on structural and instrumental power: Culpepper 2015; Young 2015; Woll 2016;

on infrastructural power: Braun 2020). Instrumental power describes firms' engagement in activities outside their core economic function to influence policy outcomes. Firms try to realize their preferences by threatening to withdraw campaign funding, providing politicians with expertise on policy issues, creating overlaps between regulatory agencies and company staff (revolving door), reframing a policy issue, or mobilizing the public. Two central concepts distinguished in lobbying research and used in this thesis are inside and outside lobbying. Inside lobbying describes interest group strategies to directly influence actors in the policymaking process. Outside lobbying strategies, in contrast, seek to influence policies by mobilizing people outside the policymaking process, e.g. the public or specific important constituents, to signal the electoral costs to policymakers (Kollman 1998; Tresch 2021). While the literature on lobbying and interest groups has led to important insights on democratic policymaking, it has been criticized by political economists for neglecting the hidden faces of power and treating business as just another interest group instead of acknowledging its central role in capitalism (Culpepper 2015; Pierson 2016).

Structural power, in contrast, is rooted in the core economic activities of businesses and requires no instrumental activity of the company. It results from businesses' privileged position in capitalism (Block 1977; Lindblom 1977, 1982) and operates as follows: As the investment decisions of capitalists react to market inducements, reforms that decrease profitability invoke divestment and hamper macroeconomic performance such as employment and growth. Anticipating the economic impact and a resulting electoral backlash, politicians shy away from reforms. Following (Young 2015, fn. 24), structural power can be conceptualized as being a hub. Infrastructural power, finally, is rooted in the "private control over 'infrastructural' goods […] that compromise the backbone for much of modern social and economic activity" (Rahman 2018, 1622). Infrastructure can be conceptualized as the ties between economic actors within a network, be it energy networks, transportation networks, financial networks, or digital networks (Rahman 2018). Infrastructural power, therefore, can be understood as the ownership of network ties. It operates through an alignment of preferences between infrastructure providers and users, because the latter rely on infrastructure to conduct their actions and attain their goals (Braun 2020).

Three important points of critique are brought forward against scholarship on structural business power: First, traditional approaches to structural power cannot explain why in capitalist economies business often loses (Culpepper 2015; Vogel 1987). More recent studies, hence, conceptualize structural power as "a variable, not a constant" (Hacker and Pierson 2002, 282) and focus on the variables that reduce corporate influence. As business power, especially in international markets, depends on the credibility and availability of exit options, factors such as domestic market size (Culpepper and Reinke 2014), capital mobility between jurisdictions (Hacker and Pierson 2002), and specific location factors such as skills (Iversen and Soskice 2019) are crucial moderators of structural

power. Additionally, the formality of the institutional venue responsible for regulation (Culpepper 2010) and its accountability to the public (Dür, Bernhagen, and Marshall 2015) affect the degree to which firms realize their interests. Finally, issue salience reduces the power of business (Culpepper 2010; Dür, Bernhagen, and Marshall 2015; Ziegler and Woolley 2016).

Second, traditional scholarship on structural power treats business as a monolithic bloc with a unified class interest and unified power. A rich literature on preference formation in trade (e.g. Frieden 1999), environmental (e.g. Genovese and Tvinnereim 2019), and welfare (e.g. Hacker and Pierson 2002) policy, however, identifies preference heterogeneity between firms from different sectors, along value chains (Zhang 2023), between small and large businesses (e.g. Milner and Yoffie 1989), due to different institutional embeddings (e.g. Martin and Swank 2012), or between capital- and labor-intensive industries (e.g. Rogowski 1990). Further, highlighting the privileged position of *all* businesses in capitalism tends to overlook that the state "is more dependent on some fractions of capital than others" (Young 2015, 446). As shown by a vast literature on power in financial capitalism (Culpepper and Reinke 2014; Kalaitzake 2017; Winecoff 2015; Woll 2013), acknowledging sectoral differences over time and between countries can lead to interesting insights on the different power resources, heterogenous preferences, and strategies available to different subsections of business.

A third critique of the literature is that instrumental and structural power mostly co-existed as separate (and sometimes conflated) concepts, but the relationship between the two has been undertheorized until recently (Culpepper 2015). Exceptions are signaling models and constructivist scholars. They argue that structural prominence must be actively communicated through instrumental activities to policymakers because they lack information on "the economic consequences of policies as well as how these are valuated by citizens" (Bernhagen and Bräuninger 2005, 43; see also: James 2018). In other words, politicians do not (always) anticipate the impact of legislation on business confidence, but these "structural effects [must be] […] ultimately mediated and actualized by agency" (Bell 2012, 668). Going beyond the mere signaling of economic consequences, constructivists highlight the role of business in altering policymakers' and citizens' perceptions of a policy through strategic lobbying (Bell 2012; Bell and Hindmoor 2014; Marsh, Akram, and Birkett 2015). Indeed, empirical evidence points towards reinforcements between structural and instrumental power under certain scope conditions (Trampusch and Fastenrath 2019; James and Quaglia 2017; Young 2015).

The Power Resource Approach in the Study of Business Power

Although the power resource approach has been traditionally applied to study inter-class conflict,[1] I argue it can be usefully applied to study business power as well. The power resource approach allows

[1] Although the theoretical formulation of the power resource approach is on the actor level (Korpi 1985), most empirical studies focus on the power resources of capital and labor in contestations over the welfare state (Korpi 1998).

thinking about business power (1) at the actor- rather than class-level, (2) as a relational concept in specific situations, and (3) with the sources of power rather than its effects as a starting point. It thus offers a way to address the critiques identified above, i.e. to integrate instrumental and structural power beyond models of mere signaling, to focus on specific firms or sectors instead of business as a class, and to contextualize business power.

Accounts of structural power emphasize how the core economic function of business empowers firms by putting them in a position of structural prominence (Young 2015). Through the lens of the power resource approach, this structural prominence rests on firms' relative endowment with power resources acquired through their economic function. While "capital in the form of control over the means of production is a very significant power resource" (Korpi 1985, 34), different firms control concentrate more or less capital and hold different kinds of capital. The quantity of a power resource is important, but so are qualitative differences between power resources. In particular, the centrality of a resource "for the daily lives of other actors" and the scarcity of a resource create qualitative differences (Korpi 1985, 34). This suggests power differences not only between firms of different sizes but also between firms of different sectors. Sectors that have a higher centrality within a given historic configuration of capitalism are more powerful because they affect the lives of more actors. For instance, in digital capitalism controlling data and digital technologies might be more important than controlling physical capital.

Differences in the quality and quantity of power resources between two firms cannot only explain differences in influence but also in preferences. For instance, firms that control physical capital might oppose disruptive developments that devalue and replace physical capital with intangible assets. Or firms that do not own digital infrastructure might prefer government intervention, whereas owners of digital infrastructure might oppose it. That the characteristics of power resources also influence political strategies, can be exemplified with the differences between capital and labor. While capital is easy to concentrate, human capital is bound to the individual. Labor, therefore, must organize in associations to maximize its power (Offe and Wiesenthal 1980).

To sum up my argument on the benefits of studying business power through a power resource lens: Starting the analysis of power from the perspective of power resources rather than the effects of power allows for an explanation of preferences as outcomes. This allows for a better understanding of the hidden in addition to the open faces of power. The power resource approach also allows for rooting firms political strategies in their economic position and therefore integrates instrumental and structural power. Finally, and most important for this study, the power resource approach allows for an analysis of how a transformation of the material foundation of capitalism changes the power resources, political preferences, and political strategies of business. It is one of such transformations, the digital transformation of capitalism, to which I turn now. Honoring two key insights of this section

– that a firms' power is based on its economic position and that power is inherently relational – I will specifically discuss the material foundation of and inter-firm relations in digital capitalism in the next section.

Digital Capitalism

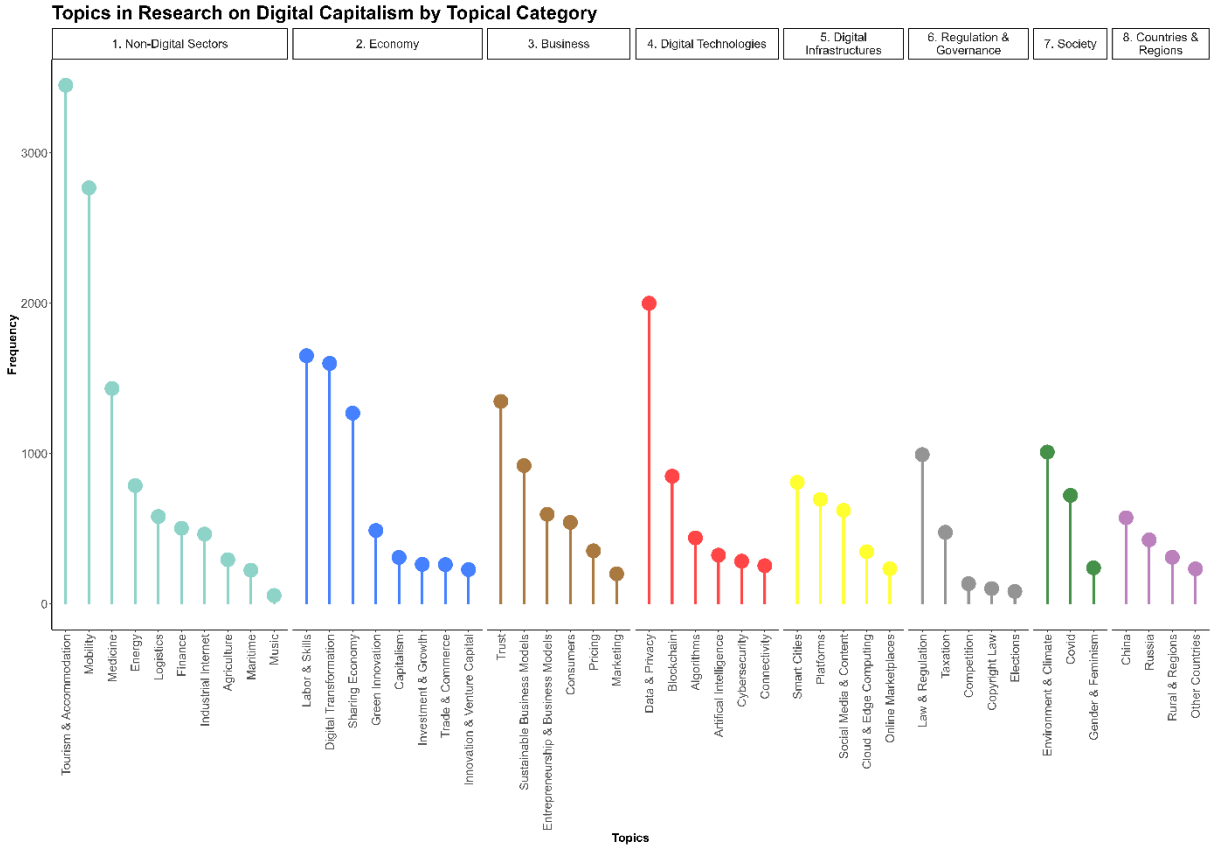
To understand business power in digital capitalism, it is necessary to understand digital capitalism. However, digital capitalism is an "ambiguous concept" that "signifies several phenomena at once" (Pace 2018, 254). Some scholars focus on the central role of and data and its processing by digital technologies (Birch, Chiappetta, and Artyushina 2020; Zuboff 2019). Others on the reorganization of markets by platforms (Kenney, Bearson, and Zysman 2021; Srnicek 2017; Staab 2019), or networks (Schiller 1999). Concepts such as the sharing economy or the gig economy cover the commodification of peer-to-peer sharing or the taskification of work enabled by digital tools, while students of business study the consequences of digitalization for managerial styles and business strategies (Cutolo and Kenney 2021). Some emphasize the structural transformation of capitalism as an economic system (e.g. Fuchs 2021; Seidl 2023), others focus on the digitalization of the practices of capitalist actors (Schiller 1999). There is also work on politics in digital capitalism. This work either focuses on the emergence of digital capitalism as a confluence of abundant capital in search for profits, US military ambitions and associated research funding, broader deregulatory trends, and the liberalization of the telecommunications sector (Schiller 1999; Srnicek 2017, chapter 1); on specific battles over policies and work conditions within digital capitalism (e.g. Collier, Dubal, and Carter 2018); or on the disruptive and commodifying macro-trends induced by the digital transformation (Seidl 2023).[2] Digital capitalism is indeed an ambiguous concept that requires a clear definition to be usefully applied.

In addition to incorporating the central features of digital capitalism at system level, i.e. as a combination of the big data, the artificial intelligence, and the platform revolution (Seidl 2023), the definition should also incorporate Pace's (2018, 263) call for outlining "the modus operandi by which the structural needs of capital are tailored to digital conditions" through firm agency. Further, scholars of digital capitalism rarely claim that it is entirely replacing previous or concurrent forms of capitalism (Fuchs 2021, 31). While it is a new and transformative layer of capitalism creating new businesses and intruding the business models of existing firms and sectors (Dolata 2019, 185–86; Kenney, Bearson, and Zysman 2021; Schiller 2014), it is closely intertwined with financial (Schiller 1999; Srnicek 2017) and industrial (e.g. Ehret and Wirtz 2017; Schreieck et al. 2019) capitalism.

[2] The only exception is Rahman and Thelen's (2019) work on a platform-consumer-investor alliance underpinning digital capitalism. Rather than focusing on the emergence of digital capitalism they focus on its reproduction, rather than focusing on merely on macro-trends they focus on the interplay of macro-trends and actors, rather than focusing on specific battles they try to understand alliances and conflict systematically.

Digital capitalism, thus, is cross-cutting economic sectors, impacting macro-economic phenomena and business strategies, and rests on data, digital technologies and digital infrastructures. It is also socially and politically embedded. Accordingly, my definition of digital capitalism encompasses three interrelated dimensions. First, the material foundation of digital capitalism is the organization of the of production and exchange around data, computerized technologies, and computerized infrastructures. Second, the organizational dimension of digital capitalism is characterized by the business models of firms and their interactions in digital ecosystems built around the new resources and means of production. Third, digital capitalism is politically embedded, reproduced, and contested. I will return to each of these dimensions of digital capitalism in the subsequent parts of chapter 1.

Figure 1: Topics in Research on Digital Capitalism by Topical Category



Before doing so, I give a broad overview of the main topics covered by research across disciplines on digital capitalism.[3] I identify these topics by running a BERTopic model on abstracts from research featuring digital capitalism across multiple disciplines. I extracted the abstracts from the Web of Science database and display the results in figure 1. I specified the model to identify topics that

[3] To identify these topics, I downloaded the abstracts of all English articles and book chapters containing at least one of the following keywords "digital capitalism", "digital economy", "surveillance capitalism", "gig economy", "platform capitalism", "sharing economy", and "platform economy" from the Web of Science database. I then ran a BERTopic model (Grootendorst 2022) on these abstracts to identify the topics prevalent in the research. The unit of analysis was the sentence level. I dropped non-substantial topics (e.g. those covering research methods, limitations of the studies, information on the publisher) and aggregated similar topics based on their estimated hierarchical relations and manual judgement.

represent high-level clusters rather than fine-grained nuances. Thus, all topics displayed in figure 1 can be assumed to be important themes of research on digital capitalism although the more frequent topics are of greater centrality to the existing research agenda. The 48 topics can be grouped into nine topical categories.

The biggest and most frequent category are studies on digital capitalism in **non-digital sectors**. Digitalization, thus, is understood as a cross-cutting trend that transforms capitalism across all economic sectors, including those that are not primarily digital. Existing research strongly focusses on tourism and accommodation (e.g. AirBnb) and mobility (e.g. Uber, food delivery, and bike sharing). Medicine, in particular the importance of digital technologies in diagnostics and treatment, is also very frequent. Digital capitalism, however, is also relatively frequently studied within sectors at the core of industrial capitalist accumulation, such as energy and manufacturing, and finance capitalism. Topic category two, **economy**, is a related dimension of research on digital capitalism. Here, topics indicate that digitalization cannot be thought separately from key macroeconomic issues such as growth and investment, innovation, trade, or the green transformation of capitalism. However, some of the economic topics also indicate that digitalization affects key polit-economic institutions such as labor markets, skill formation, and corporate governance (venture capital). That digital capitalism is not only limited to the macro or sectoral level of the economy becomes evident in topic category three, **business**. Digitalization's relation to business models and strategies as well as business-consumer relations is an important field of study.

Topic area four and five provide a glimpse into the means of production and exchange in digital capitalism. On the one hand, researchers analyze data and **digital technologies**. While data is the raw material for value-creation in digital capitalism, digital technologies to collect, store, encrypt, share, and – most importantly – process data are the central tools to make sense and generate value from unstructured data. Thus, it is not surprising that research on data and the regulation of its collection (i.e. privacy), artificial intelligence, and algorithms also is relatively frequent. On the other hand, research on **digital infrastructures** examines, first, existing infrastructure that is digitalized by making it "smart" (i.e. smart cities) and, second, different types of platforms as the new digital infrastructures.

Sixth, **regulation & governance** is another key theme in the study of digital capitalism. This hints to the political embedding of digital capitalism. In addition to general references to laws and regulation, five topics are particularly relevant: taxation, competition policy, copyright, the prevention of election interference, and privacy (see above). Finally, the topic categories seven and eight, **society** and **countries & regions** discuss digital capitalism in relation to broader societal developments such as climate change, Covid-19, patriarchy (e.g. Wajcman 2010), or geopolitical competition (e.g. Drezner, Farrell, and Newman 2020). As such they hint to the social embedding of digital capitalism.

Interestingly, the eight topical categories in research on digital capitalism are mostly encompassed in the three dimensional understanding of digital capitalism I propose above. In the reminder of the section I will consecutively review the literature on (1) the material foundations of digital capitalism, (2) the (re)organization of inter-firm relations in digital ecosystems, and (3) the power relations between firms in digital capitalism. My central argument is that the material foundations of digital capitalism equip firms with structural and infrastructural digital power resources, i.e. sticks and carrots rooted in data, digital technologies, and digital infrastructure that can be mobilized to influence other actors. These digital power resources determine the position of firms within digital ecosystems, i.e. the relations of production, exchange, and innovation in digital capitalism. Firms' position in digital ecosystems, in turn, determines their political preferences and strategies and forms the basis for the (re)production of digital capitalism.

The Material Foundation of Digital Capitalism: Data, Digital Technologies, and Digital Infrastructures

Data is the central resource in digital capitalism. As a raw material it must be mined from interactions in digital or digitized environments – be it in the consumer internet or the physical, but sensor equipped world – and stored in digital formats. Data can stem from two types of interactions, human (personal data) and non-human interactions (non-personal data). Debates on surveillance capitalism emphasize that data on human behavior is used to improve products and predict and control future behavior (e.g. Zuboff 2019). Debates on the industrial internet emphasize that the collection of data from connected production plants unleashes new levels of productivity and innovation, while data from connected devices and vehicles makes the use, servicing, innovation, and maintenance of these goods more efficient (e.g. Ehret and Wirtz 2017).

While the merits of data are undisputed among scholars of digital capitalism, they disagree on whether data should be understood as a commodity or an asset. While data certainly commodifies behavior and interactions into a tradable, interchangeable good (Grabher 2021; Mozorov 2019; West 2019), data constitutes also "a productive and owned resource", i.e. an asset (Birch, Chiappetta, and Artyushina 2020, 473). This understanding of data as an asset means that the value of data is not determined at a fixed point in time in a market exchange. Instead, the value of data has to be actively created and managed by data-owners (Birch, Chiappetta, and Artyushina 2020, 474–75). Data itself does neither possess inherent value nor does its possession automatically result in market power (Nuccio and Guerzoni 2019). It is only the centralization and processing of (big) data that creates its value (Fourcade and Healy 2017). In other words, data needs to be refined by collecting, cleaning, combining, and processing it and turning unstructured observations into information (Haskel and Westlake 2018, 63–64). Information that can be sold, licensed, or used in the form of "prediction

products" (Zuboff 2019) to optimize and influence marketing, production processes, products, risk management, maintenance, innovation processes, logistics, or human behavior. It is only the collection, cleaning, combination, and processing of data through digital technologies (e.g. algorithms, hard drives, chips, sensors, artificial intelligence) that run on digital infrastructure (e.g. broadband, cloud, marketplaces) that creates value. If data is the central resource of digital capitalism, digital technologies are its central means of production.

Datasets, prediction products, and digital technologies are all part of a broader asset class, intangible assets (Haskel and Westlake 2018). Intangible assets are at the core of innovation and production in digital capitalism and their specific characteristics require a specific form of firm organization, the **intellectual monopoly firm** (Rikap and Lundvall 2022).

First, intangible assets generate spillovers because they are inherently non-excludable, i.e. "it is relatively easy for other businesses to take advantage of intangible investments they don't make themselves" (Haskel and Westlake 2018, 72). To reap economic benefits from investments in intangible assets, firms must protect their investments against copying and replication through others. In his seminal article on intellectual monopoly capitalism Pagano (2014, 1410) argues this protection can be ensured through legal means and that the "inclusion [of knowledge] among privately owned assets involves the creation of a legal monopoly that can be potentially extended to the entire global economy". This legal monopoly is granted through intellectual property rights.

Second, intangible assets are non-rivalrous and not physically bound to space, i.e. they are easily scalable and an idea, knowledge, or data can be used by multiple actors simultaneously without being consumed (Haskel and Westlake 2018, 65–68). The non-rivalry of intangible assets implies that ownership and control over data and digital technologies can be held by separate entities (Birch, Chiappetta, and Artyushina 2020). Owners can grant *access* to (multiple) users without losing their ownership or depreciating the value of the asset (Birch, Chiappetta, and Artyushina 2020). This creates opportunities for intellectual monopoly firms to control how intangible assets are used along the value chain and impose rules on downstream users.

Third, investment in intangibles face the danger of sunk costs, because they cannot be easily valued and sold off (Haskel and Westlake 2018, 68–72). Once the excludability of intangible assets is legally created by intellectual property rights, their scalability combined with the danger of sunk costs creates economies of scale. Thus, intangible intensive firms tend to be large (Haskel and Westlake 2018, 67). These firms, thus, are not only monopolies, in the sense that their asset monopolizes a specific bit of knowledge, they also are large, in the sense that they accumulate many of these monopolies.

Fourth, intangible investments create synergies, because combining ideas can lead to new, unexpected ideas (Haskel and Westlake 2018, 80–86). This is at the core of innovation (Antonelli 1999). Synergies are especially important for data, because the value of data increases with the size, heterogeneity, and recency of the dataset (Santesteban and Longpre 2020). Combining data from different sources therefore only unleashes the full potential of big data analyses. Considering the implications of synergies and spillovers, firms face a dilemma between protecting their assets against spillovers by limiting access but at the same time must ensure sufficient access and cooperation to create synergies (Haskel and Westlake 2018, 83–84). Rikap and Lundvall (2022) argue that only relatively few firms, so-called intellectual monopoly firms, can balance synergies and spillovers in a profitable way. The business model of intellectual monopoly firms is to "extract (intellectual) rents" and appropriate knowledge and data from collaborations between multiple organizations in innovation systems (Rikap and Lundvall 2022, 392; see also: Birch, Chiappetta, and Artyushina 2020). They make profit "by turning knowledge into assets" (Rikap 2022, 150).

A special case of intellectual monopoly firms, and probably the most prominent type of organization in digital capitalism, are platform firms (Rahman and Thelen 2019; Srnicek 2017). Srnicek defines platforms as "digital infrastructures that enable two or more groups to interact" and as particularly well suited "to monopolise, extract, analyse, and use the increasingly large amounts of data" recorded in digital capitalism (Srnicek 2017, 43). While platforms extract and own substantial amounts of data and hold core innovations in terms of digital technologies, they are more than just intellectual monopolies. Platforms employ a bifurcated labor strategy of high compensation for a few core employees that maintain the platform, often computer and data scientists, and low-skilled, low-wage workers hired as formally self-employed independent contractors (Kenney and Zysman 2019). The financial backing behind platforms stems from patient venture capital and instead of pursuing short-term profitability, platforms are "committed to the longer-term project of consolidating market domination" (Rahman and Thelen 2019, 184). Platforms often achieve market domination through a combination of high initial fixed-costs, economies of scale, and network effects (Barwise and Watkins 2018) and protect it through oligopolistic strategies of "anticipat[ing] and absorb[ing] potential competitors" (Rahman and Thelen 2019, 185) and entering neighboring markets with cross-subsidies from the markets they already dominate (Srnicek 2017, 43–48). In addition, platforms are also digital infrastructures that intermediate between end-users and providers of goods and services. As such they have a considerable degree of infrastructural power, as "successful platforms generate ecosystems of firms and providers that are dependent upon the platform" (Kenney and Zysman 2019, 10). This character of platforms as the owner of infrastructure on which a digital ecosystem is built will be discussed in more detail in the next section.

To sum up, intellectual monopoly firms tend to be large, centralize intangible assets, and can set rules for downstream users by controlling and granting access to intangible assets. In the special case of platforms, they also control digital infrastructure and form the backbone of activities in the digital economy.

Inter-Firm Relations in Digital Capitalism: Digital Ecosystems

As we have seen in the last section, intellectual monopolies and platforms are organized around the extraction of value from intangible assets and digital infrastructure. How their ownership of the central resources and means of production in digital capitalism structures inter-firm relations is discussed in this section. I argue that the concept of digital ecosystems is best suited to describe the janus-faced logic of mutually beneficial cooperation and appropriation in digital capitalism.

There is wide-ranging consensus that neither intellectual monopoly firms nor platforms interact with other economic actors in pure market, hierarchy, or network relations (Kretschmer et al. 2022; Rikap and Lundvall 2022; Stark and Pais 2021). To describe the relations of production and exchange organized around intellectual monopoly firms, Rikap and Lundvall (2022) introduce the concept of the Corporate Innovation System (CIS). They define CIS as "a system organized and controlled by a dominant firm but constituted also by a multitude of more or less subordinate firms and knowledge institutions that participate in multiple production and innovation processes" (Rikap and Lundvall 2022, 390). CIS go beyond other concepts such as global value chains or global innovation networks that also consider production as a relational system. In contrast to global innovation networks that assume cooperation between firms, CIS are organized around a single lead firm that dominates other firms in the network and "simultaneously control and orient their CIS to preserve their dominant position" (Rikap and Lundvall 2022, 394). In contrast to global value chains, CIS not only show how lead firms capture value from production. They also explicitly account for intangible assets and show how intellectual monopoly firms appropriate knowledge and turn it into intellectual or data rents (Rikap and Lundvall 2022). As detailed above their ability to exert control over other actors rests on their ownership and ability to restrict access to the central inputs in digital capitalism.

The logic of appropriating value and knowledge from downstream firms also fares prominent in discussions of inter-firm relations in platform capitalism. Organizational sociologists and management scholars identify the platform not only as a new type of firm, but also an organizational form of exchange and production among firms and between firms and consumers. I will refer to this as the platforms-as-system framework to differentiate it from the platform firm. Traditional forms of hierarchical, networks, or market governance are insufficient to capture the relations on platforms (Kretschmer et al. 2022; Stark and Pais 2021). Platforms are not markets, because they are more than mere intermediaries enabling transactions between equals (Stark and Pais 2021, 50). Instead, platform

firms can effectively set the rules of interaction among users, engage in dispute solution, extract and monopolize data, and in their pursuit of market dominance are “living off of the layers of economic life below” (Stark and Pais 2021, 50; see also: Peck and Phillips 2021; Kenney and Zysman 2019). For instance, platform "[o]wners are in a privileged position to absorb ecosystem innovations into the platform itself" (Kenney and Zysman 2019, 37). In contrast to the “’invisible’ hand of markets”, interactions on platforms are structured by the “’visible’ hand” of the platform firm (Kretschmer et al. 2022, 410). Platforms are also not hierarchies (Kretschmer et al. 2022; Stark and Pais 2021). While they dominate their environments, they “do *not* seek to internalize their environments through vertical integration. Instead [they] are *designed* to be extended and elaborated from outside, by other actors, provided that those actors follow certain rules” (Plantin et al. 2018, 298). Governance on platforms also is not designed by (strict) bureaucratic rules but through algorithmic rules and standards that structure behavior but leave considerable room of maneuver to users and complementors (Kenney and Zysman 2019; Kretschmer et al. 2022, 409; Stark and Pais 2021). Finally, platforms are not networks, because they are not primarily characterized by voluntary and mutually beneficial cooperation between firms (Stark and Pais 2021). Instead, central features of networks such as trust, reputation, quality, and loyalty are established not by repeated interactions but established by technical and algorithmic solutions designed by the platform (e.g. ratings, surveillance, lock-in) (Stark and Pais 2021). Stark and Pais (2021), therefore, conclude that the platform is an organizational form by itself characterized by the logic of co-optation.

Both, the CIS and the platform-as-systems framework contribute an important insight in highlighting how central firms’ appropriate knowledge and value from peripheral firms. For intellectual monopoly firms the ability to appropriate rests on their control of intangible asset, while platform power rest on their ownership of digital infrastructure. However, both approaches neglect the mutually beneficial sides of cooperation between firms in innovation networks and on platforms. To incorporate both, the analysis of cooperation as well as appropriation, within a single framework I propose to use the concept of digital ecosystems to describe inter-firm relations in digital capitalism.

An ecosystem is a “group of interacting firms that depend on each other’s activities” (Jacobides, Cennamo, and Gawer 2018, 2256). Despite acknowledging a “shared fate” (Iansiti and Levien 2004, 69) of the entire ecosystem, ecosystems are not conceptualized as egalitarian. Instead, firms that control core products, core innovations, and core knowledge are characterized as “hubs” (Dhanaraj and Parkhe 2006; Jacobides, Cennamo, and Gawer 2018). Around the hubs, a group of firms emerges that does offer complementary services and goods that are not fundamental to the core product but make the ecosystem as a whole more valuable (Gawer and Cusumano 2008; Nalebuff and Brandenburger 2007). For instance, the cooperation between complementors and hub firms creates the synergies so important for innovation and value creation from intangible assets (Haskel and Westlake 2018).

Digital ecosystems run on digital infrastructure, i.e. the fundamental fabric enabling the exchange or licensing of goods, information and data, technologies, and services between ecosystem actors. Digital infrastructure establishes the ties that form the backbone for economic activity within the ecosystem. Platform firms that own the digital infrastructure on which the ecosystem runs, can be characterized as tie-owners. Having access to the ties established by digital infrastructure is beneficial for complementors, for instance by increasing the reach to potential customers or providing access to distribution and payment channels or data analytics tools.

Despite the positive effects of cooperating in digital ecosystems, complementors' dependencies on continuous access to core inputs and infrastructure owned by hub firms and tie owners, creates an upstream-downstream relationship. Upstream firms, i.e. platforms and intellectual monopolies, can not only effectively set the rules of interaction in the ecosystem but also exploit complementors' dependency to appropriate of value and knowledge. By highlighting the mutual benefit of cooperation and the dependencies leading to appropriation, digital ecosystems are well suited to capture the Janus-faced character of inter-firm relations in digital capitalism.

There are two further advantages of describing inter-firm relations in digital capitalism as digital ecosystems. First, it allows for the integration of relations of structural (being a hub) and infrastructural power (tie-ownership). The CIS framework focusses only on how intellectual monopolies amass intangible assets and therefore gain a privileged position in the digital economy. The platforms-as-systems framework focusses mainly on how platforms amass digital infrastructure and therefore control the backbone of the digital economy. The digital ecosystems framework allows for an integrated view on how some firms are central hubs and some own the ties within the digital economy, and other firms, in turn, do both. Second, both, the platforms-as-systems and CIS approach do focus on the set of relations built around a single firm. While this might be sufficient in truly monopolized markets, most empirical cases in the digital economy are oligopolistic with more than one hub and more than one tie-owner.

Business Power in Digital Capitalism

Before turning to business power in digital capitalism, I set the stage by summarizing the preceding sections. I argued that the power resource approach allows for the integration of different approaches to power by focusing on the bases of power rather than its effects. This focus enables an analysis of firm preferences and strategies as a result of their relative power resources. Further, I argued that a transformation in the material foundations of capitalist production also changes the power resources of firms and restructures inter-firm relations. In the case of digital capitalism, intellectual monopoly and platform firms control digital power resources, i.e. data, digital technologies, and digital infrastructure. They are the hubs and own the ties in the digital ecosystems they populate with other

firms. The transformation of power resources and the restructuring of inter-firm relations, in turn, leads to new conflicts and alliances in the political arena. Further, certain firms can pursue entirely novel or enhanced lobbying strategies. It is to these changes in the political arena of digital capitalism I turn now.

Existing Research

While studies on the market power of digital firms emerged in parallel with the digital transformation of capitalism (e.g. Schiller 1999), studies on political power in digital capitalism are still quite rare. However, a range of studies analyzes the lobbying strategies and lobbying success of digital firms. While not explicitly theorizing preference formation, they assume an incumbency-disruptor divide within the business community and preference alignment between platforms and consumers. Most of these papers study conflict between incumbent firms and disruptive, digital, market entrants whose lobbying success depends on their ability to form an alliance with consumers. The ride-hailing company Uber received special attention. Collier et al. (2018) develop a model of "disruptive regulation" and show that Uber disregarded existing taxi regulation and captured substantial market share. After establishing a customer and driver base, Uber could avoid new regulation by threatening divestment and mobilizing this base. Comparing regulatory responses to ride-hailing across countries, Thelen (2018) shows that the formation of an Uber-customer coalition and ultimately regulatory outcomes depend on the different "regulatory 'flashpoints'" triggered by institutional contexts. Similarly, but focusing on different points in time in New York, Seidl (2020) argues that different dominant narratives – a consumer liberation narrative and a congestion cum driver-interest narrative – led to different coalitions and caused a difference in outcomes. Valdez (2023) shows that Uber adapts is business model to local regulations after failing to influence them. Departing from the focus on Uber, but firmly remaining in the sharing economy, Yates (2023) illustrates that AirBnB uses a similar strategy. Studying the EU General Data Protection Regulation Kalyanpur and Newman (2019) find that after the Snowden revelations the lobbying of US platforms was perceived as undue foreign influence and therefore unsuccessful. In sum, these studies success depends on whether platforms are able to create an alliance with consumers. The scope conditions of this success are whether (1) institutions, (2) external scandals (Snowden), (3) or local conditions highlight the liberating or undermining effects of disruption.

Instead of studying the consumer-platform alliance in specific contexts, Culpepper and Thelen (2020) focus on the formation of consumers' generally pro platform preferences. They propose the concept of platform power and argue that platforms enjoy a "largely automatic" alignment of preferences with consumers. The consumer-platform alliance is grounded in the platform business model and arises because platforms simultaneously liberate consumers by providing free and useful services and create

dependencies through lock-in. Thus, “politicians rationally shy away from even entertaining policies that would deprive their constituencies of the conveniences on which many of them now rely” (Culpepper and Thelen 2020, 236). Rahman and Thelen (2019) reach a similar conclusion and argue that a coalition between consumers, platforms, and venture capital investors underpin digital capitalism. The abundance of capital in search for returns, coupled with the profit opportunities of winner-take-all markets, makes platforms a prime target for venture capital investors (Rahman and Thelen 2019; Srnicek 2017).

In addition to the incumbency-disruptor conflict and the consumer-platform alliance, a few studies dive deeper into data and information-based business models and uncover a conflict between those owning data and information and those using but not owning these intangible assets (Atikcan and Chalmers 2019; Newman 2010; Trampusch 2023).

To sum-up, existing studies on business power in digital capitalism mostly focus on lobbying strategies and their success in specific situations. Preference formation within the business community is explicitly discussed regarding a divide between owners and users of intangible assets and implicitly assumed as an incumbency-disruptor divide. Further, the platform power concept grounds a consumer-platform alliance in the platform business model. While these are important building blocks of understanding business power in digital capitalism, a unified theory that links the power, preferences, and lobbying strategies of business to the specific configuration of digital capitalism does not exist.

The Central Findings of the Dissertation

The central argument of my dissertation is that data, digital technologies, and digital infrastructures do not only constitute the material basis of production and exchange, but also are central digital power resources (DPR). Digital power resources are sticks and carrots rooted in data, computerized technologies, and computerized infrastructure that an actor can use to influence the behavior of others. As such, DPR determine the relative position of firms in digital ecosystems along two dimensions. Firms that centralize the ownership of data and digital technologies (structural DPR) are central *hubs* in digital ecosystems. Firms that centralize the ownership of digital infrastructure (infrastructural DPR) *own the ties* of digital ecosystems. Being a hub and owning the ties puts firms in an upstream position where they can determine the conditions of access to the core inputs of the ecosystem and structure the behavior of others. These changes in the material and organizational structure of capitalism create new lines of conflict and alliances between firms and enables new instrumental strategies to influence policies. Following Korpi (1985), DPR form the basis of corporate power and shape not only policy influence but also political preferences and strategies: What a firm has determines what it wants, what it does to get what it wants, and ultimately what it gets.

Firms' Digital Power Resources

Figure 2: Stylized Overview of the Firms included in the Dissertation and their DPR

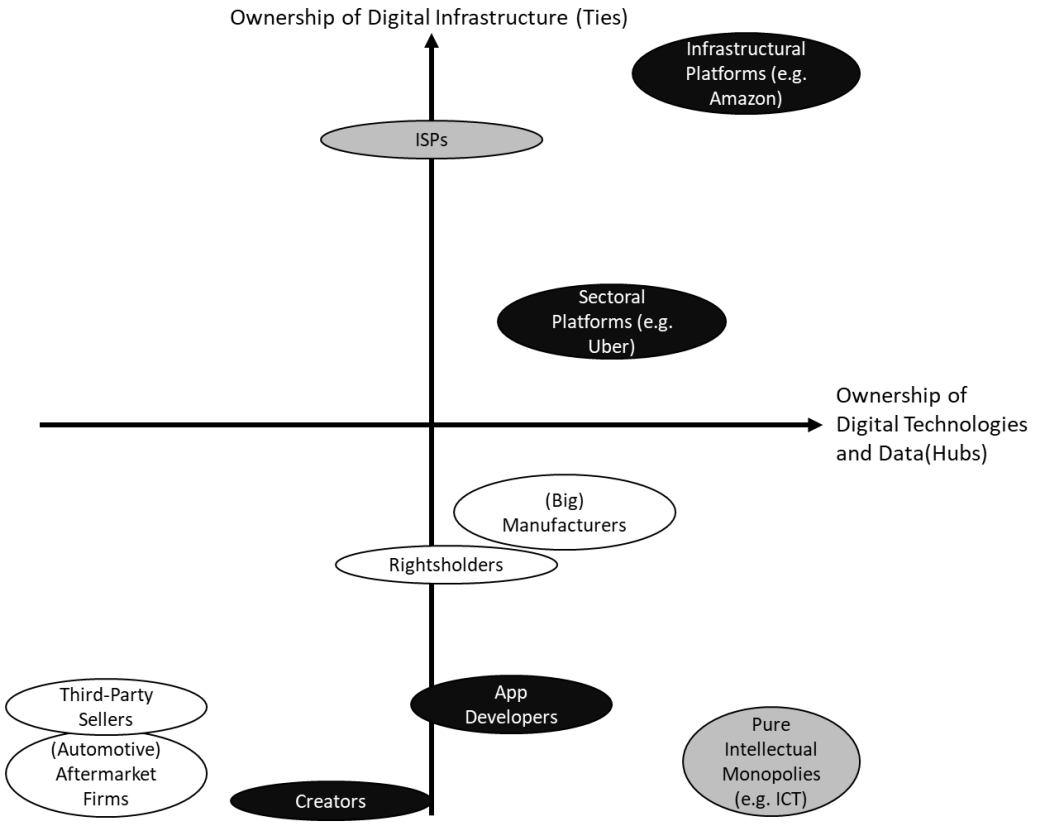


Figure 2 provides a stylized overview of the digital power resources of the (types of) firms studied throughout the chapters of this dissertation. Shaded in black are the firms typically considered to be at the forefront of the digital revolution. In grey are firms that are part of the preceding Information and Communications Technology revolution and in white are firms whose business model existed before the invention of the first computer. Even at first glance, it becomes evident that the ownership of digital power resources is not completely determined by whether a firm is conventionally considered to be digital. Big manufacturing companies, like Siemens or VW, for instance own substantial amounts of industrial data and as we show in chapter 2 leveraged this structural DPR to ensure co-ownership of industrial platforms. On the other hand, online content creators or app developers, while purely pursuing digital business models, have no (concentrated) ownership of DPR. Also, Internet Service Providers (ISPs) like AT&T may own the physical infrastructure of the internet but failed to amass amounts of data and digital technologies on par with the digital platform firms.

Another takeaway from figure two is that DPR are at least to some extent correlated with conventional indicators of size. While digital platforms and pure ICT firms do not necessarily control lots of physical assets or employ a huge labor force, big manufacturers can leverage their size to some extent to collect data in the industrial internet. Small aftermarket firms or third-party sellers (often distributers or small manufacturers selling directly on platforms), in turn, are neither powerful on conventual indicators nor

do they own considerable digital power resources. Further, figure 2 shows that infrastructural platforms own more structural and infrastructural DPR than sectoral platforms (cf. van Dijck, Poell, and De Waal 2018).

Firms' Political Preferences in Digital Capitalism

How does the relative ownership of DPR and firms' relative position in digital ecosystems affect the political preferences of firms? Existing studies implicitly assumed conflict between incumbents and disruptors and explicitly found preference heterogeneity between data-owners and data-users. Also, they assumed an alignment of preferences between consumers and platforms. I contribute to these findings by (1) explicitly theorizing conflict between incumbents and disruptors as conflict between ecosystem outsiders and insiders, (2) generalizing on findings of conflict between data-owners and data-users by identifying it as a special case of preference heterogeneity between upstream and downstream firms in the same digital ecosystem, and (3) contextualizing the finding of a consumer-platform alliance by highlighting how platforms need to create it through outside lobbying and emphasizing two scope conditions. My findings are listed in table 1.

Table 1: Firm Conflict and Alliances in Digital Capitalism

Dimension	Conflict/Alliance	(Type of) Firms	Chapter
Incumbent-Disruptor	Conflict	Carmakers *vs.* Platforms	**Two**
		Rightsholders and Artists *vs.* Content Platforms and Digital Creators	**Four**
Downstream vs. Upstream (Exploitative-Dependency)	Conflict	Carmakers (Data Owners) *vs.* Aftermarket (Data Users)	**Two**
		Rightsholders and Artists vs. Platforms (Infrastructure Owners)	**Four**
Downstream and Upstream (Community-of-Fate)[4]	Alliance	SMEs and Platforms	**Three**
		Content Platforms and Digital Creators	**Four**

Throughout the dissertation two dimensions of within business preference heterogeneity and homogeneity are identified. The first is the disruptor-incumbent dimension already exposed in studies on Uber and AirBnB. On this dimension, firms outside of a given digital ecosystem clash with those inside. In chapter 2, we describe that carmakers initially clashed with cloud platforms over the ownership of industrial clouds. At the time of the clash, carmakers identified platforms as a threat to their business model. At a later stage, however, they started to adapt their business model to the digital economy and utilized their ownership of data as a structural DPR to negotiate co-ownership of industrial clouds, thus entered into a digital ecosystem with cloud platforms. In chapter 4, I show that rightsholders try to protect their business model of centralizing the distribution and reproduction of creative works against digital content platforms through government intervention. They heavily lobbied for bills increasing the liability of platform intermediaries for copyright infringements by their

[4] Only suggestive evidence.

users, instead of adapting their business models to the digital economy (e.g. by pursuing cooperation with platforms to use online channels to monetize their works).

The second dimension around which conflict and alliances are structured in digital capitalism is the downstream-upstream dimension. In chapter 3 I distinguish two logics of this dimension. First, the exploitative-dependency logic. I find that firm preferences in digital ecosystems are predominantly shaped by this logic. The greater the difference between an upstream and a downstream firm, the more likely are preferences to diverge. This divergence is increased if an upstream firm exploits its position to appropriate value from the ecosystem. I propose that this is due to downstream firms preferring government intervention to level the playing field, while upstream firms prefer market-based solutions. This logic is also evident in chapter 2 were we observe preference divergence between aftermarket firms (downstream) and carmakers (upstream). And in chapter 4 where content platforms appropriate value from rightsholders by freely distributing their content triggering rightsholders to seek stricter copyright restrictions. The latter illustrates that the incumbent-disruptor and the downstream-upstream dimension of preference formation in digital ecosystems are analytically separate but can empirically overlap.

Second, I also propose a community-of-fate logic that can shape preferences within the downstream-upstream dimension. The preferences of upstream and downstream firms align if the costs of regulation hit the entire ecosystem or can be passed-on by upstream firms. I find suggestive evidence for this logic in chapter 3, where hearings on platform regulation suggest that the preferences between SMEs and platforms in competition, advertising, and taxation policy align on some dimensions. In chapter 4, the alliance between platforms and creators against intermediary liability also is indicative of this logic, as stricter copyright would induce costs to both actors.

Finally, I add nuances to the existing literature's finding of a consumer-platform alliance. In chapter 4 that there is indeed an initial alignment of preferences between platforms and its users, but not the public in general. To gain support among the general public, platforms need to actively employ outside lobbying strategies and create an alliance through framing and increasing issue salience. However, the success in doing so depends on the strength of counterframes and the existence of a unified public sphere.

Firms' Political Strategies in Digital Capitalism

Finally, I show that the relative ownership of DPR and firms' relative position in digital ecosystems affects the political strategies of firms. These findings link the structural position of a firm in digital capitalism with its instrumental strategies and they are summarized in table 2.

Table 2: Digital Power Resources and Instrumental Strategies

(Type of) Firm	Digital Power Resource and (Suggested) Process	Strategies	Chapter
Platforms	**Ownership of Ties** → Reach, Access, Targeting	*Outside Lobbying:* - Mobilization of Consumers and Public	**Four**
Intellectual Monopolies and Platforms	**Ownership of Ties + Being a Hub** → Upstream Position in Digital Ecosystem → Appropriation of Information → Expertise	*Standard-Setting* *Inside Lobbying:* - Access to Legislators *Regulatory Capture*	**Two** (Partly)
Intellectual Monopolies and Platforms	**Ownership of Ties + Being a Hub** → Upstream Position in Digital Ecosystems → Appropriation of Profits → Deep Pockets Pursuit to Expand and Protect Legal Construction of Intellectual Monopolies	*Inside Lobbying:* - Expenditure - Hiring of Lobbyists - Campaign Finance	**Four** (Partly)

First, I show in chapter 4 that platforms possess unique tools, rooted in their business model, for pursuing outside lobbying strategies. Through their ownership of digital infrastructure, in this case the network ties in the social and search networks of content platforms, they enjoy frequent *access* to users that use their services on a daily basis. The group of users they *reach* also is huge and diverse and their collection of behavioral data potentially allows for *targeting*. As I show, they can utilize this reach to successfully frame an issue, to raise issue salience, and to mobilize the public to signal their discontent to policymakers.

Second, we show in chapter 2 that intellectual monopolies and platforms often participate in standard-setting consortia. In fact, as the example of GAIA-X shows standard-setting consortia in digital capitalism cannot circumvent huge platforms even if they initially try to do so. While we do not flash out the process behind this in detail, their digital power resources and upstream position in digital ecosystems enable these firms to appropriate knowledge and information. And as argued by theories of intellectual monopolies this knowledge is often exclusive (see above). At the same time the technical complexity of policies increases. A hypothesis that emerges and should be pursued in further research is that upstream firms are in a unique position to accumulate exclusive expertise and use this expertise to gain access to legislators and regulatory agencies. While the role of business as natural experts in their domain and their resulting influence is documented, exclusive access would exuberate the power of business considerably. A strong test for this hypothesis could be in a highly salient policy field, because issue salience lead to the built up of independent salience through journalists and NGOs (Culpepper 2010).

Third, I show (albeit in passing) in chapter 4 that platforms possess substantial resources for inside lobbying in terms of expenditure and the hiring of lobbyists. Their deep pockets for lobbying are also rooted in their structural position in digital capitalism. As owners of infrastructural and structural power resources they occupy an upstream position in digital ecosystems that they exploit to appropriate profits. Part of which they can use to seek influence on regulation. Interestingly, Rightsholders can be considered as intellectual monopolies as well – although they control creative works and not data and digital technologies. Still, they actively engage in substantial inside lobbying as seen in chapter 4. Interestingly, their lobbying is in pursuit of protecting their legally constructed monopoly on distributing creative works. Data on inside lobbying suggests that other intellectual monopolies such as Big Pharma are similarly active lobbyists, in particular on intellectual property rights (Corporate Europe Observatory 2021). In how far the lobbying activity of intellectual monopolies is driven by the attempt to expand and protect the legal construction of their monopolies would be an interesting question for further research.

Contributions

My dissertation contributes to the literatures on business power and digital capitalism. While the contributions of each chapter are highlighted at the end of each chapter, there are four overarching contributions.

First and foremost, my empirical contribution is to analyze how changes in capitalist production and the organization of the firm affect businesses as political actors. I show that firms in digital capitalism control new digital power resources, i.e. sticks and carrots rooted in data, digital technologies, and digital infrastructures to influence others. I show that the (re)organization of inter-firm relations in digital ecosystems adds to the incumbency-disruptor dimension a second dimension of preference formation evolving between upstream and downstream firms. I show that the specific features of the platform business model and their control of digital infrastructure provide unique tools to pursue outside lobbying strategies. These findings form the central building blocks of my theoretical considerations of business power in digital capitalism outlined in this chapter.

Second, I draw on the power resource approach to bridge between the concepts of structural and instrumental business power. This contributes to the literature on business power. While structural power has been criticized for not considering variations in business power over time and between different firms and neglecting agency, instrumental power focuses only on open contestations, assumes preferences as exogenously determined, and treats business as just another interest group. Drawing on the power resource approach, I argue that the bases of business power are rooted in its economic function within a specific historical configuration of capitalism. Its control over specific means of production and the organization of inter-firm relations determine the relative power

resources of business which in turn influences political preferences and strategies. Theorizing power resources in the context of business power and using them to integrate theories of structural and instrumental power is a key contribution of this dissertation.

Third, my theoretical framework of business power in digital capitalism accounts for both, the transformation of economic infrastructures (platform capitalism) and of the means of production (surveillance capitalism and intellectual monopoly capitalism). Much of the work in political-economy does only focus on platforms while neglecting the role of data and intellectual monopolies. My framework does not only account for intellectual monopolies and structural DPR in addition to platforms and infrastructural DPR. It also allows for the analysis of how the digital transformation of capitalism changes the power of non-digital but increasingly digitalized companies, e.g. from the manufacturing sector.

Fourth, I contribute to the literature on digital capitalism by theorizing on how it systematically empowers and shapes the political ambitions firms. I therefore do a first step towards a micro-foundation of digital capitalism. Existing studies of politics in digital capitalism either focus exclusively on the macro-trends of disruption, commodification, and liberalization or on the strategies and actors in specific policy battles. However, analyses of how the transformative forces of digitalization systematically change power dynamics on the actor level are scarce. To my knowledge the only exception is the work on consumer-platform alliances (Culpepper and Thelen 2020; Rahman and Thelen 2019). I contribute to this work by highlighting how firms' political power, preferences, and strategies are rooted in the production and exchange relations of digital capitalism. In particular by (1) showing that not only platforms but also intellectual monopoly firms, especially data-owners, are systematically empowered in digital capitalism, (2) identifying the dimensions and logics of preference formation *within* the business community rather than between platforms and consumers, and (3) contextualizing the consumer-platform alliance by showing it needs to be strategically constructed and works only under certain scope conditions. I map which firms and coalitions underpin digital capitalism and try to drive it forward and which firms are disempowered and left out. Because my work outlines how the systemic forces of digital capitalism shape firm agency it is a first step towards a micro foundation of politics in digital capitalism. The second step, showing how these micro-level changes translate back to the macro-level by reproducing and contesting digital capitalism, remains to be explored in further research.

Broader Implications

Despite these contributions my dissertation also has important oversights. Of course, the proposed theory should be further tested and its scope conditions should be established. The usefulness of the power resource concept for studying the entanglements between business and politics should also be

considered for industrial, financial, and increasingly green capitalism. However, I want to close with some considerations on (1) the role of ideas for business power in digital capitalism, (2) the relation of business with other actors within digital capitalism, and (3) the implications of the changing power relations for the central institutions and growth strategies in digital capitalism.

The first oversight of my thesis is that ideational aspects are only covered in passing. I neglect ideas in order to remain focused on the material dimensions of business power. However, starting with debates on the third face of power (Lukes 1974), the literature on discursive and ideational business power has made important contributions. For instance, ideas can be coalition magnets that enable actors to rally behind an often vaguely defined but shared concept (Schmitz and Seidl 2023). Ideas can interact with my framework in the following ways: Ideas can distort the material preferences of firms, thereby interfering with the proposed link between digital power resources and political preferences. Ideas can provide an alternative link between structural and instrumental power as structural power can be constructed and actualized ideationally (Bell and Hindmoor 2014). Ideas can also influence lobbying strategies. Preexisting worldviews, for instance, can determine how likely a frame is to stick with the public. For all these reasons, further research needs to explore how ideas interact, amplify, or contradict my theoretical considerations.

The second oversight is the neglect of important non-business actors. While I believe that the focus on the firm as the central actor in capitalist production is well justified to arrive at a first approximation of the political logics of digital capitalism, this focus neglects important other actors. Changes within the firm also signify changes in its relation to workers, financiers, states, and other interest groups.

First, the implications of firm-state relations in digital capitalism are threefold. First, the power and lobbying capacities and dynamics of firms change (see above). Second, the state is in direct competition with upstream firms over governing digital spaces. For instance, platforms can act as de facto sovereigns in digital ecosystems (Lehdonvirta 2022). Third, the state increasingly becomes an active participant in digital ecosystems. More often than not it does so as a user of digital infrastructure and data rather than an owner. Thus, the state is dependent on private firms' provision of clouds, operating systems, or digitalized military equipment. Whether this dependence leads to relations of infrastructural power and a preference alignment between upstream firms and the state should be examined. Another important dimension of the politics of digital capitalism is a restructuring of voters' ideologies (Selling and Strimling 2023).

Second, a huge and important body of literature is devoted to workers' struggles within digital capitalism. Work on the specific power resources of workers in digital capitalism identifies the use of digital tools for mobilization, the collection of data to counter informational asymmetries vis-à-vis the firm, or hacking digital infrastructure when striking as important new resources (Schaupp 2021, 276–

83). Still, labor is likely to become relatively disempowered vis-à-vis firms considering the increasing automation and networking of production and the declining role of labor in value creation (Gallego and Kurer 2022). Further, firms' ability to determine what data is shared and the centralization of expertise on digital infrastructures (and their technical weaknesses) within platform firms weakens the workers counterstrategies. Further, future studies could analyze how the power relations in digital capitalism structure cross-class coalitions. A hypothesis is that the losers of digital capitalism, i.e. downstream firms, incumbent firms, and unskilled or semi-skilled workers ally against the winners, i.e. upstream firms, disruptors, and high-skilled workers.

The third broad avenue for future research on the politics in digital capitalism is to study how the actors and coalitions that were (dis)empowered by the digital transformation (re)negotiate the political-economies they populate. In other words, how does business power in digital capitalism interact with institutions and growth models in digital capitalism.

Following an historical-institutionalist understanding, institutions are the result of past power struggles and become contested when power relations in society change (Pierson 2016). As shown in this dissertation a few, often disruptive firms at the center of digital ecosystems have been empowered vis-à-vis incumbents and downstream firms. In addition to inter-class conflict between capital and labor, intra-class conflict between firms becomes increasingly important (see also: Schwartz 2022). Further, as elaborated a few paragraphs ago there are reasons to assume that business has been empowered in the conflict against labor. I will hypothesize on the effects this might have on our current political economies.

The organization of inter-firm relations in digital ecosystems leads to a concentration of profits in upstream firms and narrowing profit margins for downstream firms. To remain profitable, downstream firms are therefore pressured to cut non-essential costs. In addition, the increasing digitalization of non-digital firms results in a decreasing centrality of labor in profit creation, be it because firms increasingly automate production or pursue non-labor-based business models. Further, the collection of specific data and the introduction of algorithmic governance (e.g. wearables, tailored instructions) increasingly substitutes for specific-skills of workers (Schaupp 2021).

This combination of rising pressures to cut costs and decreasing centrality of workers (with specific skills) might further undermine the institutions central to coordinated market economies (Hall and Soskice 2001). For instance, Emmenegger and co-authors (2023) have found that large German firms increasingly lobby for an expansion of general education at the cost of dual vocational training, while small Swiss firms maintain firm supporters of the dual system. They attribute this to differences in size and opportunity structure. An alternative explanation could be that small firms are in a less favorable position to collect data and to replace specific-skills. Therefore, small firms are still more reliant on

labor than large firms. The need to cut-costs to remain profitable despite value appropriation and a decreasing reliance on specific-skills could also lead to decreasing support of large firms for extensive welfare states. Non-wage labor costs are central burdens for firms and if they are less reliant on investments of workers in specific skills, they might be less inclined to co-finance the protection of specific-skills against unemployment (Mares 2001).

Finally, the implications for the growth models' approach are worth considering. In how far does the extraction of knowledge and value from digital ecosystems constitute a growth model on its own or contributes to existing growth models? It certainly does contribute to the Irish growth model (Bohle and Regan 2022), not least because intellectual monopolies can relatively easily shift profits across borders. Does the expropriation of profits from downstream firms and the resulting pressure on profitability challenge the existence of cost-sensitive export-led growth models? This question is particularly worthwhile to study in Germany were a strong reliance on export-led growth, cost-sensitivity of exports, and a strong *Mittelstand* without many DPR would make it an extreme case of this dynamic (Baccaro and Höpner 2022). And if this dynamic indeed exists, what does it mean for the coalitions supporting the German growth-model? Within industrial policy, conflict between the export-oriented industrial *Mittelstand*, advocating for greater protection from US tech giants, and large exporters, wanting to keep up with US giants through merges and acquisitions, is increasingly observable (Germann 2023). Given their position in digital ecosystems and the ability of large exporters to centralize data, this conflict seems plausibly related to their relative control of DPR. Whether this conflict dimension also leads to unexpected fissures between the export-oriented *Mittelstand* and large exporters in the key policy areas underpinning the German growth model, such as fiscal policy or monetary policy, is an interesting research question.

In sum, I hope that my thesis contributes to the understanding of business power in digital capitalism and the concepts and hypotheses I developed can be usefully applied to study how actors negotiate change in political economies facing the digital transformation. Before this introduction, finally, comes to an end, I briefly summarize the chapters.

Summary of the Chapters

Chapter 2

The first paper of my dissertation "Business Power in Digital(ized) Capitalism: The Political Economy of Structural and Infrastructural Digital Power Resources" is presented in chapter 2. In contrast to the focus on the exercise of power by digital companies in the existing literature, we propose the concept of *digital power resources (DPR).* The central arguments of chapter 2 are as follows: First, DPR can be held by firms from all economic sectors and not only digital firms. Second, the sectoral distribution of

DPR varies across national political-economic contexts. Third, DPR can have effects independent of their use by structuring business preferences and strategies in digital capitalism.

While much of the discussion of business power and digitalization is limited to digital platform firms, digitalization cuts across economic sectors. Business models in the traditional economy become increasingly digitalized and so do the power resources of traditional firms. To understand the power of digital as well as digital*ized* firms, we introduce the concept of digital power resources. Digital power resources are "the means and capacities, rooted in data and computerized technologies and infrastructures, that enable actors who control them 'to reward and punish other actors'" (Kemmerling and Trampusch 2022, 2; Korpi 1985, 33). We argue that DPR are rooted in firms' core economic activities and that they can be structural and infrastructural. Structural DPR stem from control over data and digital technologies. Firms that control data and the technologies (e.g. algorithms, chips) to process it are central to value creation in digital(ized) capitalism and occupy a privileged position vis-à-vis others. Infrastructural DPR, in contrast, stem from firms' control over the backbone features of the digital economy. For example, technical standards and platforms. These digital infrastructures enable and structure the downstream uses of the internet for a wide range of dependent actors.

After defining DPR, we propose new indicators and apply them to a sample of 120 large firms from five sectors and headquartered in the US, UK, France, and Germany. We indeed find that not only digital, ICT, and telecom firms control structural and infrastructural DPR. Traditional manufacturers, too, collect and process data, engage in standard-setting, and build platforms for the industrial internet. We further show that the sectoral distribution of DPR varies systematically across firms due to their national political-economic environment. "Reflecting their countries' focus on the Industrial Internet, French and German manufacturing firms possess substantial DPR. In the US, digital, ICT, and ISP companies dominate on our new indicators, while in the UK no clear pattern emerges—except for the dominance of three ISPs." (Kemmerling and Trampusch 2022, 2).

To illustrate the contributions of our new concept, we show that DPR have effects independent of their use to influence policy and that they can explain business preferences and strategies that are puzzling from existing perspectives. We focus on the German automotive sector, an extreme case of the Industrial Internet of Things (IIoT). From the platform power perspective, it is puzzling that carmakers (e.g. VW) adopt a strategy of cooperation with cloud hyperscalers (e.g. Amazon Web Services). After all, integrating clouds into their vehicles and production plants locks carmakers into an ecosystem and grants hyperscalers access to sensitive data. Considering carmakers' DPR, however, sheds light on these cooperations. Through their centralized control over production and vehicle data, a crucial resource for hyperscalers to develop software for the IIoT, carmakers ensured data sovereignty and co-ownership of IIoT platforms. Further, and adding to sectoral explanations of business preferences, DPR can explain preference heterogeneity towards data-sharing legislation within the German

automotive sector. Carmakers prefer market-based solutions whereas aftermarket SMEs (repair and sales) argue for strong regulation and model contract clauses. While old conflicts within the sector centered on profit margins, carmakers' control of IIoT platforms introduced a new dimension of conflict around market access. Carmakers can exploit their infrastructural DPR to restrict aftermarket SMEs' access to data. Hence, we demonstrate that the relative power resources of actors influence what they want (preferences) and what they do (strategies).

Chapter 3

My article "Communities of Fate and Exploitative Dependencies: An Ecosystem Explanation of Business Preferences in Digital Capitalism" is included as the third chapter of the dissertation. In the paper I investigate the effect of firm interdependencies in digital ecosystems on preference alignment between firms. The central argument is that the theories of preference formation need to take the digital reorganization of value creation and business to business relations seriously. Firm interactions in digital capitalism are predominantly organized in ecosystems built around digital technologies and/or infrastructures. While each ecosystem member adds value to the entire ecosystem, ecosystems are not egalitarian. In contrast, core inputs are often controlled by upstream firms around which a group of downstream firms is organized. Downstream firms are reliant on access to the core inputs to offer complementary services and goods to the ecosystem. I hypothesize that this interdependency creates two logics of preference formation, the exploitative-dependency logic and the community-of-fate logic. To test my hypotheses, I use the statistical method of multi-regressive quadratic assignment procedure and triangulate its results with a BERTopic model on congressional hearings on platform regulation as well as a qualitative reading of firms' testimonies in the policy areas of taxation, advertising, and competition.

In digital capitalism the core inputs are intangible assets and digital infrastructures. Drawing on the intellectual monopoly framework, I argue, that an upstream firms' control of intangible assets (e.g. data, digital technologies, and intellectual property) creates de facto control along the entire intangible value chain. Similarly, digital infrastructures, especially platforms, create dependencies between infrastructure owners and downstream firms reliant on continued access to the infrastructures. This asymmetry creates ample opportunities for upstream firms to exploit downstream firms by extracting rents and act as rule setters of the ecosystem. Regulation of digital ecosystems, therefore, imposes different costs on upstream and downstream firms. Because upstream firms are disproportionally advantaged as long as ecosystems are organized by market interactions, they oppose government intervention. Downstream firms, on the other hand, prefer government intervention to level the playing field. I indeed find that an exploitative-dependency logic exists in digital ecosystems: Firms that are in an upstream-downstream relation have higher odds of diverging preferences and this is more pronounced the more an upstream firm exploits its market power.

I further hypothesize that whenever the costs of regulation are distributed across the entire ecosystem preferences between upstream and downstream firms are aligned (the community-of-fate logic). I argue the distribution of regulatory costs primarily depends on the policy area. Policies, such as cybersecurity or data privacy and advertising, aim to regulate the entire ecosystem and result in preference similarity because all ecosystem actors depend on the continued operation of the ecosystem. In contradiction to my hypothesis the statistical analysis finds no support for the community-of-fate logic. In contrast, the topic model and the qualitative analysis of selected hearings suggests that the community-of-fate logic exists and downstream firms argue against regulation because it would harm the entire ecosystem. However, this logic is evident in policies across different policy areas, including those that primarily address within ecosystem conflict (e.g. competition policy). This suggests that the multidimensionality of a single bill can activate ambivalent logics and the measurement on the policy area level is not nuanced enough. Still, chapter 3 shows that changing business to business relations in digital capitalism affect the formation of business preferences.

Chapter 4

Chapter 4 includes the final paper of my dissertation titled "Saving the Internet: The Use and Limits of Outside Lobbying Strategies by Digital Platforms". After studying *digital power resources* and *preferences* in chapter 2 and 3, the final chapter looks at the lobbying *strategies* of digital platforms against stricter copyright legislation. Before the advent of digital technologies copyright was a highly technical and low salience policy area dominated by the interests of rightsholders. Digitalization, however, not only challenged existing copyright legislation by enabling the decentralized reproduction and distribution of creative works over the internet, it also introduced and empowered a new set of actors with vested interests in the issue. Thus, the proposal of rules to make online intermediaries liable for copyright infringements by their users resulted in a heated lobbying battle. Rightsholders and artists supported stricter rules and digital platforms, digital rights groups, and users allied in opposition of the rules.

The central argument proposed in chapter 4 is that digital platforms occupy an intermediary position in a centralized network that allows them to reach a large and diverse group of users, shape how an issue is framed and how salient it is, and mobilize the public on their behalf. They, thus, possess unique tools for outside lobbying, i.e. the mobilization of the public with the goal to influence policy insiders. Outside lobbying is usually considered a strategy predominantly used by citizen groups. To unpack the causal mechanism of platform outside lobbying and establish its scope conditions, the paper asks two research questions: How can platforms mobilise the public to support their policy goals? And under which conditions is platform outside lobbying (un)successful? To answer these questions, I combine theory-testing process tracing in a deviant and typical case with time-series and quantitative text

analysis. I selected the US Stop Online Piracy Act as a typical case for successful platform outside lobbying and the EU Copyright Directive as a deviant case (i.e. despite efforts platform outside lobbying failed to prevent the directive).

With regard to the first question I find that platforms' ownership of centralized network infrastructures builds three advantages for outside lobbying into their business model. First, platforms enjoy *free and frequent access* to users because of their embeddedness into daily routines. Second, centralization tendencies in digital capitalism mean that platforms often *reach* a large and diverse group of users. Third, network ownership ensures that platforms can extract behavioural data and *target* specific user groups for mobilization purposes. Platforms opposing legislation can use these tools to increase issue salience, transmit a frame supporting their position, and mobilize the public. Thereby they influence how the legislation is perceived and discussed in the public sphere and, ideally, signal the electoral costs of a proposal to legislators who, in turn, retract their support.

I find supportive evidence for this mechanism in the discussions on the US Stop Online Piracy Act and in some EU countries during the discussion of the EU Copyright Directive of 2019. Platforms successfully increased issue salience and changed the framing of the debate from focussing on the fair remuneration of creators and theft of intellectual property to discussions of censorship and the functioning of the internet. In other EU countries, particularly France, Spain, Belgium, and Portugal, however, I find that the existence of strong counterframes not only distorted the signal platforms wanted to send to legislators by providing a powerful counternarrative. Counterframes also delegitimized platforms by portraying their outside lobbying as a misinformation campaign. This reversed the intended effect of outside lobbying. The failure of platforms to successfully frame the issue in the fragmented public sphere of the EU and the existence of strong counterframes in some EU member states were important scope conditions that interfered with the mechanism of platform outside lobbying.

Publication Status of the Articles

The first article “Digital power resources (DPR): the political economy of structural and infrastructural business power in digital(ized) capitalism” is joint work with Christine Trampusch and was published in Socio-Economic Review (2022), OnlineFirst, 1-26. Both authors contributed equally to the research at all stages of the process.

“Communities of Fate and Exploitative Dependencies. An Ecosystem Explanation of Business Preferences in Digital Capitalism” is single-authored and is currently prepared for submission to the Max Planck Institute for the Study of Societies Discussion Paper Series.

“Saving the Internet: The Use and Limits of Outside Lobbying Strategies by Digital Platforms” is single-authored and has been submitted to Business and Politics. The paper was invited for revision and resubmission and I am currently in the process of revising it.

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Chapter 2: Business power in digital(ized) capitalism: The political economy of structural and infrastructural digital power resources

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Abstract

Studies on digitalization and business power tend to focus on digital platform firms. In contrast, we argue that data, digital technologies, and digital infrastructures create novel—digital—power resources (DPR) for firms throughout sectors. Digital power resources can be structural, i.e. rooted in data and digital technologies, and infrastructural, i.e. rooted in digital infrastructure. We propose indicators and apply them to a sample of 120 large firms from the US, UK, France, and Germany, active in five sectors. We find that firms from all sectors control DPR but the sectoral distribution varies depending on the national political-economic context. Lastly, we demonstrate the analytical value-added of our concept by explaining variation in business preferences and strategies toward data sovereignty and data-sharing regulation in the German automotive sector. Our DPR concept improves our understanding of why and how business seeks to influence (digital) policies and of politics in digital(ized) capitalism in general.

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Introduction

Business models across the economy are undergoing a fundamental transformation. A new pattern of capital accumulation has emerged, based on the extraction of data as a raw material and the analysis of that data by digital technologies such as artificial intelligence and machine learning (e.g. Newman, 2010; Srnicek, 2017; Zuboff, 2019). Digital infrastructures form the backbone of ever more business activities (Rahman, 2018; Hassel and Sieker, 2021). Digitalization is not limited to the digital or information and communication technology (ICT) sectors. Instead, it is a crosscutting trend that is reshaping the entire economy, including the manufacturing sector. Buzzwords like Industry 4.0 and the Industrial Internet of Things (IIoT) are popular among CEOs and politicians. Although the literature increasingly acknowledges the role of digitalization for business models, studies on its implications for business power are largely limited to one particular type of company, namely digital platform firms, and how these firms use their power (e.g. Moore and Tambini, 2018; Kenney *et al.*, 2019; Culpepper and Thelen, 2020).

The objective of this paper is to complement the literature on platform power. To do so we introduce the concept of digital power resources (DPR). Based on Korpi's (1985, p. 33) original definition of power resources, DPR are the means and capacities, rooted in data and computerized technologies and infrastructures, that enable actors who control them "to reward and punish other actors". We argue that firms from all economic sectors accumulate DPR. We extend the business power literature by emphasizing that digitalization not only creates new digital behemoths but also digitalizes the business models of traditional firms. As these digital*ized* companies increasingly base their production strategies on data and digital technologies their power resources become increasingly digital.

We make three contributions to the political economy debate on corporate power in digital capitalism. First, we suggest a novel method for how to conceptualize and measure structural and infrastructural DPR. Based on long-standing debates in the business power literature, we contend that structural DPR are rooted in a firm's privileged position in the economy. We argue that structural DPR stem from firms' digital factors and means of production, i.e. data and digital technologies. Infrastructural DPR are rooted in an actor's control over digital general-purpose technologies that enable downstream uses for other actors. Platforms and technical standards determine the digital activities of a broad range of actors and therefore serve to operationalize infrastructural DPR.

Second, we argue that national political-economic configurations shape the distribution of DPR across economic sectors. Different institutional environments and coalitional alignments foster different patterns of digitalization (Rahman and Thelen, 2019; Thelen, 2019) which in turn empower companies from different sectors. To substantiate our claim, we apply new indicators to a sample of 120 large firms headquartered in France, Germany, the UK, and the USA, and from the digital, ICT, internet

service provider (ISP) sectors, as well as from manufacturing of machinery and equipment, and manufacturing of motor vehicles. Our data reveals, first, that companies across all five sectors increasingly possess DPR. Digitalization empowers not only digital and ICT firms and our new concept allows us to observe this trend. Second, we find cross-national differences in the distribution of DPR. Reflecting their country's focus on the Industrial Internet, French and German manufacturing firms possess substantial DPR. In the US, digital, ICT, and ISP companies dominate on our new indicators, while in the UK no clear pattern emerges—except for the dominance of three ISPs.

Third, we go beyond the literature's focus on the use of power in digital capitalism. In contrast, we find that DPR affect what firms want (preferences), how they act (strategy), and whether they achieve their goals (influence).[5] While it is important to study how businesses use their DPR to influence policy, going one step back and explaining business preferences is equally important to help us understand how digitalization changes business power. Since business preferences and strategies are rooted in economic structures and the relative distribution of power resources (Korpi, 1985), it seems reasonable to assume that the digital transformation of the economy and of firms' power resources affects firms' preferences and strategies. With case evidence from the German automotive sector, we illustrate how our DPR concept can explain puzzling business strategies and preferences on data sovereignty and data-sharing regulation. We argue that cooperation with the cloud hyperscalers becomes a viable strategy for carmakers because of their considerable structural DPR. As this cooperation ensures carmakers co-ownership of cloud platforms, they also build up infrastructural DPR that are at the root of a new dimension of preference heterogeneity between carmakers and aftermarket (repair and maintenance) SMEs. Applying our concept to the German automotive sector is of general interest for further studies on business power, since this sector can be regarded as an *extreme case* of digital disruption. According to Gerring (2007, pp. 101–105), extreme cases are useful for analyzing associations in an explorative way.

In the next section, we introduce our concept of DPR, which takes the new pattern of capital accumulation in the digital(ized) economy into account. Based on this concept, we suggest new indicators to measure infrastructural and structural DPR and present our expectations of how national political-economic configurations shape the distribution of DPR across economic sectors. In section three, we apply the indicators to our sample of large firms to explore the variation of DPR between sectors in different countries. Section four applies our concept empirically and illustrates how DPR help to explain business strategies and preferences toward data sovereignty and data-sharing regulation in the German automotive sector. The last section concludes.

[5] We define an actor's preferences as "the way it orders the possible outcomes of an interaction" and strategies as the "tools … [it] uses to get as close to its preferences as possible" (Frieden 1999, pp. 42 and 45).

Theorizing corporate power resources in digital(ized) capitalism

So far, comparative political economy scholarship on business power in the digital economy has mainly focused on the exercise of political and economic power by digital platform firms. Platforms are intermediaries between (at least) two groups of users and provide the sociotechnical architecture of interactions between these user groups (Dolata, 2022). They come in a variety of shapes, including search, social networking, media, trading, booking or service, cloud, and crowdsourcing platforms (Dolata, 2022, p. 460). Key aspects discussed in the platform power literature are, first, the market power of platform giants, which they use to dominate other actors in their ecosystem and acquire smaller competitors (Kenney *et al.*, 2021). Second, platforms possess a distinct form of political power, which is rooted in a mixture of consumer dependence and liberation. Because platforms provide the infrastructure of users' daily activities and simultaneously provide new, cheap, and convenient services, there is an alignment of preferences between consumers and platforms leading "politicians [to] rationally shy away from even entertaining policies that would deprive their constituencies of the conveniences on which many of them now rely" (Culpepper and Thelen, 2020, p. 8; see also: Rahman and Thelen, 2019). Although the platform power literature highlights an important new type of power, as a result of its focus on the digital platform firm, it neglects the digital transformation of the wider economy.

Digitalization fundamentally transforms economic and social actions in contemporary economies (e.g. Kenney *et al.*, 2019). It is closely connected to large-scale processes of change in the structure of corporations and the accumulation of capital. Digitalization is (re)structuring the relations of production and altering global value chains (Rikap, 2018; Durand and Milberg, 2019). Firms are adapting their business models to these changes and increasingly generate profit using "information technology, data, and the internet" (Srnicek, 2017, p. 4).

The growing importance of digital technologies and data for value creation and of digital infrastructures as a backbone of economic activity lead to a new pattern of capital accumulation; this new pattern is an important phenomenon for comparative political economists interested in business power for three reasons.

First, digital technologies have become important means of production and data an essential resource (Srnicek, 2017; Moore and Tambini, 2018; Zuboff, 2019). In contrast to industrial capitalism, value in digital(ized) capitalism is not only generated by labor and physical assets. Instead, the basic raw material is data created by the storage of information in digital formats and mined from interactions in digital environments (Newman, 2010, p. 1291). To extract value from raw data, it needs to be collected, stored, structured, and analyzed using novel means of production, namely digital technologies (e.g. algorithms, chips).

Second, companies using digital technologies rely on a broad network of digital infrastructures, i.e. "basic information technologies and organizational structures" (Tilson *et al.*, 2010, p. 748), which provide the backbone of their economic activities (e.g. cloud computing, digital marketplaces) (Hassel and Sieker, 2021; Kenney *et al.*, 2021). While digital technologies are often the fundamental building blocks of digital infrastructure, the crucial difference between the two is that the latter enables a wide range of downstream activities for a broad variety of users(Tilson *et al.*, 2010), whereas the former is applied to achieve a specific end. Digital infrastructure can consist of the physical network infrastructure of the internet, but often also takes the form of a platform ecosystem (Rahman, 2018). These ecosystems are the product of network effects, and "the rules and norms that govern the various parts of Internet services" (Hassel and Sieker, 2021, p. 2) are set by the actors who own and control them.

Lastly, the importance of data, digital technologies, and digital infrastructures is not limited to the digital or ICT sectors but also reshapes the trading and production processes of "traditional" manufacturing or service firms. According to the European Commission (2018, p. 10) nearly a third of the growth of Europe's total industrial output stems from "the uptake of digital technologies". Digital technologies and infrastructures not only connect business to consumers (B2C), but also business to business (B2B), and machines to machines (M2M). An important component and indeed catalyst of this trend is the IIoT which "includes all devices and objects whose state can be altered via the Internet" (OECD, 2018, p. 5). As brick-and-mortar retailers increasingly rely on e-commerce, banks on fintech, and carmakers on connected machines and vehicles, the crosscutting characteristics of digitalization are evident. So, to fully understand business power in digital capitalism, political-economists have to factor in the digital*ized* economy as well.

Acknowledging these three key features, we complement the existing literature by introducing the concept of *digital power resources (DPR).* Drawing on Korpi (1985, p. 33), we define DPR as the means and capacities, rooted in data and computerized technologies and infrastructures, that enable actors who control them "to reward and punish other actors". Digital power resources are the foundations of business power in digital(ized) capitalism. And just as digitalization affects the entire economy, DPR can be controlled by firms across all sectors. With our focus on the sources of power we also follow Young's (2015, p. 447) notion that the effect of power—influence—and its cause—the source of power—should not be "conflated".

In the remaining part of the chapter, we elaborate on our DPR concept and how distinct national political-economic configurations shape the sectoral distribution of DPR.

Previous studies on business power distinguish between three different types. While instrumental power encompasses firms' noneconomic activities, such as lobbying or campaign contributions (Young,

2015, p. 449), structural and infrastructural power are rooted in the core activities of the firm. As previous studies already show that digitalization creates new channels for firms' lobbying activities (e.g. Culpepper and Thelen, 2020; Seidl, 2020), our study focuses on structural and infrastructural DPR.

Structural DPR: Controlling the factors and means of production in the digital(ized) economy

Structural power means that structurally prominent firms limit their economic activities—either automatically or strategically—if they do not achieve their preferred outcome, thereby harming overall economic performance (Culpepper and Reinke, 2014; Culpepper, 2015). Structural prominence, i.e. an actors' "distinctive location in a set of relationships that conveys its importance relative to other actors" (Young, 2015, p. 448)", is the key source of structural power. In the economy, structural prominence rests on a firm's control of the factors and means of production. Accordingly, structural power resources are traditionally measured as *employment, assets,* and output (*sales*) (Table 1). While these measures are well suited to reflect structural prominence in industrial capitalism, they need to be complemented to reflect the new pattern of accumulation in digital(ized) capitalism. As data and digital technologies become important factors and means of production, we operationalize DPR as the control of data and digital technologies (see Table 1).[6]

Several scholars have already highlighted that data is an important source of market power in the digital(ized) economy. Market power is largely dependent on the value (including its depreciation over time) and the exclusivity of data (Graef, 2018, p. 88; Katz, 2019) and stems from three mechanisms.

First, data and digital technologies have economies of scale. Data analysis requires (1) huge amounts of (2) sufficiently heterogenous and (3) up-to-date data (Santesteban and Longpre, 2020). Only when a database includes enough observations, data analysis is meaningful. And the results of data analysis become better and more robust, the more pronounced each of the three aforementioned properties is. Relatedly, the development of machine learning and artificial intelligence algorithms requires access to data with these three properties (Santesteban and Longpre, 2020) as well as substantial upfront investment in a skilled workforce and hardware (Nucci and Guerzoni, 2019, p. 315). Second, data ownership can create entry barriers. There are only some firms that can extract enough data themselves to enable big data analyses. Although smaller firms can try to buy data from third-party vendors, availability of (high-quality) data is often limited (Bundeskartellamt, 2017, p. 7). Thus, the more exclusive a firm's control of data, e.g. in a certain sector, the higher the entry barriers for other

[6] Due to limited data availability, we focused on the six indicators presented in Table 1. One old indicator that is missing is firms' international footprint. This measures the credibility of firms' threats to relocate in response to an unfavorable regulatory environment (Culpepper and Reinke, 2014). Data for this is only available for US firms. More refined new indicators are: the number of (data) scientists and IT experts as a proxy for R&D and artificial intelligence capacity; ICT investments and ICT assets as a proxy for digital technologies; the valuation of companies' data assets as a proxy for their control over data.

firms. Third, data ownership drives innovation potential. Controlling and analyzing data is a key driver for the improvement of products and processes and the development of new, innovative software (Barwise and Watkins, 2018). Further, firms with concentrated data ownership can extract rents and reinvest them in research and development which triggers an innovation spiral (Rikap, 2018; Nuccio and Guerzoni, 2019).

Table 1: Structural DPS ("by being")

Description	Indicator	Operationalization
Traditional indicators		
Labor, physical investment, and physical assets	Employees	Number of people employed by a company (multiple of median of large companies from the same country)
	Industrial output	Sales (US) or operating revenue (DE, FR, UK) (multiple of median of large companies from the same country)
	Physical assets	Total assets (multiple of median of large companies from the same country)
New indicators		
Stock of and investment in digital technologies and data	Intangible assets	Intangible assets (multiple of median of large companies from the same country)
	Research and development (R&D) capacity	R&D expenditure (multiple of median of large companies from the same country)

Source: Own compilation.
Note: Large companies are defined according to the AMADEUS Database as those with an operating revenue >= 13 million USD, and/or total assets >= 26 million USD, and/or more than 149 employees.

While this market power does not necessarily result in abuse (Nuccio and Guerzoni, 2019), it certainly can be used to reward or punish other actors, for instance, by imposing specific data collection practices on users, limiting competitors' data access, enabling price discrimination, and cross-leveraging insights from data in one market to enter bordering markets (Graef, 2018). These uses of data and digital technologies as structural DPR have direct effects on other businesses, consumers, and state actors. However, control over data and digital technologies—central factors and means of value creation and innovation—can also have effects that are more in line with the traditional divestment threat mechanism of structural power.

Ideally, indicators for structural DPR would thus reflect assets and investments in data and digital technologies (see fn.3). The absence of data on such fine-grained measures, however, forces us to take a more general stance. We opted to provide indicators pertaining to the broader *knowledge* economy rather than the more specific *digital(ized)* economy. Accordingly, we suggest that firms' intangible assets and R&D expenditure are appropriate measures for the stock of and investment in data and intangibles. Although intangible assets are increasingly linked to digital technologies, they also include

nondigital economic competencies and innovative property, such as training, branding (e.g. copyright, patents), and design (Haskel and Westlake, 2018, pp. 44–45).

Infrastructural DPR: Controlling the backbone of the digital(ized) economy

Infrastructural power, although originally applied to the state (Mann, 1984), has recently identified in financial and digital companies (Rahman, 2018; Bernards and Campbell-Verduyn, 2019; Braun, 2020). Infrastructural power is rooted in the "private control over 'infrastructural' goods that comprise the backbone for much of modern social and economic activity" (Rahman, 2018, abstract). These infrastructural goods are (a) consumed in a non-rivalrous manner and (b) are general-purpose inputs for a wide range of (c) downstream activities (Frischmann, 2012, pp. 61–62). Controlling infrastructural goods means having "control over the background features of economic life" (Bernards and Campbell-Verduyn, 2019, p. 4). Accordingly, we understand infrastructural power resources as a firm's control of general-purpose resources that are essential for (a broad range of) downstream activities of other actors.

Infrastructural power resources are often associated with network effects (Hassel and Sieker, 2021). Therefore, infrastructural power resources in the traditional economy include the control of transportation, telecommunication, electricity, and financial networks (Rahman, 2018). As collecting data on these indicators would have required further extensive desk research, we decided to not include data on the traditional indicators. Instead, our focus is on infrastructural *digital* power resources which include the control of physical network infrastructure, such as data centers or submarine communications cables, digital networks built around platforms and ecosystems, and the private regulation of general-purpose technologies through standard-setting (Rahman, 2018, p. 1676; Rahman and Thelen, 2019, p. 8; Hassel and Sieker, 2021, p. 4).

To measure infrastructural DPR, we propose two indicators: The *control of digital infrastructure* such as platforms and the involvement of firms in *standard-setting activities* (see Table 2).[7]

Why do we include platforms? Via platforms, firms exert two types of control, which, borrowing from Farrell and Newman (2019),[8] can be described as "chokepoint" (excluding others from a network, setting the terms of access) and "panopticon" effects (surveilling the interactions of others in the network). Through their control of a network, platforms can act as gatekeepers and structure user

[7] Additional indicators for infrastructural DPR are: AI-as-a-Service offers—general-purpose artificial intelligence algorithms which are billed by usage—or the control of the physical infrastructure of the internet (e.g. submarine cables or internet exchange points). We did not include these indicators because data on the former is scarce and the latter are usually owned by consortia rather than firms.

[8] Although Farrell and Newman (2019) describe these concepts in the context of state power, we believe that they can be usefully applied to describe the infrastructural power of platforms.

behavior in their ecosystem (van Dijck *et al.*, 2018; Kenney *et al.*, 2021). Furthermore, they can surveil user (inter)actions to source and monetize behavioral data (Srnicek, 2017; Zuboff, 2019).

Table 2: Infrastructural DPR ("by having")

Description	Indicator	Operationalization
Traditional indicators		
Control of and intermediary position in an analog network	Control of physical network infrastructure	Does a firm operate and/or occupy a central position in a transportation, electricity, financial, or telecommunications network?
New indicators		
Creation and consolidation of network effects	Standard-setting	Involvement in standard-setting consortia
Control of and intermediary position in a digital network	Control of digital infrastructure	Does a firm operate and/or occupy a central position in a product, advertising, e-commerce, or (industrial) cloud platform?

Source: Own compilation.

We distinguish four types of platforms (cf. Srincek, 2017).[9] First, e-commerce platforms connect buyers and sellers. Second, advertising platforms connect consumers and advertisers. Third, product platforms range from video-on-demand services to connected cars but are all built around products which constantly send usage data to producers. We also include operating systems in this category. Lastly, (industrial) cloud platforms allow "for pooling and sharing hardware infrastructure resources on a massive scale" (Kushida *et al.*, 2015, p. 6) and provide the "'nodes' through which data flows are managed, processed, stored, and channeled" (van Dijk *et al.*, 2019, p. 9). There are three kinds of cloud services, which all build on each other. Infrastructure-as-a-Service (IaaS) serves as the foundation of the cloud by providing storage capacity and computing power. Platform-as-a-Service (PaaS) provides an environment for programming and accessing applications (much like an operating system). And lastly, Software-as-a-Service (SaaS) enables the distribution of software over the internet (Kshetri, 2013, p. 272). Platform-as-a-Service and Infrastructure-as-a-Service are the key technical infrastructures enabling the IoT because they allow for the analysis of data collected from a network of connected machines or connected consumer devices and industrial products (Ehret and Wirtz, 2017). Thus, the cloud is the foundational layer for many other business models, including other platforms (van Dijk *et al.*, 2019, pp. 12–13) and we devote particular attention to cloud platforms in our empirical analysis.

[9] We exclude lean platforms, because they offer specific services (e.g. ride hailing or food delivery) rather than general-purpose ones.

Why is corporate *standard-setting* a good proxy for infrastructural DPR? First, involvement in *standard-setting* activities enables firms to affect users across the internet. Although, internet governance combines private governance such as self-regulation and multistakeholder regulation with public governance such as regulations and coordination (Newman, 2020), private actor standard-setting governs much of the technical infrastructure and network architecture (DeNardis, 2014). Internet standards and protocols establish the basic rules to ensure (inter)operability and security. Through involvement in standard-setting companies can directly influence which downstream uses of infrastructure are available and how these can be pursued by internet users. In short, standards are infrastructural DPR, because they "establish a universal technical language" that makes the internet work (DeNardis, 2014, p. 65).

Second, firms can establish their technologies as the default to gain competitive advantages (Fuchs, 2007, p. 117). Consider, for instance, the Global Standard for Mobile Communication (GSM). As GSM is based on technologies developed by companies such as Alcatel, Ericsson, Nokia, and Siemens, these companies had an important first-mover advantage until the late 1990s (Pawlicki, 2017, pp. 22–23). Third, company-driven standard-setting crowds out public regulation and hinders the buildup of state capacity and expertise.

In the empirical part of the paper, we focus on standard-setting in the Industrial Internet because this is an evolving field in need of standardization and there are first-mover advantages up for grabs. Before proceeding to the empirical part, however, we outline our expectations on the sectoral distribution of DPR.

The sectoral distribution of DPR varies between countries

We have now established that firms in all economic sectors can possess structural and infrastructural DPR. However, we also maintain that national differences in (1) institutions, (2) the availability of venture capital, and (3) coalitional dynamics structure the patterns of digitalization and therefore the sectoral distribution of digital power resources across nations. Drawing on Rahman and Thelen (2019), we argue that national institutions determine the societal backstops for digital and ICT firms' operations in a country, while venture capital availability determines the likelihood of a digital or ICT giant originating in a country. Therefore, we expect that digital and ICT firms from countries that combine supportive national institutions and plenty of venture capital possess significant DPR. Regarding the digitalization of the manufacturing sector, we follow Thelen (2019) in highlighting the importance of cross-class coalitions within the manufacturing sector and government support in managing the transition to new digital(ized) business models. Where cross-class coalitions exist and government support for the IIoT is strong, we expect manufacturing companies to possess significant DPR. We deliberately selected countries that vary on these three dimensions.

Rahman and Thelen (2019) argue that several political-economic factors in the US create an environment that is conducive for digital and ICT companies to thrive. Weak labor market regulation, weak unions, and overlapping jurisdictions mean there are few societal backstops, while military research expenditure and private venture capital provide sufficient financing. Lastly, a large domestic market and consumer-oriented antitrust regulations allow for the growth of these firms (Rahman and Thelen, 2019). Therefore, we expect that US digital and ICT firms possess significant DPR.

While in the UK societal backstops are also limited, it lacks the conditions for successful start-up finance and the growth of digital and ICT firms. Public and private venture capital funding lags far behind the US, both in relative (0.11 vs. 0.63 percent of GDP in 2019) and absolute terms (US$3.35 vs. US$135.65 million in 2019) (OECD Venture Capital Investments Statistic). Also, the British domestic market is relatively small and antitrust law more closely aligned with the European tradition. Although the institutional context allows digital and ICT businesses to operate effectively, we do not expect those businesses to originate in the UK. Since our sample focuses on the firms headquartered in the UK, we expect digital and ICT firms not to perform particularly well on our new indicators for DPR. Regarding the DPR in the manufacturing sector, we expect some similarities between the US and UK. Because both countries lack strong unions and business associations, the formation of cross-class coalitions is unlikely. We therefore expect the DPR of US and UK manufacturing firms to be limited.

Germany is, in many ways, the opposite of the US. Venture capital is scarce (OECD Venture Capital Investments Statistic) and labor market regulation is strict, creating financial and societal backstops for digital and ICT firms. However, the organizational characteristics of unions and business associations—encompassing and prone to cross-class alliances—, combined with government support, foster the digitalization of manufacturing (Thelen, 2019). This leads us to expect a sectoral distribution of DPR that favors the manufacturing sector over digital and ICT firms.

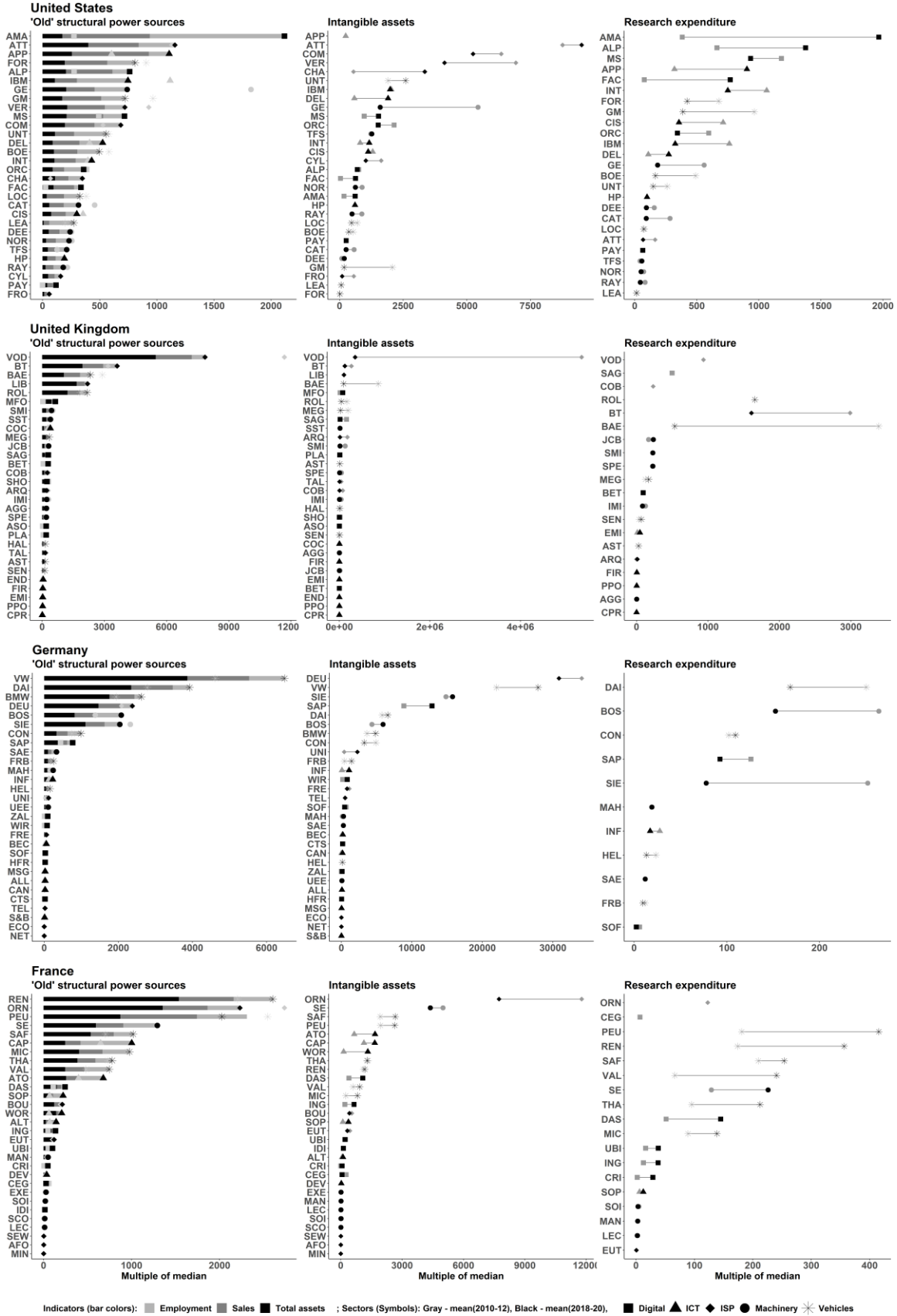
France, for its part, has strong labor regulation and limited venture capital availability but unions and business associations are also quite weak. However, the state actively coordinates economic activities and manages the digitalization of the manufacturing sector. Recently, the government launched initiatives such as the *Alliance Industrie du Futur* and *France Num* to accelerate the slow uptake of digital technologies among French businesses (European Commission, 2020, pp. 11–12). We therefore expect French manufacturing businesses to possess more DPR than those in the UK and the US, but less than those in Germany. We also expect French digital and ICT companies to possess few DPR. We explore the validity of these expectations in the next section.

The sectoral distribution of DPR in the US, UK, France, and Germany

In this section we apply our concept of structural and infrastructural DPR to a sample of companies headquartered in the US, UK, France, and Germany. Within these countries, our sample consists of the six largest independent (i.e. non-subsidiary) firms by turnover in the following digital(ized) sectors[10] (cf. UNCTAD, 2017; European Commission, 2018, p. 111): (1) Digital companies such as advertising, cloud, product, or e-commerce platforms (e.g. Facebook, Alphabet, Amazon) and software developers (e.g. SAP, Microsoft). (2) Internet service providers (ISPs) that provide the physical infrastructure of the internet, such as cable or wireless networks (e.g. Vodafone, Comcast). (3) ICT hardware producers (e.g. Cisco, Apple) that provide the technologies for computing power, connectivity, and intermediation. Additionally, in the ICT sector there are also consultancies that advise on digital technologies. Lastly, we selected (4) manufacturers of motor vehicles (MMV) and (5) machinery and equipment (MME) to analyze the DPR of industrial firms.

[10] We provide a list of corporations and details on the selection process in the online appendix(Table A1).

Figure 1: Firms' structural DPR by sector and country



Note on the "old" structural power sources: Bar colors indicate the multiple of the median for each individual indicator averaged over the period 2018–2020. The symbols indicate the accumulated multiple of the median over all indicators averaged over the period 2018–2020 (black) and 2010–2012 (gray).

Structural DPR

Our data on structural DPR stem from the Compustat (US) and AMADEUS (Europe) databases. While, for most companies, the former starts in the late 1990s, the latter only starts around 2010. To smooth out non-systematic fluctuations and missing values, our data compares the three-year average over the period 2010–2012 with the period 2018–2020. Our indicators are expressed as the multiple of the median large firm of a country. For instance, in 2018–2020 Amazon had 1,179 times the employees of the median large American firm. Figure 1 depicts the structural DPR of companies in the US, UK, Germany, and France.

In the US, digital, ICT and ISP companies are among the strongest on the "old" indicators—and this is increasingly the case. Although GM, GE, and Ford are also among the top ten, their "old" structural power resources are declining. Turning to our new indicators, we observe that four ISPs dominate in terms of intangible assets. Digital and ICT companies also possess substantial intangible assets. Apart for GE and United Technologies, manufacturers cluster toward the bottom. A similar picture emerges when looking at R&D expenditure. Digital and ICT companies clearly dominate over manufacturers and ISPs, although Ford and GM occupy a strong but declining position.

In Germany and France, the opposite is true. Carmakers and large MME firms dominate the "old" indicators together with one large ISP. Although SAP (digital), Capgemini, and Atos (ICT) are fairly strong, too. On our indicator for intangible assets, aside from the large ISP, carmakers and MMEs Siemens, Bosch, and Schneider Electric are very strong and their intangible assets are mostly on the increase. Digital companies and smaller MMEs are rather weak, apart from SAP and Dassault Systemes. Interestingly, in France, three ICT consultancies perform strongly. Although data on R&D expenditure is scarce, it shows a similar sectoral distribution. Carmakers and Siemens, Bosch, and Schneider Electric are leading on this indicator. Although in France, digital companies outperform smaller MMEs, only SAP and Dassault can compete with the larger manufacturers on R&D spending.

In the United Kingdom, no clear pattern is evident. Vodafone, British Telecom, and Liberty Global perform strongly on almost all indicators. On the "old" indicators, Rolls Royce and BAE Systems are also strong. While ICT companies clearly cluster at the bottom, the non-digital power resources show no clear pattern for manufacturers and digital companies. This also holds for intangible assets. The data on research expenditure is scarce but the available information shows that ISPs dominate. The digital company SAGE, and vehicle manufacturers Rolls Royce and BAE Systems also have substantial R&D expenditures. Companies from the ICT sector cluster toward the bottom, while MMEs are "the best of the rest".

To sum up, the sectoral distribution of structural DPR largely varies as expected between the countries. Interestingly, in each country, at least one ISP possesses considerable non-digital structural power

resources and intangible assets. Apart from this, in the US, DPR concentrate in the digital and ICT sector. Interestingly, this also holds true for non-digital structural power resources. In the UK, other than the dominance of three ISPs, there is no clear pattern. In Germany and France, manufacturers clearly possess the most digital and non-digital structural power resources, albeit with the notable exceptions of the digital companies SAP and Dassault. In France, ICT consultancies are also quite strong but are unable to match the large manufacturers on most indicators.

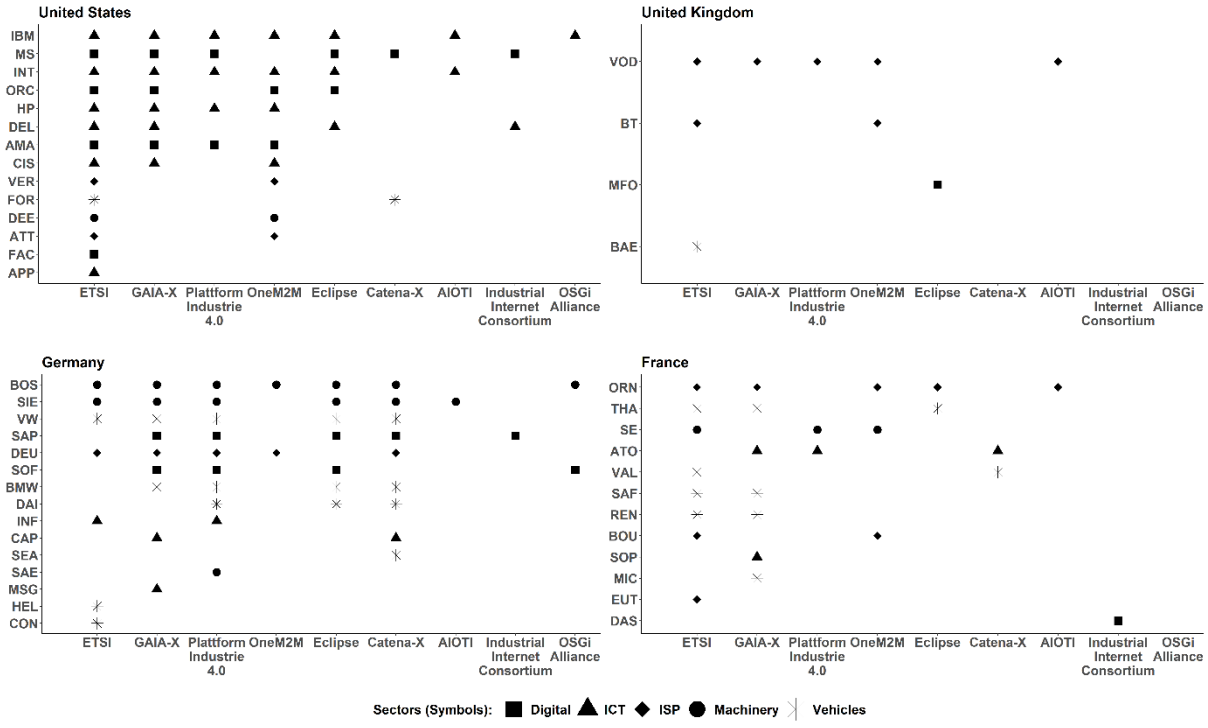
Infrastructural DPR

Regarding infrastructural DPR, we only report case-by-case findings obtained from desk research (e.g. companies' and consortia's annual reports and websites, national and international newspapers). Official statistics do not systematically capture any data on cloud computing, platforms, or standard-setting on the firm level, and company's annual reports rarely include these items.

Standard-setting activities

We focused on standard-setting activities in the IoT. Unlike standard setting in 5G, which relies on a legacy of standards in mobile communication, standard-setting in the IoT is a newer development and technologically more challenging (Ladid and Karagiannis, 2019, p. 4). In recent years, new consortia have been launched to negotiate the standards for the operation and (inter)action in the IoT.

Figure 2: Involvement in standard-setting consortia

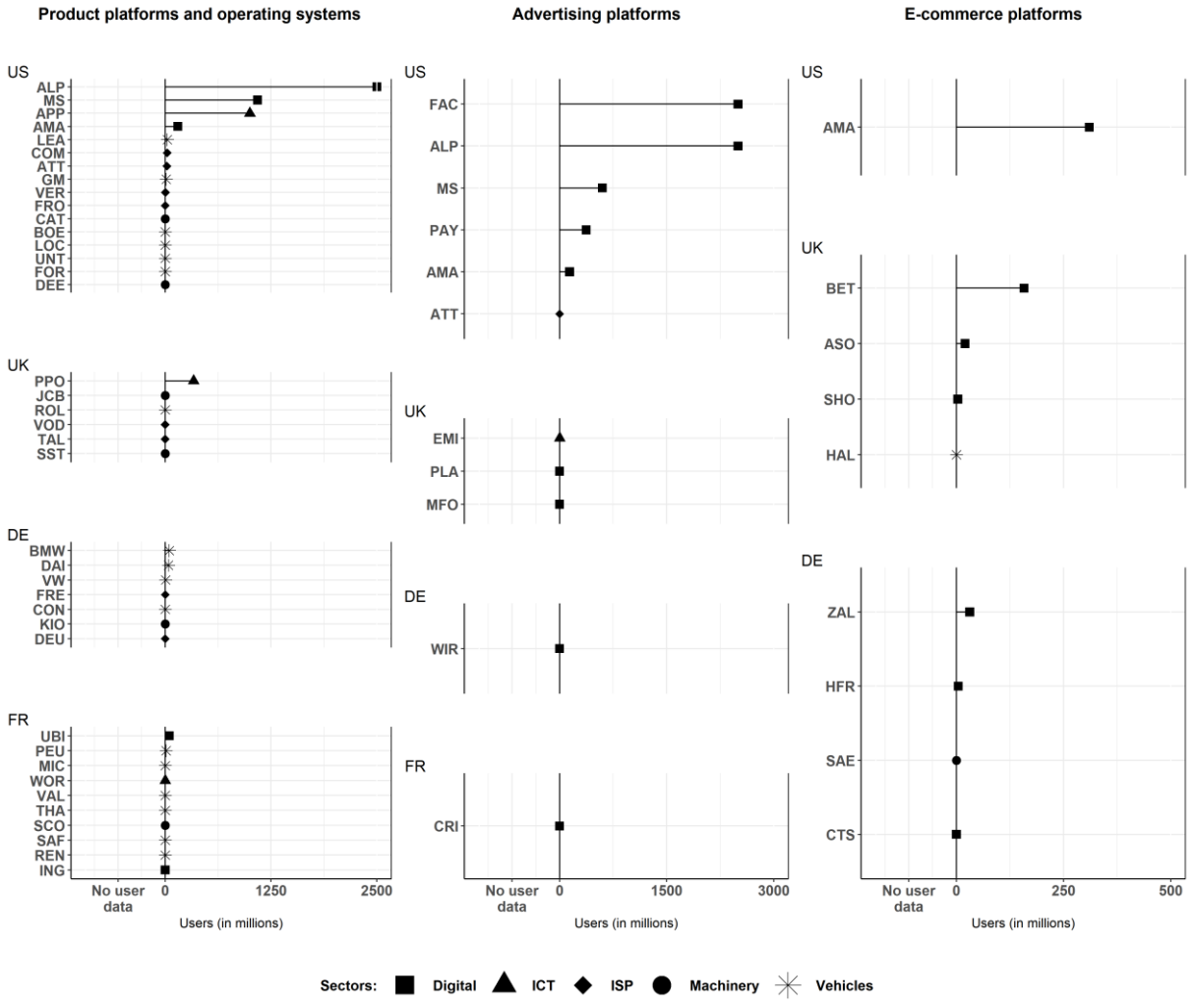


Note: Firms are ordered by frequency of involvement in standard-setting consortia. Firms not included are not involved in the standard-setting consortia.
Sources: Own compilation, February 2022; online appendix, Table A2.

Figure 2 shows that, in our sample, firms from all sectors are involved in standard-setting, suggesting that digital infrastructure is not only a potential DPR for digital, ICT, and ISP companies. Looking at cross-national variation, it is mainly US firms which are active in the consortia, followed by their German counterparts. French and British firms are far less active. Strikingly, US firms from the digital and ICT sectors are particularly heavily involved, while most of the manufacturing firms in the consortia are German and French. Table A2 in the online appendix provides more detail on the specific standard-setting activities depicted below.

Platforms

Figure 3: Platforms operated by firms and their users, by country and sector



Sources: Own compilation, January 2021. A detailed list of sources can be found in the online appendix (Table A3).
Notes: Data for most companies is for 2019 or 2020; except for: GM (2017), MIC (2011 and 2014), FRO (2018), EMI (2018), UBI (2013). For VER, JCB, CON, and ROL, user data is only partial. BMW and DAI operate two product platforms as a joint venture and REN operates its product platform as a joint venture with Nissan and Mitsubishi.

While standards and protocols structure the behavior of actors across the entire IoT, platforms shape the downstream uses of actors in their ecosystem. Figure 3 shows whether a company from our sample operates a product, advertising, or e-commerce platform and, if this information is available, the

number of platform users.[11] Major differences between platform types become evident. Digital companies, especially the US tech giants, dominate advertising and e-commerce. However, in e-commerce, some British and German companies also operate platforms with substantial user bases. Product platforms show a more diverse picture, as firms from every sector—especially vehicle manufacturers—operate platforms. Platforms for processing and analyzing data from connected cars, planes, or ships suggest that the IoT equips manufacturers with substantial infrastructural DPR. Interestingly, manufacturers from the US, Germany, and France outperform their British counterparts on this indicator.

Table 4: Companies that operate industrial clouds (IaaS or PaaS)

United States	United Kingdom	Germany	France
Digital			
• Alphabet (ALP) • Oracle (ORC) • Amazon (AMA) • Microsoft (MS)		• SAP • Software AG (SOF)	• Cegedim (CEG)
ICT			
• Hewlett-Packard (HP) • IBM • Dell (DEL) • Intel (INT) • Cisco (CIS)		• Cancom (CAN)	
ISP			
• Verizon (VER)		• Deutsche Telekom (DEU) • Ecotel Communication (ECO) • United Internet (UNI)	• Sewan (SEW)
Machinery			
• Thermo Fisher Scientific (TFS) • Northrop (NOR) • Raytheon (RAY) • Lockheed Martin (LOC) • General Electric (GE)	• Spectris (SPE) • Smiths (SMI) • BAE Systems (BAE)	• Schaeffler (SAE) • Bosch (BOS) • Siemens (SIE)	• Scopelec (SCO) • Schneider Electric (SE) • Thales (THA)
Vehicles			
		• BMW • Volkswagen (VW) • Daimler (DAI) • Continental (CON)	

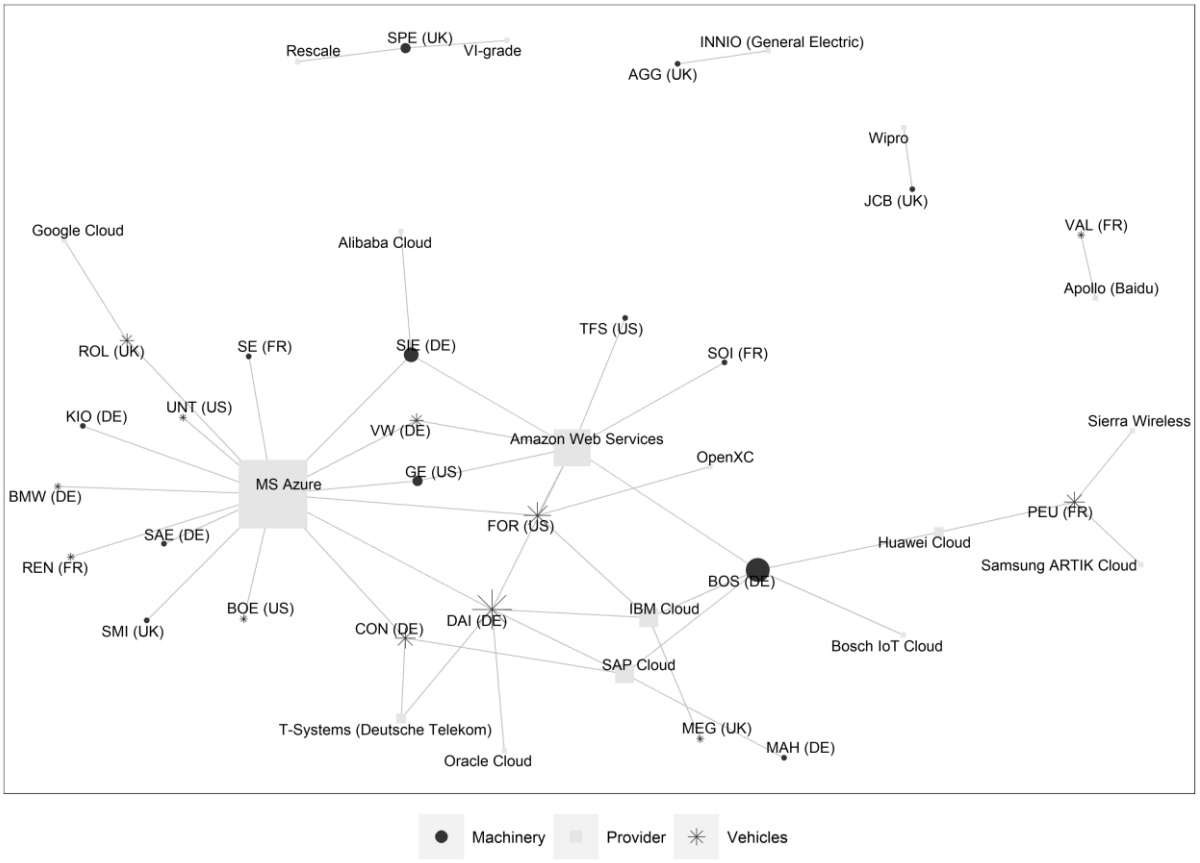
Sources: Own compilation, June 2020 and January 2021; a detailed list of sources is available in the online appendix (Table A3).

[11] The comparability of user data is limited, however, as users are operationalized differently across platforms as connected devices/vehicles, active devices, quarterly or annual active customers, and (monthly or daily) active users.

The fourth platform type, industrial clouds, are particularly important as they lay the foundation on which other platforms operate. In the absence of detailed quantitative data, we approach the issue from two angles. First, we evaluate which companies offer PaaS or IaaS solutions (see Table 4). Second, we collected data on the IaaS providers used by the manufacturers in our sample (Figure 4).

Table 4 shows that in the digital and ICT sector US companies are the dominant cloud providers. Consequently and as depicted in figure 4, most of the manufacturing firms in our sample rent IaaS solutions from these providers. Especially the so-called "hyperscalers", i.e. Microsoft Azure, Amazon Web Services (AWS), and IBM, dominate. Some European manufacturers also rely on non-American cloud providers (particularly German ISPs and Chinese firms). Some larger manufacturers also develop their own cloud platforms. While the Bosch IoT cloud offers IaaS, other manufacturers concentrate on PaaS. Especially German and US manufacturers offer PaaS solutions which are usually integrated into the cloud ecosystem of a single hyperscaler. However, Siemens' MindSphere, Bosch's IoT Suite, and the Continental.cloud multihome. As we show below, the development of PaaS solutions constitutes an important infrastructural DPR for manufacturers.

Figure 4: Manufacturing firms' cloud providers (IaaS)



Note: *Providers:* Symbol size reflects the number of manufacturers in our sample using this provider's cloud.
Manufacturers: Symbol size depicts the number of providers this manufacturer uses.
Sources: Own compilation, June 2020; A detailed list of sources can be found in the online appendix (Table A4).

Overall, our indicators for infrastructural DPR show that US digital and ICT companies are quite prominently involved in standard-setting activities, dominate the IaaS layer, and operate a clear majority of advertising and e-commerce platforms. However, many German and French manufacturers also participate in standard-setting consortia and often operate product platforms and PaaS solutions (especially US and German firms), meaning they possess considerable infrastructural DPR as well.

Our findings on the sectoral distribution of structural and infrastructural DPR show that data, digital technologies, and digital infrastructures are important sources of power for firms from all sectors. Our findings also support our initial expectations regarding the sectoral distribution of DPR across countries with different political-economic characteristics. In the next section, we illustrate that DPR have real effects by analyzing how they shape firm preferences toward data sovereignty and data-sharing in the German automotive sector.

How DPR determine businesses' preferences and strategies regarding data sovereignty and data-sharing in the German automotive sector

Why do we focus on digital power *resources* and their impact on preferences and strategies rather than studying the use and effect of power in digital(ized) capitalism?

While DPR also affect business influence, focusing on the relationship between DPR and preferences and strategies is promising for two reasons. First, it enables us to broaden our analytical spectrum. Of course, studying how business uses its power resources to influence public policy is of major importance. However, analyzing only the extent of firms' influence does not provide a complete picture. For this, we also need to understand the direction of their influence and what they seek to achieve (Nijhuis, 2021) and how they act to achieve their goals. Second, business preferences and strategies are highly dependent on economic structures and the distribution of power resources between actors. Actors form their preferences and strategies in situations of interdependence in which they observe the power resources of others (Korpi, 1985). Therefore, we argue that if digitalization changes business power resources, this affects preference formation and strategy building as well.

To demonstrate the empirical value of our DPR concept for further studies on business power in digital capitalism, this section illustrates how DPR shape preferences and strategies of cloud hyperscalers, carmakers, and aftermarket SMEs (repair and maintenance) regarding data sovereignty and data-sharing regulation in the German automotive sector. The fundamental digital disruption of business models and production systems in this sector (Boes and Ziegler, 2021) makes it an *extreme* case, which is particularly useful to illustrate our concept's analytical contribution. While early attempts at digitalization date back to the 1990s, German carmakers only realized the true potential of data and digital technologies in the early 2010s (Boes and Ziegler, 2021). The advent of cloud computing, in particular, was hailed as the start of a new era in which connected vehicles collect a constant stream

of data on traffic, usage, and driver behavior, and in which smart factories allow to track every part and machine in plants around the world.

Using DPR to explain data sovereignty strategies

Existing accounts of platform power struggle to explain carmakers' strategy of cooperation with the cloud hyperscalers. They argue that in each sector a platform enters it exerts considerable power and captures value from dependent businesses (Kenney *et al.*, 2021). While start-ups tend to benefit from cooperation with platforms, mature business are negatively affected (Cutolo and Kenney, 2021, p. 598). Cloud platforms in particular are in a powerful position vis-à-vis users as they provide "the general-purpose technologies of the digital economy" (Hassel and Sieker, 2021, p. 11).

Initially, fears of losing data sovereignty and missing out on the digitalization of the sector indeed were reflected in companies' skepticism toward cooperation with the hyperscalers. With the likes of Apple, Google, and Amazon pushing infotainment systems, autonomous driving, and industrial clouds, carmakers saw tech companies as their "biggest challenge" (Georges Massing, Daimler AG's VP Digital Vehicle & Mobility, quoted in Daimler AG, 2020). Carmakers feared that tech companies would occupy the interface to the data (Matthias Müller, VW CEO, quoted in Reuters, 2016). Consequently, all big German carmakers developed private clouds internally to maintain data sovereignty (Müller and Witmer-Goßner, 2021).

Despite these fears, carmakers changed their strategy in the late 2010s which is puzzling from a platform power perspective. Why should carmakers cooperate with cloud platforms and voluntarily choose dependency? We explain this shift in carmakers' approach to cooperation by their immense stock of automotive and industrial data. Concentrated data ownership is a structural DPR which can be leveraged in negotiations with the hyperscalers to maintain data sovereignty. This makes cooperation a viable strategy for carmakers.

In 2018, VW began to cooperate with MS Azure on autonomous driving. While VW ultimately chose MS Azure for its Automotive Cloud because the latter has no ambitions in the mobility sector, it also negotiated with AWS, Apple, and Google (Novet, 2019). BMW's Open Manufacturing Platform and Daimler's eXtollo have also been running on MS Azure since 2019 (Boes and Ziegler, 2021). In 2019, VW launched its Industrial Cloud in cooperation with AWS. While the short-term goal of the Industrial Cloud is to connect all Volkswagen AG plants, the long-term goal is to set an industry standard and offer an app store for the Industrial Internet (Boes and Ziegler, 2021).

Such cooperation reveals the complementary interests of the tech companies and manufacturers. While manufacturers want more efficient production through artificial intelligence and machine learning, cloud providers need access to big data to develop these digital technologies. As Sarah

Cooper, GM of IoT solutions at AWS puts it: “Additional partners always bring in additional data, which in turn enables new [technology] solutions.” (VW, 2020). However, unlike in the consumer internet where control over data is atomized, manufacturers concentrate the control over data in the Industrial Internet (see also Figure 1). This limits the “bargaining power [of platforms] vis-à-vis other network participants” (Butolo and Schneidemesser 2021, p. 16). In other words, as long as carmakers control the customer interface in their cars and the machines in their plants, cloud providers will continue to depend on cooperation to get access to industrial and mobility data. As carmakers’ control over data stems from their core economic activities of producing and maintaining cars, they occupy a privileged position in the data value chain. Their control of industrial and mobility data constitutes structural DPR. Access to this data is the precondition for tech companies to develop SaaS and PaaS solutions for the Industrial Internet. To gain access, hyperscalers have agreed to the industry’s demand for data sovereignty. For instance, MS Azure guarantees to store companies’ data iin Europe to shield them from US surveillance agencies (Armbruster and Knop, 2022). And AWS makes data security and confidentiality a top priority. In its Industrial Cloud, VW fully controls “with whom [it shares] that data and for what purpose” (Cooper in VW, 2020).

Using DPR to explain business preferences on the regulation of data-sharing

Above, we show that it is necessary to consider non-digital companies’ structural DPR to explain business strategies in digital(ized) capitalism. By studying the preferences of carmakers and automotive aftermarket firms (repair and maintenance) regarding data-sharing regulation, we now show that it is equally important to consider non-digital companies’ infrastructural DPR.

Preferences between carmakers and aftermarket firms already diverged before the sector was digitalized. However, we argue that digitalization created new infrastructural DPR for carmakers that added a new line of conflict. Previous disagreements were rooted in the “old” structural power resources of carmakers and evolved around the distribution of profit margins. The centralization of car production allowed carmakers to stabilize their margins amid increasing production costs because they could pass on costs to aftermarket SMEs (e.g. Büschemann, 2003). While digitalization introduces new structural DPR and further increases carmakers structural prominence, it also introduces new infrastructural DPR which lead to a new dimension of preference heterogeneity. Because carmakers co-own cloud platforms they can determine data and platform access. Therefore, current disagreements evolve not only around profit margins but also around market access. The latter dimension is overlooked when focusing only on the “old” structural power resources of non-digital firms.

The EU regulates the issue of Business-to-Business (B2B) data-sharing in the Free Flow of Non-Personal Data Regulation (2018), the Data Governance Act (2021), and the Data Act (scheduled for 2022). The

acts implement sectoral data access rights, model contract clauses, and legislative fairness tests. Digital and manufacturing companies alike targeted all three initiatives with massive lobbying efforts. Preferences regarding data access rights are heterogenous within the automotive sector (Trampusch, 2022). We argue that the distribution of structural and infrastructural DPR among data holders, i.e. carmakers, and data (re)users, i.e. aftermarket SMEs explains this heterogeneity. As described above, carmakers produce machine and vehicle data and also co-control the platforms to access this data. Aftermarket SMEs, in contrast, increasingly need access to data to repair and maintain cars. While carmakers prefer self-regulation and contractual solutions, data (re)users favor state intervention into data flows.

The European Commission's public consultation processes reveal that business preferences toward data-sharing are, first, a product of structural DPR.[12] Associations representing aftermarket firms argue that carmakers "monopolise data" (ZDK, 2017) and "have a unique privileged position to […] control the flow of in-vehicle data" because they "control the access to all communication devices" (CLEPA, 2021, p. 4). Aftermarket SMEs, however, need access to in-vehicle data because in connected cars, "the repair process starts […] remotely […] where the data quality and the ability to safely access car functionality determines the quality of the service" (CECRA, 2020, p. 2). As argued above, carmakers' control of data is a type of structural DPR. As the Central Association of the German Motor Trade observes, this "economical imbalance of power between the players" can be used to "charge prohibitive prices" for data (ZDK, 2017).

Second, infrastructural DPR shape preferences, too. The main lobby association of aftermarket firms argues that carmakers have become "self-appointed gatekeepers" (FIA Region 1, 2021, p. 3) and can exclude aftermarket SMEs from the data value chain (CECRA, 2020, p. 2; SMEunited, 2020, p. 3). Disagreement is not limited to the distribution of profit margins or prohibitive prices. Carmakers are also criticized for limiting market access and usurping the downstream activities of aftermarket SMEs (SMEunited, 2020, p. 3). Business associations representing aftermarket firms, therefore, demand from the EU that the "core question the Data Act needs to answer [is] how to guarantee access to data-driven downstream markets that are digitally controlled by the manufacturers" (ZDH, 2021b, p. 4). To do so, the associations propose model contract clauses (ZDH, 2021b, p. 3), fair terms and conditions (CECRA, 2021, p. 1), and regulation that limits a single company's control over machine data (CECRA, 2020, p. 6). Carmakers' associations, in contrast, argue that data is a competitive asset and includes trade secrets (VDMA, 2017, p. 5). Policymakers, therefore, "must refrain from obliging enterprises to grant access to data" (VDMA, 2017, p. 5, see also: Newman and Krupa, 2021).

[12] In the following we refer to evidence presented in a recent study by Trampusch (2022).

Conclusion and discussion

Our article makes three contributions to the literature on business power in digital capitalism. First, we introduce the concept of digital power resources (DPR) that we define as the means, rooted in the control of data, digital technologies, and digital infrastructures, that enable actors to reward or punish others. We go beyond the literature's focus on the digital platform firm. Our central argument is that firms from all sectors can possess DPR as digitalization transforms the entire economy. Digital power resources can be structural, i.e. rooted in privileged control over data and digital technologies as the new factors and means of production in digital(ized) capitalism, or infrastructural, i.e. rooted in control over digital infrastructure that shapes the downstream activities of a broad range of users.

Second, we propose new indicators to measure our concept and apply them to an original dataset to study the sectoral distribution of DPR across different political-economic contexts. We measure firms' structural DPR by intangible assets and research expenditure and their infrastructural DPR by control of platforms and involvement in standard-setting consortia. While our sample of large US, British, French, and German firms from the digital, ICT, ISP, and vehicle and machinery manufacturing sectors is not representative, it does allow for explorative insights. We find that firms from all sectors can accumulate DPR indeed. However, the sectoral distribution of DPR follows cross-national differences. In the US, mainly digital and ICT firms perform strongly on our indicators. In France and Germany, in contrast, the manufacturing sectors accumulated considerable DPR. Lastly, in the UK, no clear sectoral pattern exists. These differences largely align with our expectations stemming from the (non)existence of societal backstops to digital disruption, venture capital funding, and state initiatives, and/or cross-class coalitions supporting the digitalization of manufacturing.

Third, we illustrate the analytical value added of our concept by studying business preferences and strategies toward data sovereignty and data-sharing regulation in the German automotive sector, which is an extreme case of digital disruption. We show that our concept of DPR explains phenomena that are puzzling from existing viewpoints. We also show that DPR affect business preferences and strategies and have consequences beyond the use of power. What initially appears to be a counterintuitive strategy of cooperation between cloud hyperscalers and carmakers can be explained when DPR are considered. Carmakers' centralized control of vehicle and production data is a type of structural DPR that limits the loss of data sovereignty and ensures co-ownership of IIoT cloud platforms. Because of carmakers' considerable structural DPR, cooperation with hyperscalers is a viable strategy. As carmakers own data and co-own cloud platforms they also can control access to vehicle data. This, in turn, explains a new dimension of preference heterogeneity evolving around market access between carmakers and aftermarket firms. While aftermarket SMEs prefer broad data-sharing obligations, carmakers oppose them.

Based on our findings, we suggest five lines of argument. First, future studies should broaden the sample to include companies beyond the six largest firms per country and sector. We had to limit our sample because sectoral classifications do not classify digital firms separately. Therefore, we had to identify digital firms ourselves. Further, the collection of data on infrastructural DPR required extensive desk research. Although we believe that our sample was sufficient to introduce our new concept, future research should focus on different sectors and/or include small(er) firms to test its applicability in a broader sample.

Second, future studies should further explore the causes for variation in the types of power resources (digital vs. non-digital, infrastructural vs. structural) between firms. While we show that the sectoral distribution of DPR varies between national political economies, future studies could be located at the firm level. While company size is certainly a factor as larger firms tend to have more power resources regardless of type, this correlation is far from perfect. Firms that are small in terms of assets or employment can still have centralized control over data or digital infrastructure. Firms can also invest one type of DPR to acquire another type. Carmakers' use of structural DPR to acquire co-ownership of clouds and their cooperation with each other in sector-wide standard-setting initiatives like Catena-X could be further analyzed to uncover such interaction effects between different types of DPR. In sum, the causes of variation and interactions between firms' power resources need to be explored and our concept of DPR establishes the necessary tool for that.

Third, the effects of DPR require further analysis. Digital power resources have effects on what firms want (preferences), how they act (strategy), and whether they achieve their goals (influence). Our case study of the German automotive sector illustrates how DPR shape business preferences and strategies. As a result, they also affect business (dis)unity. We show that centralized data and cloud ownership in the automotive sector drives disunity between aftermarket firms and carmakers. The conditions of when the distribution of DPR drives business (dis)unity require further research.

Fourth, going beyond the effects of DPR within the business community, future studies should also consider other actors. At first sight, an empowerment of business vis-à-vis *non-business* interest groups and the state seems to be plausible. Both infrastructural and structural DPR are closely linked to the economic function of business in digital(ized) capitalism and therefore put business in a privileged position to accumulate DPR. There are strategies to limit this empowerment, however. Similar to the collective organization of labor in industrial capitalism, unions or consumer groups could collectivize data ownership among users, thereby strengthening their bargaining position. State actors could establish interoperability and portability guidelines for platforms to limit lock-in effects or expand public regulation instead of private standard-setting.

Fifth, digitalization also introduces new tools for instrumental power, in particular outside lobbying. While the platform power literature shows how platforms mobilize users, other interest groups can use the internet to reach and mobilize potential supporters. We know that salience is an important mediator of business power. Conceptualizing salience as an endogenous variable and studying how businesses and other interest groups use digital tools to manage salience in lobbying battles provides an important complementary angle to our focus on structural and infrastructural DPR.

We conclude that the concept of digital power resources which considers data, digital technologies, and digital infrastructure as increasingly important sources of corporate power across all sectors not only improves our understanding of why and how businesses seek to influence (digital) policies but also of politics in digital(ized) capitalism in general.

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Chapter 3: Communities of Fate and Exploitative Dependencies: An Ecosystem Explanation of Business Preferences in Digital Capitalism.

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Abstract

What shapes business preferences in digital capitalism? Existing research focuses on the alignment of preferences between platforms and consumers. However, this neglects that firms' political preferences across economic sectors are reshaped by the digital transformation of capitalism and its core resources, means of production, and inter-firm relations. I argue that a firm's ownership of data, digital technologies, and digital infrastructures determines its relative position in digital ecosystems of production and exchange. Centralized ownership of the core inputs (being a hub) and infrastructure (owning the ties) of an ecosystem places firms in an upstream position relative to other firms, which depend on access to participate in digital value creation. I find that the upstream-downstream divide creates two logics of preference formation: First, the exploitative-dependency logic evolves around the ability of upstream firms' ability to appropriate value from the ecosystem and creates preference divergence toward government intervention to level the playing field. Second, the community-of-fate logic generates preference similarity when specific regulations threaten to impose costs on the operation of the entire ecosystem. These insights are based on a statistical analysis of US lobbying data and triangulated with a BERTopic model and a qualitative reading of firm testimonies in congressional hearings on platform regulation. I contribute by proposing a new ecosystem explanation of preference formation that takes inter-firm relations seriously, by analyzing firm preferences in digital capitalism beyond the platform, and by proposing a new measure of preference similarity based on BERTopic that addresses weaknesses of existing text-as-data approaches to preference measurement.

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Introduction

What shapes business preferences in digital capitalism? Existing research on preference formation in digital capitalism identifies an alignment of preferences between consumers and platforms (Culpepper and Thelen 2020) and highlights conflicts between incumbent business and digital disruptors (Collier, Dubal, and Carter 2018). However, there is more to digital capitalism than consumer liberation and the disruption of existing markets. Digital capitalism fundamentally changes capitalist production and exchange and the way how firms interact with each other. Intellectual monopolies and platform firms centralize control over data, digital technologies (e.g. algorithms, AI, chips), and digital infrastructure (e.g. clouds, marketplaces, content platforms) – core inputs to and the backbone of digital capitalism. Intellectual monopolies and platform firms are central hubs and/or own the ties enabling interaction in digital ecosystems, i.e. "group[s] of interacting firms that depend on each other's activities" (Jacobides, Cennamo, and Gawer 2018, 2256) structured around digital inputs and infrastructure. Other firms rely on access to these inputs and infrastructure to pursue new digital or digitalize existing business models. Thus, ecosystems are characterized by interdependence and mutually beneficial cooperation but are also highly asymmetrical: being a hub or owning the ties enables firms to set the conditions of access to core inputs and appropriating value and knowledge from the ecosystem (Rikap and Lundvall 2022; Stark and Pais 2021).

I argue that a firms' position in a digital ecosystem is determined by its control of structural, i.e. data and digital technologies, and infrastructural, i.e. digital infrastructure, digital power resources (DPR) (Kemmerling and Trampusch 2022). A firm that owns more DPR relative to another firm is further upstream, a firm that owns less DPR is further downstream. Based on the janus-faced logic of cooperation and appropriation in of digital ecosystems I deduct two sets of hypotheses that form my central argument on preference formation. First, I hypothesize that economic dependencies in digital capitalism create a new dimension of conflict between firms. Firms that control the means of value creation in digital ecosystems prefer non-intervention and oppose regulation, while downstream firms prefer regulation to level the playing field and outlaw exploitative strategies of upstream firms (what I term the *exploitative-dependency* logic).

Second, the mutual benefits of cooperation in an ecosystem mean that policies that concern the operation of the entire ecosystem induce costs on upstream and downstream firms. Thus, I argue that entire ecosystem policies reverse the general trend of greater preference dissimilarity. In other words, my second set of hypotheses is that common membership in digital ecosystems leads to higher preference similarity between upstream and downstream firms if the cost of regulation is distributed across the entire ecosystem (what I term the *community-of-fate* logic).

I ground my argument in the literatures on digitalization, intellectual monopolies, and business preferences. While the effects of digitalization and platform dependency on the economic strategies of firms and the political alliance between platforms and users have received widespread attention, the effect on political strategies and preferences of business has been largely neglected (except for: Newman 2010; Trampusch 2023). I contribute to the literature in three ways. First, I complement theories on business preferences by adding an ecosystem-based explanation of preferences to existing structural-materialist and constructivist explanations. Second, I highlight under which conditions business unites *and* conflicts in digital capitalism – not only with consumers but also with each other. Third, I introduce a new measurement of preference similarity based on BERTopic modeling that addresses some of the weaknesses of older approaches to measure interest group preferences with quantitative text analysis.

To test my argument, I employ a threefold empirical strategy. This is necessary because each approach individually is imperfect and requires triangulation. First, I conduct Multiple Regression Quadratic Assignment Procedure on measurements of activity overlap. Activity overlap serves as a proxy for preference similarity and incorporates whether two firms focus on the same dimension of a multidimensional policy (the *what-to-lobby-on* component) and whether they take the same position on that dimension (the *directional* component). To cross-check the results and the validity of the employed measurements, I complement the regressions with analyses of congressional hearings on platform regulation. I not only conduct a BERTopic model on the witness testimonies in these hearings to evaluate overlap in the topical emphasis of firms and platforms (*what-to-lobby-on*) and the content similarity of their testimonies (*directional*). I also qualitatively examine hearings in the policy areas of competition, advertising, and taxation to add illustrative context to my findings.

I find support for the exploitative-dependency logic across all methods. The preferences of upstream and downstream firms indeed diverge. This holds true for infrastructural and structural dependencies, especially if upstream and downstream firms operate in similar sectors. For infrastructural dependencies preference divergence also increases the more upstream firms exploit their position of market power. While the community-of-fate logic is not supported by regression results, findings from the congressional hearings suggest this might be due to measurement error, in particular the measurement of the costs of regulation on the policy area level. In their testimony, downstream firms often caution against overregulation arguing that it would create unintended consequences for the entire ecosystem suggesting that the community of fate logic indeed exists.

The reminder of the paper proceeds as follows. First, I briefly introduce the existing approaches to explain business preferences. I then propose my new framework of an ecosystem-based explanation of business preferences and link it to the literatures on intellectual and data monopolies and digital

platforms. After introducing hypotheses on the exploitative-dependency logic of business preferences in digital ecosystems, I outline the community of fate logic. In section three I describe my empirical strategy. Section four describes the results of the MRQAP. In section five I discuss these results with regard to further evidence collected from congressional hearings. I then conclude by highlighting the weaknesses and contributions of this study and outlining avenues for future research.

Structural-Materialist and Constructivist Explanations of Business Preferences

Business is a strong political actor yielding considerable influence on politics and policies. However, in contrast to the assumptions of traditional views on business power, business is not a homogenous class with a single preference (Culpepper 2015). Yet, the ability of business to get what it wants is dependent on whether it speaks with a single voice (Falkner 2008). Thus, understanding business preferences is a key perquisite to understanding business power.

Woll (2008) differentiates two explanations of firm preferences. First, the structural-materialist approach argues that firm interests can be deduced from economic theory and are shaped by "what a firm produces" (Woll 2008 xii). Because firms' fundamental preference is profitability, the distributional consequences of a regulation determine whether a firm supports or opposes it. The structural-materialist viewpoint is widely spread in studies of trade and environmental policy. Studies in these fields often explain firm and sectoral preferences as a product of the costs associated with a regulation (e.g. Alt et al. 1996; Murphy 2004). They find that firm preferences vary along sectoral lines, between small and large businesses (e.g. Milner and Yoffie 1989), between sheltered and internationally exposed firms (e.g. Cao and Prakash 2010), along global value chains (e.g. Zhang 2023), or between labor- and capital-intensive industries (Rogowski 1990). Most of these older studies focus on the "immediate economic costs of policy adjustment" (Genovese and Tvinnereim 2019) and emphasize the absolute cost of regulation. More recent studies, in contrast, find that firms can benefit from competitive advantages when a regulation imposes relatively higher costs on their competitors (Meckling 2015). Firm preferences towards the same policy also have been found to shift over time, for instance, when a policy is phased-in (Genovese and Tvinnereim 2019) or when firms are able to cash-in on first-mover advantages by developing regulation compliant products (Ambec et al. 2013). Finally, the structural-materialist approach has recently been adapted to incorporate transformations of capitalism. Financialization has been found to increase preference homogeneity between non-financial and financial businesses, because they increasingly rely on the same tools to generate profit (Pagliari and Young 2020) and hold assets of similar liquidity (Doose 2023). In digital capitalism, the endowment with data and information assets (Atikcan and Chalmers 2019, 549; Newman 2010) and different positions of firms within data value chains (Trampusch 2023) have been found to shape preferences.

In contrast to the structural-materialist explanation, constructivist explanations emphasize that preferences are embedded in social and historical contexts. Studying what business wants is difficult, because the fundamental or ideal preferences of a firm are distorted by the context it is embedded in. Instead of going down with flying colors pursing an ideal but unachievable goal, actors strategically adjust their goals to what is realistically possible given their environment. Therefore, we can only observe what others state to want in a specific situation (their *strategic preferences*), not what they actually, inherently want (their *ideal preferences*) (Hacker and Pierson 2002; Woll 2008). Building on Frieden (1999, 42) and Woll I define strategic preferences as "the way [an actor] orders the possible outcomes of an interaction" with regard to a concrete policy proposal (Woll 2008).

This rank-order of possible outcomes is not only influenced by structural factors but also by a firms strategic environment, that is the actions of others, the institutional context in that they act, and issue characteristics (Hacker and Pierson 2002; Woll 2008). The relative power resources (Korpi 1985), the status quo (Baumgartner et al. 2009), (anticipated) (re-)actions (Pierson 2016), and the strategies of others influence what firms state to want. Further, the institutional context limits what fights are worth fighting and what goals seem unattainable in the near or distant future (Pierson 2016). Finally, issue characteristics also influence the strategic preferences of firms (Falkner 2008; K. L. Young 2012).

In addition to the materialist and constructivist explanation of preferences, I propose an ecosystem approach to preferences. Similar to materialist approaches the distributional consequences of regulation are at the center of this approach. However, instead of only explaining the costs of regulation through a firms' ownership of production inputs, it adds an infrastructural dimension and the relative position of a firm to others within an ecosystem is at the core of the approach.

An Ecosystem Explanation of Business Preferences in Digital Capitalism

Digitalization has fundamentally transformed capitalist production. Data is the central raw material in digital capitalism and digital technologies are its central means of production (e.g. Schiller 1999; Srnicek 2017; Staab 2019; Zuboff 2019). To generate value from data it must be collected, cleaned, combined with other data, and processed by digital technologies. Algorithms and software running on clouds and computer chips refine data from a raw material into a "prediction product" (Zuboff 2019) that can be used to optimize risk management, marketing, maintenance, or innovation processes and influence human behavior or production processes (Ehret and Wirtz 2017; Zuboff 2019). The foundation of this mode of production are digital infrastructures like platforms (including clouds) (Srnicek 2017; Staab 2019), internet cables, and common standards that enable the connections through which data is mined and supply the digital technologies for its storage and analysis. Thus, digital capitalism is a mode of production with data and digital technologies as its core inputs and digital infrastructures as its backbone.

Building on the transformed material foundation of capitalism, firms create new digital or digitalize existing business models. Further, inter-firm relations are restructured by empowering firms that own the core inputs and infrastructures of digital capitalism. The new paradigmatic types of firms in digital capitalism are intellectual monopolies (Durand and Milberg 2020; Pagano 2014) and platforms (Rahman and Thelen 2019; Srnicek 2017) and scholars studying these firms agree that their interactions with other firms are neither structured by markets nor hierarchies nor networks (Kretschmer et al. 2022; Rikap and Lundvall 2022; Stark and Pais 2021).

Intangible assets such as data and digital technologies require a specific form of firm organization because they are non-excludable, non-rivalrous, and create synergies (Haskel and Westlake 2018; Pagano 2014; Rikap and Lundvall 2022). Because intangible assets are non-excludable, firms have to protect their investments in intangible assets against freeriding by other firms. Without protection the benefits of investing in ideas, knowledge, technology, or data spillover from investor firms to those that did not invest (Haskel and Westlake 2018; Rikap and Lundvall 2022). In order to limit freeriding and spillovers intellectual property rights establish legal monopolies on intangible assets and restrict how others can use them (Pagano 2014). Because intangible assets are non-rivalrous, ownership is separated from control (Birch, Chiappetta, and Artyushina 2020; Haskel and Westlake 2018). Thus, owners of intangible assets can grant access, often through licensing, to multiple users of these assets (Birch, Chiappetta, and Artyushina 2020). Intangible-asset owners continued ownership means that they can determine the conditions of access and can exert control over users. Finally, the combination of intangible assets, such as data, ideas, or knowledge, creates synergies that are at the core of innovation (Haskel and Westlake 2018; Rikap and Lundvall 2022).

Firms owning intangible assets, thus, face a trade-off between protecting their investment against freeriding and ensuring sufficient access for synergies to emerge. Rikap and Lundvall (2022) argue that this trade-off is solved by organizing inter-firm relations in corporate innovation systems (CIS). A CIS is "a system organized and controlled by a dominant firm but constituted also by a multitude of more or less subordinate firms and knowledge institutions that participate in multiple production and innovation processes" (Rikap and Lundvall 2022, 390). Dominant firms can use their control over intangible assets to structure interactions in the CIS by dictating access conditions. They are also in a position to appropriate value and knowledge from subordinate firms (Birch, Chiappetta, and Artyushina 2020; Rikap and Lundvall 2022).

Turning away from data and digital technologies, platform firms are defined as "digital infrastructures that enable two or more groups to interact" (Srnicek 2017, 43). They are intermediaries between a group of consumer-users and a group of provider-users, typically other firms that depend on the platform for their economic activities. As such, platforms "are *designed* to be extended and elaborated

from outside, by other actors, provided that those actors follow certain rules" (Plantin et al. 2018, 298). Not only are platforms central intermediaries, but they also own the network infrastructure, set the rules of access and interaction in their networks, and extract vast amounts of behavioral data (Srnicek 2017). Further, because of a backing by patient capital, network effect, and economies of scale platforms show huge tendencies for centralization and pursue strategies of market dominance (Barwise and Watkins 2018; Rahman and Thelen 2019). Once market dominance is established, platforms can "liv[e] off of the layers of economic life below" (Stark and Pais 2021, 50; see also: Peck and Phillips 2021; Kenney and Zysman 2019).

Inter-firm relations with platforms are conceptualized neither as arms-length market relations nor as following hierarchical logics of rule and command (Kretschmer et al. 2022; Stark and Pais 2021). Instead, platforms structure the economic actions of a formally independent but de facto subordinate group of firms. Therefore, Stark and Pais (2021) describe the platform as an entirely new system of inter-firm relations. To better distinguish their approach from the understanding of platforms as a firm, I will refer to it as the platform-as-systems approach.

I argue that both the CIS and the platforms-as-systems approach do not account sufficiently for the Janus-faced character of inter-firm relations in digital capitalism. They overemphasize the exploitative character of appropriation over the mutual benefits arising from cooperation. This dynamic is better captured by approaches that describe inter-firm relations in digital capitalism as digital ecosystems. An ecosystem is a "group of interacting firms that depend on each other's activities" (Jacobides, Cennamo, and Gawer 2018, 2256). Despite the mutual benefits, interdependence, and a "shared fate" (Iansiti and Levien 2004, 69) of all members within an ecosystem, ecosystems are asymmetric with some firms carrying more weight than others. Asymmetry in ecosystems can be characterized as being a hub and owning the ties. Firms that own the core inputs (e.g. products, innovations, knowledge) of an ecosystem are hubs (Dhanaraj and Parkhe 2006; Jacobides, Cennamo, and Gawer 2018). Firms that own the core infrastructure on which an ecosystem runs are owning the ties. Around tie-owners and hubs a group of complementors emerges. These complementors offer complementary services and goods that are not fundamental to the core inputs of an ecosystem but make the ecosystem as a whole more valuable (Gawer and Cusumano 2008; Nalebuff and Brandenburger 2007).

In digital capitalism, intellectual monopolies centralize ownership of the core inputs to value creation and form the hubs of digital ecosystems (Birch, Chiappetta, and Artyushina 2020; Rikap and Lundvall 2022). Platform firm, centralize the ownership of digital infrastructure and own the ties of digital ecosystems (Kenney, Bearson, and Zysman 2021). This puts the concept of digital ecosystems at the center of an analysis of business preferences in digital capitalism. Business to business relations are characterized by the relative position of firms within a digital ecosystem of value creation. I argue that

the relative position of a firm is determined by its ownership of structural and infrastructural digital power resources (Kemmerling and Trampusch 2022). Thus, the control of data and other intangible assets by hub firms (structural) and the ownership of digital infrastructures by tie-owning firms (infrastructural) determine (inter)dependencies within digital ecosystems. Within a direct relation between two firms one occupies a more upstream position, i.e. can grant access to core inputs and infrastructure, and the other occupies a more downstream position, i.e. is more dependent on being granted access. How the Janus-faced character of cooperation and appropriation in ecosystems pans out along the structural and infrastructural dimension of ecosystems will be discussed in the next section.

The Exploitative-Dependencies Logic

Does the relative position of firms in a digital ecosystem affect business preferences? Following structural-materialist approaches, I argue policies have different distributional consequences for upstream and downstream firms. Because upstream firms own the ecosystems' infrastructure and core inputs, they can determine the conditions of access to value creation in the ecosystem. They set the rules for ecosystem interactions. Downstream firms despite relying on access to the infrastructures and inputs of the ecosystem have no independent control of these resources and have no say over the rules in the ecosystem. I hypothesize that this shapes their exposure to regulatory costs, and thereby their preferences, in two ways. First, upstream firms can exploit the infrastructural and structural power stemming from being a hub and owning the ties to extract value and knowledge from the ecosystem. Structuring the interactions in asymmetric ecosystems on a contractual basis and through B2B negotiations, is therefore their preferred modus operandi for ecosystems. On the other hand, downstream firms are disadvantaged in B2B negotiations and therefore lobby for government intervention to restrict the power of upstream firms, level the playing field, and limit rent extraction (cf. Trampusch 2023). Second, the costs of implementation and enforcement are distributed unequally in asymmetric digital ecosystems. Because upstream firms either control the ecosystems' infrastructure and/or are central hubs, they form points of control (Zittrain 2006). Governments seeking to regulate digital ecosystems gravitate toward these points of control as exemplified by regulation on fraud prevention, content moderation, or cybersecurity (Tusikov 2017). Thus, my first set of hypotheses, which will be further disaggregated below, can be described as the exploitative-dependency logic.

> *H1: The greater the difference in the relative position of firms in digital ecosystems, the less the degree of preference similarity.*

Structural Dependencies

Structural dependencies arise from some firms being a hub in digital ecosystems. The intellectual monopoly framework argues that legal protections of intangible assets puts owners into positions of market power (Durand and Milberg 2020; Rikap 2022; Schwartz 2022). Schwartz (2022, 16, italics by Schwartz) argues that the "varying success in controlling IPRs in vertically *disintegrated* production chains produces an economy with three *ideal typical* firms that are often linked in a *de facto* integrated production process". His typology of three-tiered firms is similar to the upstream-downstream relations in digital ecosystems. He argues that although production processes are de jure disintegrated, tier-one firms are de facto in control over the whole production process. Their control stems from monopolies on intangible assets protected through intellectual property rights and is escalated by monopoly rents on innovation and data (Rikap 2022). Their high profit volume, in turn, enables them to acquire potentially disruptive rivals early on to cement their market power (Rikap 2022). Tier-two firms are physical capital-intensive manufacturers that might benefit from investment barriers to entry, but are partly reliant on licensing intangibles from tier-one firms. For instance, semiconductor fabs or carmakers that have to license chip designs fall into this category. Finally, tier-three firms are "low-skill, labor-intensive manufacturing and service firms with low profit volumes and few barriers to entry" (Schwartz 2022, 16).

In addition to intellectual property, companies turn data into an intangible asset through the use of digital technologies (Birch, Cochrane, and Ward 2021; Rikap 2022). Because of the network effects of Big Data (Barwise and Watkins 2018), data owners enjoy intellectual monopolies (Rikap 2022). Trampusch (2023) builds on these insights to argue that the assetization of data substantially restructures value chains and thereby affects the political preferences of business. Firms that occupy upstream positions in data value chains can generate "rents from exclusive access to data" (Rikap and Lundvall 2022 abstract), "decide what kind of data is generated" (Fisher and Streinz 2022, 831), and sell or license their data to downstream firms. Because of their location within the data value chain, upstream firms prefer market-based governance of data, whereas downstream firms prefer state regulation to ensure fair and transparent access (Trampusch 2023). From this I infer the following hypothesis:

> *H1a: The higher the difference in control over intangible assets, the lower the degree of preference similarity between firms.*

Infrastructural Dependencies

Infrastructural dependencies arise when some firms own the ties of digital ecosystems. Thus, they develop mainly between platform owners and their business users. In short, platform-owners occupy an upstream position within digital ecosystems characterized by infrastructural power.

Actors with infrastructural power control general-purpose technologies and resources that enable a wide range of downstream uses (Braun 2020; Frischmann 2012; Mann 1993). They control the backbone of the social and economic activities of a broad group of other actors (Rahman 2018, abstract). Existing theories of infrastructural power argue that it leads to an alignment of preferences because downstream users are dependent on continuous access and well-functioning infrastructure (Braun 2020). While Young and Pagliari (2017) identify credit as an infrastructural resource and indeed find that the interests of non-financial sectors align with those of the financial sector, I argue that the logic – in most cases – is different in digital ecosystems. Because platforms are not neutral providers of infrastructure but directly utilize their ownership to exploit downstream users by appropriating value and knowledge, the exploitative-dependency logic prevails in most cases. Only in cases where the costs of regulation affect infrastructure owners and downstream uses preferences align.

The ability to extract rents and the market power of platforms stems directly from their business model. Central features of the platform business model enable platforms to become "critical market creators" (Hassel and Sieker 2021, 7) and pursue winner-take-all strategies, which, in turn, lead to high levels of concentration (Kenney and Zysman 2019; Rahman and Thelen 2019). There are three central features on which the market power of platforms rest: (a) backing by patient venture capital that enables long-term strategies of market domination rather than short-term shareholder-value orientation (Rahman and Thelen 2019). (b) direct and indirect network effects that can activate a virtuous circle of network growth (Barwise and Watkins 2018). (c) "control and commodification of the flow of information" (Hassel and Sieker 2021, 5), i.e. the ability to extract and create value from surveilling the behavior of actors within their networks (Zuboff 2019). These three features limit competition not only by creating high barriers of entry and economies of scale but also by enabling platforms to exploit their market dominance. Platforms can structure the behavior in their networks through code and regulate the terms of access (Kenney, Bearson, and Zysman 2021). Further, they can utilize network ownership and surveillance to extract rents from network participants, favor their own products, "absorb ecosystem innovations from the platform itself" (Kenney and Zysman 2020, 37; see also: Zhu and Liu 2018), and engage in predatory pricing (Kenney, Bearson, and Zysman 2021; Kenney and Zysman 2020). Finally, they can cross-leverage their dominance to either vertically capture activities down the value chain or absorb bordering market segments horizontally (Kenney, Bearson, and Zysman 2021). Platforms, thus, possess substantial market power which creates dependencies and opportunities for abuse.

How dependencies on platforms shape business strategies has been extensively discussed in business administration. Platform-dependent entrepreneurs (Cutolo and Kenney 2021; Kenney, Bearson, and Zysman 2021) develop a range of strategies to make the best of their dependency including bypassing platforms, optimizing their businesses for platform algorithms, and mitigating the risks of dependency

(Balsiger et al. 2023). However, how platforms shape political preferences has been discussed only with regard to consumer-platform alliances but not business preferences. In their seminal article, Culpepper and Thelen (Culpepper and Thelen 2020) argue that platform companies possess a specific kind of power rooted in their market domination. Because platforms provide the digital infrastructure for consumers to access a broad range of liberating services and social activities, the preferences of consumers and platforms are aligned against regulation. Similarly, Rahman and Thelen (Rahman and Thelen 2019) find that the political-coalitional foundation of the platform business model is an alliance between platforms, venture capitalists, and consumers. Putting consumers at the center of the argument about platform power, however, directs attention away from the multi-sidedness of platforms. Businesses of all kind use platforms, be it third-party sellers on marketplaces, manufacturing companies on clouds, publishers on content platforms, or retailers on advertisement platforms. Because platforms are the infrastructures that provide these businesses with central means for their economic activities, businesses are dependent on the continuous provision of these means by the platform.

Building on these considerations, hypothesis 1b states:

> *H1b: Dependencies on digital infrastructure reduce preference similarity between upstream and downstream firms.*

Exploitation and Market Power

While H1a and b argue that dependencies in digital ecosystems create preference divergence between upstream and downstream firms, H1c and d maintain that preference divergence is increased by the degree to which these dependencies are exploited and whether dependencies are structural and infrastructural at the same time.

Upstream firms, although they control the core inputs of an ecosystem, are not necessarily able to exploit their position. If either competitive markets or existing government regulation is sufficient in ensuring a level playing field and (more or less) equal positions in negotiations between upstream and downstream firms, calls for government interventions are obsolete. Competitive forces may force upstream firms to "behave", because downstream actors can switch their operations between several upstream firms or government regulations may already prohibit anti-competitive practices of upstream firms. While in both cases upstream firms are still hubs in the ecosystem, their ability to exploit this position for economic gains and rent extraction is reduced.

> *H1c: The effect of difference in the relative position of firms in digital ecosystems on preference similarity becomes more negative the more upstream firms exploit their position.*

Finally, some upstream firms may centralize intangible assets and provide the core infrastructure of the digital ecosystem. These firms own the central inputs and the digital infrastructure at the core of digital ecosystems. Dependencies, and therefore preference divergence, should be greater if upstream firms are hubs *and* tie-owners rather than only hubs *or* tie-owners. Arguably, the ability to surveil interactions within and extract data and innovations from the ecosystem, makes platforms a paradigmatic case for this scenario.

> *H1d: The effect of platform dependency on preference similarity becomes more negative the greater the difference in intangible assets.*

The Community of Fate Logic

My second set of hypotheses, however, focuses on the other side of the Janus-face, cooperation in digital ecosystems. Before deriving a hypothesis on how the policy area moderates the effect between upstream-downstream relations on preference similarity, I briefly outline the benefits of cooperation in digital ecosystems.

First, how do downstream firms benefit from cooperation with intellectual monopolies? Because intellectual monopolies control data and digital technologies, cooperation is necessary for downstream firms that want to pursue digital(ized) business model. If, for instance, a manufacturer wants to build a smart factory it needs access to chips, information protocols, sensors, and actuators (Ehret and Wirtz 2017) – all of which is sourced from ICT companies and protected by intellectual property law. Further, the manufacturer probably stores its data in the cloud of either Microsoft Azure or Amazon Web Services. If the manufacturer wants to gain insights on predictive maintenance or on how to optimize the production process it has to license data analytics software (Ehret and Wirtz 2017). In similar ways all digital(ized) business models of downstream firms require the licensing of data and/or digital technologies from upstream firms. Scholars of innovation systems and intangible assets also highlight the synergies and positive-sum effects of cooperation and the sharing of intangible assets (Chaminade, Lundvall, and Haneef 2018; Haskel and Westlake 2018).

Second, what are the means platforms provide to complementors to ensure mutually beneficial cooperation? Because of centralized market structures platforms own huge networks that enable other businesses to *reach* millions of consumers. They depend on the platform not only to sell or advertise their products but also to keep in contact with their customers or for product reviews. Secondly, platforms can provide ease *logistics* and provide *distribution channels* for businesses. Be it Amazon's logistics operation, targeted advertising, or Alphabet's Content-ID system for automatic copyright detection. Thirdly, the ability of platforms to extract and analyze data means that platforms can provide businesses with *market and production analytics tools*. This can be crucial for determining the quantity, price and profitability of a good or service but also for efficient production and

maintenance. Fourth, platforms can provide centralized *payment channels* either owned by the marketplace platform itself or by separate payment providers (e.g. PayPal). Finally, platforms can provide the computing power or software used by businesses through the *cloud* thereby laying the foundations of their digital operations. While these means are important for complementors, I argue that the many opportunities for abuse generally lead complementors to prefer government intervention while platforms oppose it – unless policy specifically targets these means.

Thus, I hypothesize that the effect of upstream-downstream relations on preference similarity is moderated by the policy area that is regulated. First, it matters whether regulation affects the entire ecosystem or aims to regulate within ecosystem relations. Some policy areas, such as competition, platform-complementor relations, and content regulation, affect how relations within digital ecosystems are structured. In these areas, the distribution of costs differs between upstream and downstream firms as outlined above and the effects of H1 should be amplified.

However, the effect should be less pronounced or even reversed in policy areas that impose costs on the entire ecosystem. Although the economic gains in ecosystems often are distributed unequally all ecosystem actors are codependent on a well-functioning ecosystem and would lose if policies harm an ecosystems' overall performance. In the policy areas of cybersecurity, privacy and advertising, and innovation this *community-of-fate* logic is likely to apply. Strict privacy and advertising regulation would not only harm platforms such as Google or Facebook who make a fortune in selling targeted ads but also the buyers of these ads, often small businesses who reach a well-defined group of potential customers for relatively little money. Similarly, all ecosystem actors should share a preference for an innovative and secure ecosystem not straddled by spam and malware.

> *H2: The effect of difference in the relative position of firms in digital ecosystems on preference similarity becomes more positive in policy areas that impose costs on the entire ecosystem.*

In sum, I argue that government intervention into digital ecosystems imposes costs on upstream firms, because it limits their ability to extract rents and act as private rule-setters. Downstream firms, on the other hand, benefit from intervention, when it aims to reduce asymmetries within ecosystems. While the general tendency, therefore, is for preference divergence, policy areas that directly affect the entire ecosystem should lead to greater preference similarity.

Empirical strategy

To test these hypotheses, I adopt a threefold empirical strategy where I combine inferential statistical analysis of transparency register data, a BERTopic model of business and platform testimonies in congressional hearings on platform regulation to derive large-n descriptive insights, and an illustrative qualitative account of hearings in competition, taxation, and advertising policy. As all of these

approaches individually are imperfect, this strategy serves the purpose of triangulation and increasing the confidence in my empirical findings.

Multi-group logistic MRQAP

In the large-n inferential part of my study, I analyze firm dyads nested within a bill. As the values of dyadic variables are influenced by the characteristics of both firms and every single firm is part of multiple dyads, independence between observations cannot be assumed. To account for dyadic data, network analysts commonly use Multiple Regression Quadratic Assignment Procedures (MRQAP) (e.g. Selling 2020). In contrast to regression models, input takes the form of matrices rather than vectors (Elmer and Stadtfeld 2020). However, since effect sizes are estimated similarly, MRQAP coefficients can be interpreted in the same way as regression coefficients. To compute p-values, the dependent matrix is permutated 1000 times and the effects on the observed matrix are compared to the effects on permutated matrices in order to determine significance (Dekker, Krackhardt, and Snijders 2007). As my dependent variable is binary is use logistic MRQAP. Finally, as interest groups express their preferences in relation to a specific package and my analysis takes package-level characteristics into account, I use a mutli-group model (Elmer and Stadtfeld 2020).

Dependent variables

The problem of how to measure preferences received quite some attention in the literature on preference formation. Quantitative studies have either used interviews (Dür 2008), qualitative content analysis (Selling 2020), quantitative text analysis (Klüver 2009, 2015), or measures of activity overlap based on transparency register data (Selling 2020). Specifically, when comparing preferences between actors, scholars face the problem of condensing preferences to a common scale. To do so, interest group scholars often reduce preferences to a single dimension (Baumgartner et al. 2009; Klüver 2009). However, since any given policy is multidimensional this results in a loss of nuance (Bunea and Ibenskas 2015, 433). This loss of nuance is less problematic for studies analyzing lobbying coalitions or preference attainment (Klüver 2015), because their interest lies not in the preference as such but the strategic actions resulting from it. And as long as the strategic actions can be explained by a parsimonious identification of preferences it does not matter (Frieden 1999, 44).

However, when seeking to explain preferences as an outcome multidimensionality matters. As Frieden (1999, 42) states “the seemingly straightforward notion of preferences as a ranking over possible outcomes can obscure important subtleties. Preferences depend on the specification of the problem” and the process of preference formation is multilayered (Frieden 1999, 41–47). In this paper, my goal is to uncover the effects that a firms’ business relations and its strategic environment has on its strategic preferences. Firms face two decisions when articulating their policy preferences. First, they have to choose on what they want to spent their limited time and resources. As my analysis is situated

at the bill level, I cannot analyze which bills firms choose to lobby on. However, I can analyze what dimensions of a bill a firm chooses to lobby on. I assume that these are the dimensions on which a firm has the strongest preferences and that firms that choose to lobby on the same issues have greater preference similarity. Secondly, however, even actors that focus on a common issue can take opposite positions on whether or how it should be regulated. Thus, preference similarity is highest between two firms that lobby on the same bill dimension and in the same direction.

Unfortunately, data availability is constrained on at least one component of preference similarity. The detailed policy position of firms toward congressional bills is not readily available. Thus, I approximate preference similarity by creating a measure of activity overlap (Selling 2020; Zhang 2023). The measure is based on data from firms' Lobbying Disclosure Acts (LDA) reports accessed through the Lobbyview database (Kim 2017). Firms report the issue dimensions they emphasized and the lobbying agencies they hired when lobbying on a given bill. While this gives no direct information of the position they take on a given bill, the same lobbying agencies is very unlikely to represent both sides on a bill. My measure of activity overlap is binary and indicates whether two firms in a dyad focus on the same issues and hire the same lobbyists on a given bill (1) or not (0). In the appendix I also report the results of models on whether two firms lobby on the same issue dimension only (Table A1) and of normal multi-level logit regressions (Table A2 & A3).

Although activity overlap measures important dimensions of preference similarity, it is not a perfect measure. First, the lobbyists component of the measure is likely to underestimate preference similarity. This is because more than one lobbying agency is active on the same side of an average bill and it is more demanding for two firms to coordinate on the same lobbying agency than merely lobbying on the same side. Even if only focusing on strategic preferences, acting to pursue a preference is different from merely stating a preference. Activity overlap, therefore, might be better understood as a measure of lobbying coalitions rather than mere preference similarity (Junk et al. 2020). Second, measures of activity overlap, especially when binary, miss a lot of nuance. Even though firms focus on the same overall issues of a bill and take the same overall position, they might do so to different degrees or with different justifications. To address these shortcomings, I not only read firm testimonies in selected congressional hearings on platform regulation. I also ran a BERTopic model on the testimonies in all hearings and evaluate the regression results against these methods.

Key Independent Variables

My first central independent variable is *platform-dependency*. Unfortunately, there is no readily available measure of how exposed a specific firm is to a specific platform. But, building on Kenney et al. (2021), I take a sectoral approach. To do so, I identify large platform companies and classify them as either sectoral or infrastructural (van Dijck, Poell, and De Waal 2018). I then identified the 2 or 3-

digit NAICS sectors in which these platforms operate. Finally, I coded firm-platform dyads as characterized by platform dependency if the platform operates in a firm's primary sector. For infrastructural platforms I coded all sectors as dependent, as they, by definition, form the backbone of most modern economic activities. Table 1 gives an overview of the platform firms covered and their dependent sectors. Platform dependency is a binary variable.

Table 1: Overview of Platforms and Dependent Sectors

Platform	Type	Dependent Sectors (2/3-Digit NAICS)
Amazon	Infrastructural	All
Apple	Infrastructural	All
eBay	Sectoral	44, 45
Etsy	Sectoral	44, 45
Meta (Facebook)	Sectoral	44, 45, 71, 512, 513, 516, 541
Alphabet (Google)	Infrastructural	All
IAC/InterActiveCorp	Sectoral	541, 71, 72, 53, 512, 513, 516, 44, 45, 238, 236
LinkedIn	Sectoral	None
Lyft	Sectoral	722
Microsoft	Infrastructural	All
Netflix	Sectoral	512, 516
Oracle	Infrastructural	All
Reddit	Sectoral	541, 71, 512, 513, 516, 44, 45
Salesforce	Sectoral	None
SAP	Sectoral	None
Taskrabbit	Sectoral	236, 238, 484, 5617
Tripadvisor	Sectoral	72, 71
Twitter	Sectoral	541, 71, 512, 513, 516, 44, 45
Uber	Sectoral	722
Wikipedia	Sectoral	71, 512, 513, 516
YAHOO! INC	Sectoral	541, 71, 72, 53, 512, 513, 516, 44, 45
YELP, INC.	Sectoral	72, 71
YOUTUBE	Sectoral	541, 71, 512, 513, 516, 44, 45
Zillow	Sectoral	53

Note: 236: Construction of Buildings, 238: Specialty Trade Contractors, 44-45: Retail Trade, 484: Truck Transportation, 512: Motion Picture and Sound Recording Industries, 513: Publishing Industries, 516: Broadcasting and Content Providers, 53: Real Estate and Rental and Leasing, 541: Professional, Scientific, and Technical Services, 5617: Services to Buildings and Dwellings71: Arts, Entertainment, and Recreation, 72: Accommodation and Food Services, 722: Food Services and Drinking Places

My second central independent variable measures the standardized *percentage difference of intangible asset ownership* between two firms in a dyad.[13] Intangible assets encompass data and intellectual property. The data source is CompuStat.

[13] A percentage difference of 100 means that firm A has double the intangible assets than firm B. To standardize a variable the mean is subtracted from the original value and then divided by the standard deviation. Regression coefficients can thus be interpreted as the effect of a one standard deviation increase of the variable.

Interaction Variables

First, as a more proper test of H1a than the main model, I interact intangible assets difference and sectoral similarity.[14] Although huge differences in intangible assets between two firms indicate different degrees to which they control input factors it doesn't indicate that these are *core* input factors for the downstream firm. Both, data and intellectual property, are specific to certain market segments (Haskel and Westlake 2018, 70). Thus, it does not only matter whether firms are upstream and others are downstream, it is at least as important that they are members of the same ecosystem. While platform-dependency is measured in a way that already encapsulates whether firms in a dyad act within the same ecosystem, this information is not contained in measure of intangible assets. The interaction with sectoral similarity serves as a proxy for this. To compute sectoral similarity, I follow Selling (2020) and use the CompuStat Business Segments data to compute the cosine similarity between two firms' distribution of revenues on the NAICS 4-digit level. A score of 0 indicates that two firms generate revenue in completely distinct industries, whereas 1 indicates full overlap.

To test whether the negative effect of ecosystem dependencies on preference similarity is amplified by the ability of upstream firms to exploit their market power (H1c), I interact platform dependency/intangible asset difference with the percentage difference in markups between two firms. In contrast to traditional measures of the size of firms that rely on *employment* or *turnover*,[15] markups express the ability of a firm to set prices. In the liberal utopia of perfect competition, the price of a good would equal its marginal production costs. Markups express the difference between prices and production costs. As they capture a firms' position in global value chains (Schwartz 2022) irrespective of the underlying factors and means of production, markups are a more adequate measure of the power differential between firms in digital capitalism with its multitude of different business models. I compute markups using CompuStat data by dividing the difference between turnover and cost of goods sold by the cost of goods sold (Orhangazi 2019, 1284). The *markup differential* within a dyad is the standardized percentage difference between the two firms. Third, I interact platform dependency and intangible assets difference to test H1d.

Fourth, I interact the policy area with platform dependency to test H2. To determine the policy area, I use classifications from the US Congress and distinguish between nine policy areas. The following policy areas are only included as control dummies in the regressions: *economy, trade, security, social, politics, energy and environment, tax,* and *miscellaneous*. The policy areas *within platform-ecosystem conflicts* (competition, content regulation, platform-business relations) and *entire platform-ecosystem*

[14] Ideally, also the interaction effects of intangible asset difference would be assessed with measurements of sector specific intangible assets. Unfortunately, however, data on sector specific intangible assets does not exist and the limited variation in the dependent variable renders three-way interactions impossible.
[15] The standardized percentage difference in employment and turnover are included as controls.

policies (privacy and advertising, cybersecurity, and innovation policy) are also interacted with platform dependency. A single bill can belong to multiple policy areas. I focus on platform ecosystems, because the complexity of intangible asset ecosystems would require hand-coding on the firm-dyad bill level which is prohibitively costly.

Controls

Existing literature identifies economic, institutional, and lobbying environment related factors influencing preference similarity (and lobbying coalitions) between interest groups.

First, economic factors largely emphasize materialistic models of preference formation. Thus, *sectoral similarity* between two businesses and similar degrees of *trade activity* should influence whether they lobby in the same direction. While the measure for sectoral similarity is described above, trade activity is operationalized using CompuStat data as the standardized percentage difference in the share of foreign to domestic pretax income.

Second, institutional factors, namely *policy area,* and the *political venue* influence lobbying activities. I control for policy area as described above and add a dummy for whether a bill originated in the house or senate. I also add session fixed effects with the most recent Congress in the data (116^{th}) being the reference category.

Third, the lobbying environment might influence preference similarity. First, I count the *number of organizations* active on a bill as a proxy for issue salience. The more salient an issue, the more organizations are likely to mobilize around it. High salience often is associated with business unity (Smith 2000). Second, I control for the *involvement of peak organizations* on a bill. When organizations such as the US Chamber of Commerce or the Business Roundtable lobby on a package, it is likely to be either an issue on which many businesses are active with a unified voice. Or it is an issue where only firms with diverging preferences have to speak up, whereas all other firms delegated their lobbying activities to the peak organizations.

Results

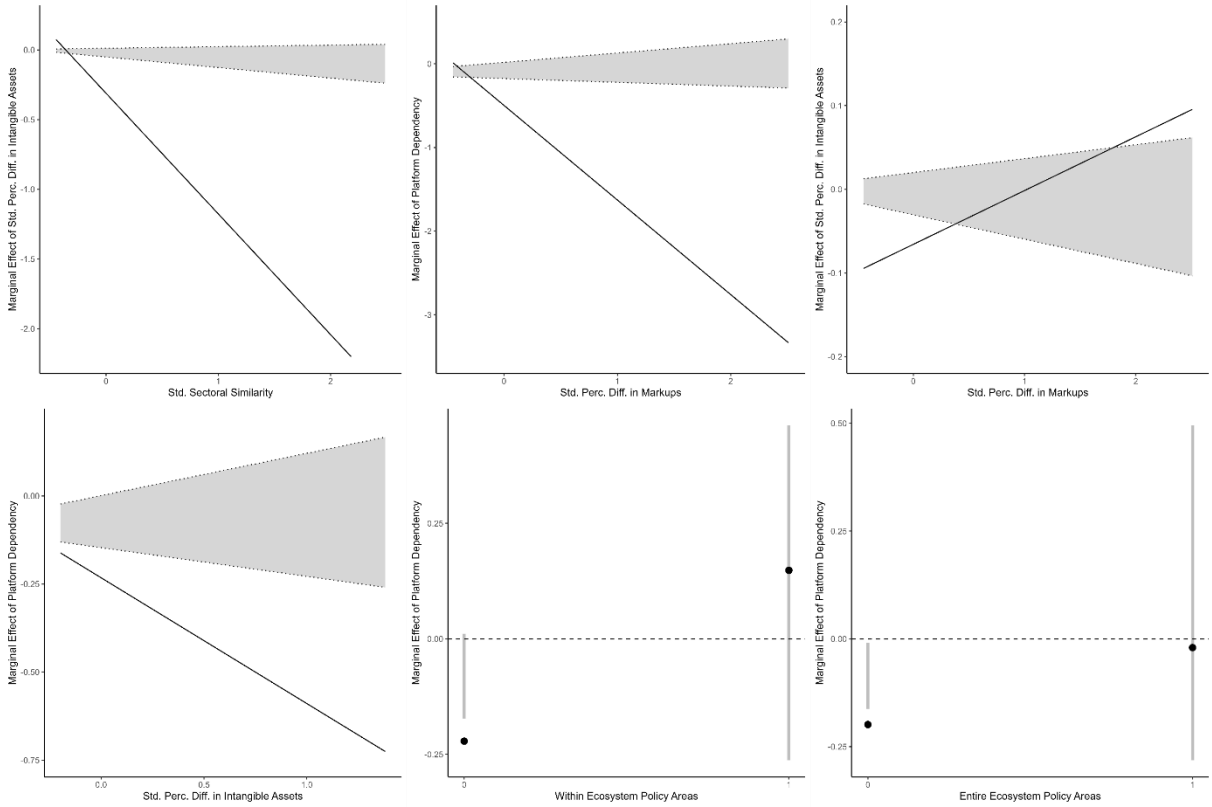
Table 2: Results of the MRQAPs on Activity Overlap

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
	Activity Overlap (Same Issue and Same Lobbyists)						
Platform Dependency	-0.2 ***	-0.19 ***	-0.5 ***	-0.2 ***	-0.24 ***	-0.23 ***	-0.21 ***
Δ Intangible Assets	-0.05 ***	-0.31 ***	-0.05 ***	-0.07 ***	-0.04 **	-0.05 ***	-0.05 ***
Sectoral Similarity	1.22 ***	1.09 ***	1.22 ***	1.22 ***	1.22 ***	1.22 ***	1.22 ***
Δ Markup	-0.66 ***	-0.62 ***	-0.59 ***	-0.68 ***	-0.65 ***	-0.66 ***	-0.66 ***
Δ Employees	-0.18 ***	-0.11 ***	-0.19 ***	-0.17 ***	-0.17 ***	-0.18 ***	-0.18 ***
Δ Sales	-0.34 ***	-0.24 ***	-0.34 ***	-0.33 ***	-0.34 ***	-0.34 ***	-0.34 ***
Δ Trade Exposure	0.05 **	0.06 ***	0.05 ***	0.05 **	0.05 ***	0.05 **	0.05 **
Number of Organizations	-0.3 ***	-0.3 ***	-0.3 ***	-0.3 ***	-0.3 ***	-0.3 ***	-0.3 ***
Umbrella Organization	0.05 ***	0.04 ***	0.04 ***	0.04 ***	0.05 ***	0.05 ***	0.05 ***
House	0.07	0.07 *	0.07	0.07	0.07	0.07 *	0.07
Policy Areas							
- Miscellaneous	-0.15	-0.16	-0.15	-0.15	-0.15	-0.14	-0.15
- Within Ecosystem	-0.65	-0.63	-0.65	-0.65	-0.65	-0.7	-0.65
- Entire Ecosystem	0.37 *	0.38 **	0.36 *	0.37 *	0.37 *	0.36 *	0.34 *
- Trade	0.2	0.19	0.2	0.2	0.2	0.2	0.2
- Security	0.29 ***	0.28 ***	0.29 ***	0.29 ***	0.29 ***	0.29 ***	0.29 ***
- Tax	0.99 ***	1 ***	0.99 ***	0.99 ***	0.99 ***	1 ***	0.99 ***
- Economy	0.23 ***	0.22 ***	0.23 ***	0.23 ***	0.23 ***	0.23 ***	0.23 ***
- Social	-0.55 ***	-0.55 ***	-0.55 ***	-0.55 ***	-0.55 ***	-0.55 ***	-0.55 ***
- Politics	-0.19 ***	-0.18 ***	-0.19 ***	-0.18 ***	-0.18 ***	-0.18 ***	-0.19 ***
- Energy/Environment	-0.03	-0.04	-0.03	-0.03	-0.03	-0.03	-0.03
Δ Intangible Assets * Sectoral Similarity		-0.87 ***					
Platform Dependency * Δ Markup			-1.13 ***				
Δ Intangible Assets * Δ Markup				0.06 ***			
Platform Dependency * Δ Intangible Assets					-0.36 ***		
Platform Dependency * Within Ecosystem Policies						0.38 **	
Platform Dependency * Entire Ecosystem Policies							0.19
Intercept	-3.4 ***	-3.4 ***	-3.37 ***	-3.4 ***	-3.4 ***	-3.4 ***	-3.4 ***
Session Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.356	0.357	0.357	0.361	0.356	0.356	0.356
Dyads	185174	185174	185174	185174	185174	185174	185174
Bills	4534	4534	4534	4534	4534	4534	4534
Unique Firms	680	680	680	680	680	680	680

Note: *** p < 0.01; ** p < 0.05; * p < 0.1

Table 2 displays the results of the multi-group logistic MRQAP regressions. Model 1 is the main model, while model 2-7 include interaction terms. Coefficients are displayed as log-odds. In model 2-7 the coefficient of an individual variable (X) in the interaction term displays the change in the log-odds of activity overlap when the other variable (Z) in the interaction term is zero. The coefficient of the interaction term (X*Z) displays the change in the marginal effect of X for a one unit increase of Z. Whether the marginal effect of X is significant has to be evaluated for each value of Z. To ease interpretation, figure 1 displays the interaction effects. Note that the grey areas in figure 1 do not represent confidence intervals, because these cannot be estimated in MRQAP. Rather, they represent the 95%-distribution of the coefficients computed on the permutated matrices. If a real coefficient is outside the 95%-distribution of permutated coefficients a relationship can be considered non-random and is significant at $p < 0.05$.

Figure 1: Interaction Effects Plot (Dependent Variable: Activity Overlap)



Note: Grey areas DO NOT represent confidence intervals but indicate the 95%-distribution of permutated coefficients. If a real coefficient is outside this distribution it is significant at $p < 0.05$.

Model 1 shows that both main independent variables have a significant and negative effect on activity overlap. Platform dependency reduces the odds of two firms lobbying on the same issue-dimension of a bill using the same lobbyists by 17.3% and for each one standard deviation increase in the difference of intangible assets the odds for activity overlap decrease by 4.9%.[16] This provides support for hypotheses 1a and 1b. While the effects of within ecosystem policies is non-significant, firms' odds of

[16] Log-odds are transformed to percentage change of odds by exponentiating and subtracting one.

activity overlap increase by 43.3% for entire ecosystem policies. Not surprisingly, the controls show that firms tend to lobby alike when they are in similar sectors, are similarly reliant on trade, when lobbying on economic, tax, entire ecosystem, and security policies, and when umbrella organizations are involved. They are less likely to lobby alike if they have different market power (markups), different sizes (employees, sales), and when lobbying on social or polity and politics related policies. Contrary to Smith (2000) salience decreases preference similarity.

Model 2 includes an interaction term between intangible asset difference and sectoral similarity and shows that similar sectors have higher odds of activity overlap, but only when the difference in intangible assets is low (table 2). Turning to figure 1 (upper left) it also becomes evident that the higher the sectoral similarity of a dyad, the more negative the effect of a one standard deviation increase in intangible difference becomes. This suggest that the more specific the intangible assets held by an upstream firm to a downstream firms' business, the less likely these firms are to display similar preferences. For firms in totally different sectors intangible asset difference has a near zero effect. Confidence in H1a is increased by these results.

Model 3 includes an interaction between platform dependency and markups. The upper central panel of figure 1 reveals that for negative values of the standardized percentage difference in markups (i.e. upstream and downstream firms have similar degrees of market power) the effect of platform dependency is around 0. It then shortly turns insignificant before becoming significant and ever more negative. For the largest difference in markups, the odds of activity overlap decrease by 95.5% for platform-dependent dyads. This suggests that preferences between platform-dependent businesses and platforms are similar, if platforms cannot exploit their upstream position. However, the more platforms do so, the higher the difference in preferences. Interestingly, the interaction between difference in markups and difference in intangible assets takes the opposite direction than for platform dependency (model 6). While the effect of a one standard deviation increase in the difference in intangible assets decreases activity overlap for firms with similar market power, firms with different market power have higher odds of activity overlap when the difference in intangible assets also increases. The interaction is only significant at the highest and lowest values of markup differences. While these findings might be due to the inability to measure specific intangible assets, there is still only partial support for hypothesis 1c.

As a final test for the hypotheses of set 1, model 5 interacts platform dependency and difference in intangible assets. While both, the effect of platform dependency and intangible asset difference is significant and negative when the other variable is zero, the effects reinforce each other. For dyads characterized by platform dependency and the biggest observed difference in intangible assets the odds to lobby on the same issue with the same lobbyists are 52 % lower. The regression results, thus,

provide general support for the first set of hypotheses. The preferences of upstream and downstream firms within digital ecosystems are indeed less likely to align, especially if upstream firms exploit their market power.

Turning to the second set of hypotheses, model 6 and 7 examine whether the policy area influences the effect of platform dependency on activity overlap. Model 6 shows that the effect of platform dependency reduces the odds for activity overlap by 19.7% when lobbying on bills that do not regulate within ecosystem conflicts. For within ecosystem policy areas, the effect of platform dependency is positive but insignificant. Strikingly, model 4 shows a similar pattern for entire ecosystem policies. This suggests that the lobbying activities of platform-dependent firms and platforms are not shaped by whether a bill regulates within ecosystem conflicts or issues concerning the functioning of the entire ecosystem. As the evidence provided in the next section suggests this is likely do to an insufficiently nuanced measurement of policy area.

Business and Platform Testimonies in Congressional Hearings on Platform Regulation

As mentioned above two deficiencies of the activity overlap measure are its inability to account for nuance and to measure preferences rather than actions. To triangulate results, I analyze the statements of firms in congressional hearings on platform regulation. To determine the relevant hearings, I searched for all hearings in which at least one of the platforms indicated in table 1 testified as a witness. I then downloaded the transcripts of these hearings from govinfo.gov and extracted the witness testimonies. I hand-coded whether the witnesses represent a business or a platform and excluded all testimonies by other interest groups. I then created a BERTopic model to analyze which topics firms emphasized and how they talked about them.

Quantitative text analysis methods to determine interest group preferences were criticized for three reasons (Bunea and Ibenskas 2015). First, the use of bag-of-words approaches neglects many contextual factors of speech because it only counts word frequencies and neglects the embedding of words in a sentence structure. Second, policies are typically multidimensional and methods that reduce the dimensionality of policies to much neglect important nuances between interest group preferences (Bunea and Ibenskas 2015, 433). Third, texts should be carefully selected in order to ensure a similar text generating process and the comparability between texts (e.g. same language, targeted to similar audiences) (Bunea and Ibenskas 2015).

While Klüver (2015) argues that bag-of-words approaches perform relatively well, because much ideological information is transported through word choice, recent innovations in text-as-data methods can better account for words in context. The method applied in this paper, BERTopic uses word embeddings for this purpose (Grootendorst 2022). BERTopic also has the advantage to account

for the multidimensionality of policies, because it directly measures which topics are emphasized within platform regulation. After identifying the topics prevalent in the hearing, one can compare whether two firms emphasize similar topics (i.e. the "what to lobby on component" of a preference) and whether they speak similarly about the same topic (i.e. the "direction component" of a preference). Third, as the texts analyzed here are testimonies by interest groups delivered to an audience of US legislators no fundamental difference in the text generating process can be assumed. Another advantage of using BERTopic to analyze preferences is that it can be very modular by focusing on the similarity of firm preferences between or within selected topics rather than analyzing the overall similarity between two interest groups on a policy.

Applying a BERTopic model involves five steps (Grootendorst 2022). First, documents are to numeric representations by applying a word embedding model. In the second step the dimensionality of these numerical representations is reduced and, third, clustering is applied to identify similar documents. In these steps, researchers can choose to focus either on a representation of the global or local structure of the data. As my goal is to identify common topics across all hearings (to ensure comparability between hearings) without losing the fine-grained arguments brought forward by interest groups on specific bills, I decided to tend towards a more localized representation (see script for parameters). This is also the reason I chose sentences as the unit of analysis. After creating topical clusters of documents (and a residual cluster for outliers), cluster-based TF-IDF scores are computed. Cluster-based TF-IDF scores are the ratio between the frequency of a given term within the cluster divided by the frequency of the term in all documents. The initial topic model yielded 192 topics based on 42096 sentences from 1707 statements in 174 hearings. I further aggregated these 192 topics to 90 topics based on the hierarchical relations between topics and my own judgement.

Before turning to the results of the topic model, the implications of document selection on its results have to be considered. Because I selected only testimonies from hearings with platform involvement, the identified topics can be broadly understood as different dimensions of platform regulation. Further, the hearings' other witnesses are usually involved with platforms to some degree. Congress invites only witnesses to hearings that can contribute expertise and/or experience on the policy discussed. Although this does not *necessarily* mean that testifying businesses and platforms are members of the same ecosystem they *likely* are. The topics emphasized by an actor in her testimony, thus, represent the dimensions of platform regulation the actor perceives as important. Differences in the relative prevalence of a given topic between actors indicate that this dimension of platform regulation is problematized to different degrees.

What do firms lobby on in platform regulation?

To assess the "what to lobby on component" of preferences, I assess what topics firms and platforms speak about in hearings on platform regulation. Figure 2 displays the 50 most frequent topics in the congressional hearings. The size of the dots indicates the overall frequency of the topic and the color indicates different categories of topics.

Topics to the left are more prevalent in business testimonies. Interestingly, the category of non-personal data, which includes topics such as data, vehicles, and cloud computing, is the category with the highest difference in emphasis between business and platforms. This suggests that firms within platform ecosystems see the regulation of non-personal data as an important dimension of platform regulation, whereas platforms do not. Strikingly, especially considering that the overall prevalence of both topic categories is similarly high, views on the importance of the regulation of non-personal data are much more controversial between businesses and platforms than views on personal data. This is coherent with H2 because platforms and firms within the same ecosystem are in direct conflict over ownership and access of non-personal data (Trampusch 2023) whereas the exploitation of personal data can be beneficial for both to enable targeted advertisement. Interestingly, another category emphasized relatively more by business is taxation.[17]

Topics to the right are more prevalent in platform testimonies. The one topic category that is relatively more emphasized by platforms than by businesses is B2B relations within the ecosystem. Hypothesis 2 also predicts this to be a controversial policy area. The topics of Amazon and Retail, Antitrust, Postal Service, Platform-Business Relations, and News and Journalism cover many conflicts around content moderation, fair remuneration, rent extraction, asymmetries in online marketplaces, preferential treatment of in-house products and services by platforms, and anticompetitive practices in general. Looking at the content of these topics, it becomes evident that platforms emphasize these topics to shine light on the many opportunities they create for complementors rather than the within ecosystem conflicts. As further explored below this is evidence for the inherent ambivalence of B2B relations on platforms.

In addition to topic categories that are overemphasized by platforms or businesses as a whole, there are also bifurcated categories. These indicate that there is a general understanding that the overall dimension of platform regulation is important, however, that there are disagreements on subdimensions. First, both businesses and platforms emphasize topics of Rules and Regulation to

[17] Apple and Loans are included in this category, because loans between subsidiaries and parent companies are discussed in the hearings as a tool for tax evasion and Apple features prominently in hearings on tax evasion.

similar degrees. However, they seem to disagree on who should make and enforce these rules, because platforms overemphasize standardization. Private standard-setting is a means to prevent public regulation and often is highly biased towards platforms because they own an ecosystem's infrastructure and typically have outsized market power (Kemmerling and Trampusch 2022). This is congruent with the hypotheses in set 1 because it shows the opposition of platforms against government intervention.

Figure 2: Difference in Topic Prevalence between Business and Platform Statements

Second, topics highlighting specific problems on platforms, such as hate speech, cybersecurity, elections, or fraud are bifurcated. This contradicts hypothesis 2, because it assumes that ecosystem actors share a common concern for trust and security of the ecosystem. Still, businesses overemphasize fraud and hate speech, while platforms are more concerned with cybersecurity and elections. A possible explanation for the bifurcation could be that regulation of hate speech and fraud would impose new costs on the platform (e.g. content moderation), while cybersecurity and election interference already impose high costs on the platform. Platforms as owners of the ecosystem infrastructure are directly responsible for data breaches, malware, and hacks and the Cambridge Analytica Scandal and Facebook's role in the 2016 election are central drivers of the so-called techlash. In order to save face and costs of enforcement, platforms might try to address these issues in Congress and share responsibility with the government.

Finally, there are topics that are emphasized to similar degrees by businesses and platforms. These include the categories of Research & Development and Investment (congruent with H2), Intellectual Property, Personal Data (congruent with H2), and Labor and Skills as well as the single topics of Litigation, Law Enforcement, and Consumers.

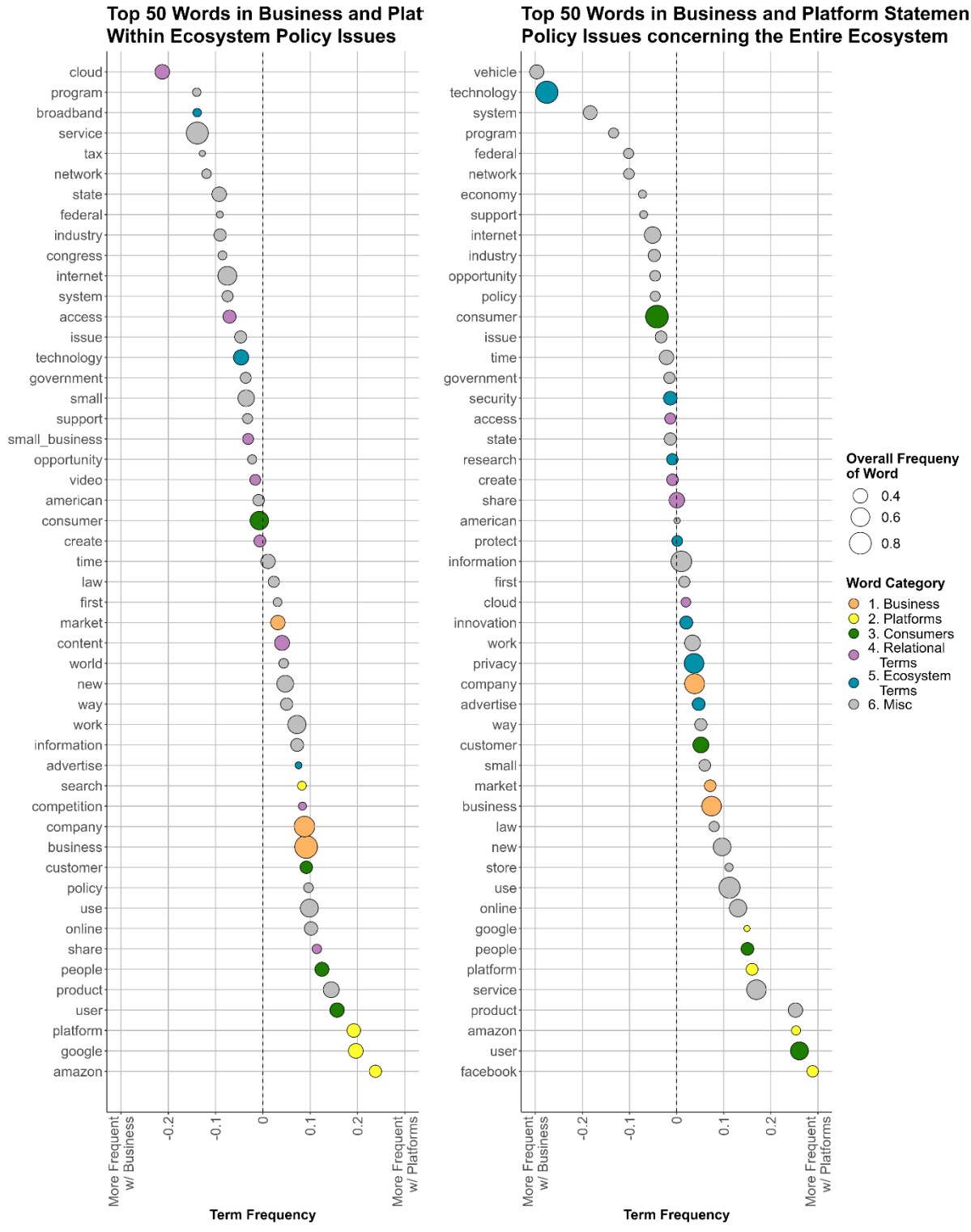
In which direction do firms lobby in platform regulation?

Figure 3 displays the word frequencies of the top 50 words used in congressional hearing testimonies on within (left) and entire (right) ecosystem policies. This is to assess the "direction component" of preferences. In both policy areas terms referring to business (orange), to platforms (yellow), and to individuals and consumers (green) are relatively frequent and generally more often used by platforms. Differences between policy areas become evident when looking at words that describe relations between actors in the ecosystem (purple, *relational terms*). Looking at the relative frequencies of relational terms in hearings on within ecosystem policies, terms such as cloud, access, share, and competition show substantial differences between business and platform actors. These differences are less pronounced for the terms small business and content. In hearings on entire ecosystem policies, relational terms are not only less frequent in general, differences in frequencies between business and platforms also shrink considerably. In contrast, words that describe characteristics of the entire ecosystem (turquoise, *ecosystem terms*) display a reversed pattern. Business and platforms tend to use terms such as protect, research, advertise, innovation, security, and privacy equally frequent when testifying on entire ecosystem policies. On the other hand, differences in term frequency between business and platforms for the terms advertise and broadband are higher in hearings on within ecosystem policies.

While the higher overall frequency of relational terms in hearings on within ecosystem policies and ecosystem terms in hearings on entire ecosystem policies is not surprising, the differences in the

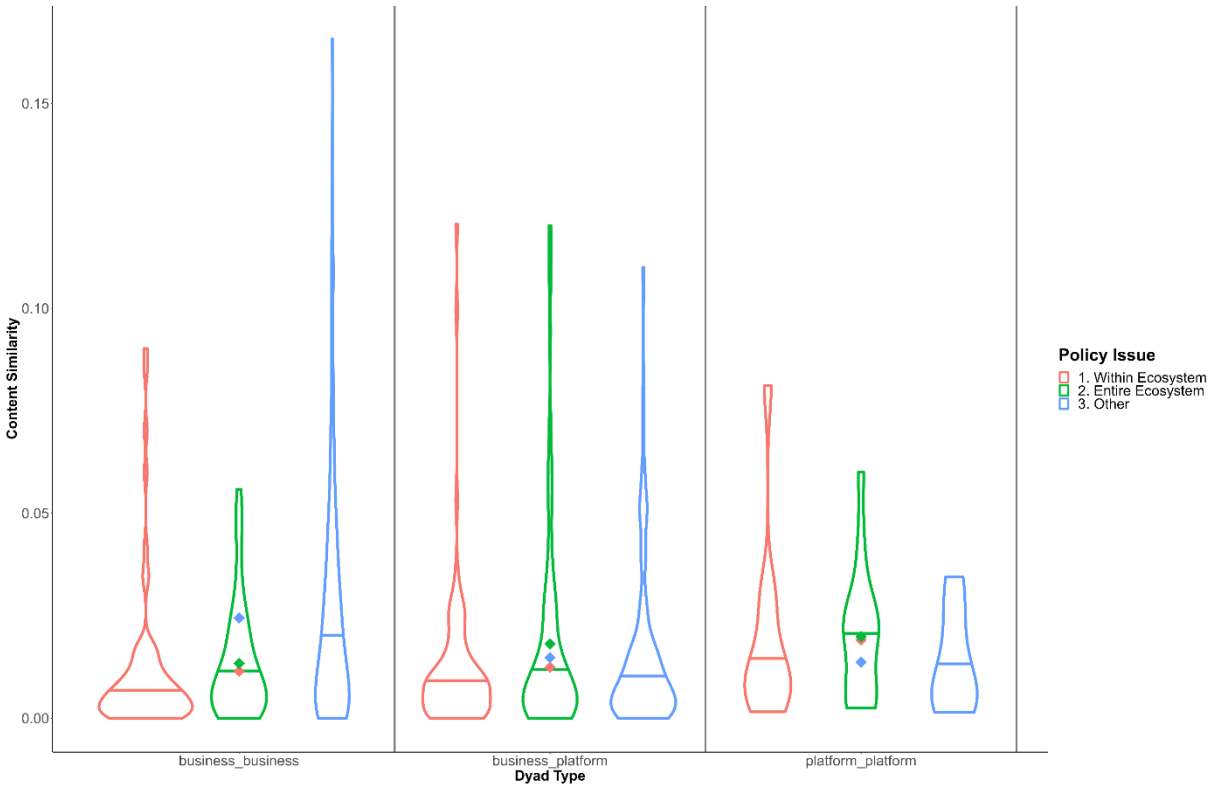
relative emphasis of platforms and businesses on these terms is interesting. Regardless of whether a term is relational or ecosystem, the difference in relative emphasis is higher on within ecosystem policies than on entire ecosystem policies. This suggests that businesses and platforms speak alike when policies concern the entire ecosystem but not when policies focus on within ecosystem relations providing support for H2.

Figure 3: Top 50 Words in Business and Platform Testimonies on Platform Regulation



This general trend is also evident in figure 4 which depicts the distribution of content similarity by dyad type across policy areas. The content similarity measure represents whether two interest groups speak about the same topic *in the same way*. To create the measure, I created TF-IDF representations of all sentences a given firm has used in a given hearing and that are representative of a given topic.[18] I then computed the cosine similarity of the topic and bill specific TF-IDF matrices of all firm dyads. To create a score on the firm-dyad-hearing level I took the mean of a firm-dyads similarity score across all topics within a hearing. Figure 4, thus, displays the overall degree of similarity of the direction firms lobbied a specific bill.

Figure 4: Content Similarity of Statements by Dyad Type and Policy Issue



There are four elements of interest in figure 4. First, the violin shaped elements display the distribution of firm-dyads at each value of content similarity. The broader the violin at a specific value of content similarity, the more firm-dyads are located at that value.[19] The height of the violin shows the range of the distribution. The median, i.e. the value of content similarity that cuts the distribution in half, is marked by a horizontal line in the body of the violin and the squares depict the mean. The distance between median and mean indicates the skewedness of the distribution. Taken together, range (i.e.

[18] For instance, I took all sentences on the topic *privacy* from *Googles'* testimony in the hearing on *Privacy Implications of Online Advertising* and counted the frequency of the word *data* (TF) and divided it by the overall frequency of *data* in the sentences of all firms' testimonies relating to *privacy* in the hearing (IDF). Doing this for all words Google used in its testimony in the same hearing on the same topic results in the TF-IDF matrix.
[19] For instance, in the most-left red violin, many business firms testify totally dissimilar on within ecosystem policies but only two firm-dyads have a content similarity of 0.09.

the distance between the most-similar and the most-different firms) and skewedness (i.e. the degree to which the mean is representative of the typical (median) case) can be interpreted as an indicator of polarization. Colors are used to distinguish within ecosystem (red), entire ecosystem (green), and other (blue) policies.

Interestingly, the content similarity of platforms and business testimonies in the same hearings varies between policy areas. Despite some outliers (the height of the violin), within ecosystem policies show the lowest average and median values of content similarity within business-platform dyads. In contrast, the average for entire ecosystem policies is the highest for within business-platform dyads. However, the range of content similarity is very similar across policy areas and the skewedness of the distribution of dyads in entire ecosystem hearings suggests that at least some businesses and platforms do not follow the general trend and that there is some polarization even on policies concerning the entire ecosystem.

Comparing content similarity between business-platform dyads and other dyad types it becomes evident that both business-business dyads and platform-platform dyads speak much more similarly about entire and within ecosystem topics. Also, the skewedness and range of entire ecosystem policies is lower in these dyads. For platform-platform dyads this also holds for the other policy areas category. However, skewedness and range are consistently high for within ecosystem policies across dyad types, indicating that polarization is a consistent feature of these policies. The key takeaway from figure 4 is that while business and platforms tend to speak more similarly about entire ecosystem policies than about within ecosystem policies, this does not result in perfect homogeneity. While this provides limited support for H2 it also hints at some of the underlying reasons for why support for them is ambivalent. As further shown in the next section of the paper, the costs a bill imposes on downstream firms and platforms are not sufficiently captured by policy area. Instead almost every bill entails ambivalent provisions.

Illustrative Evidence from Hearings on Competition, Advertising, and Taxation Policy

To further explore H2, I qualitatively examined congressional hearings in the areas of competition policy, data privacy and advertising regulation, and taxation. While competition policy is a central component of what I code as within ecosystem policy areas, data privacy and advertising regulation are entire ecosystem policy areas. Additionally, I selected the hearing on taxation policy because it illustrates how a bill from a non-inherently within or entire ecosystem policy area can encompass both dimensions. As will be seen it simultaneously would impose costs on the entire ecosystem but also only on some actors within.

In the policy area of competition, SME representatives emphasize how regulation would not only affect platforms but all actors within the ecosystem. For instance, Jake Ward of the Connected Commerce

Council and the Application Developers Alliance cautions Congress against overregulation.[20] He aims "to defend small businesses from the unintended consequences of overreacting, to defend an ecosystem in an economy that is working, and to speak up for tens of millions of American businesses whose […] bottom lines have been well served by digital tools and the companies that produce them" (Ward in: Committee on Small Business 2019, 32). In a similar vein, Graham Dufault of the App Association highlights how platforms foster business opportunities for others because they "reduce overhead", create "a trusted space", and provide "immediate access to billions of consumers around the world" (in: Committee on Small Business 2019, 33). These testimonies are very similar to Amazon and Googles lines of argumentation who emphasize how many of the services provided by platforms "lower […] barriers to entry for entrepreneurs." (Mehta in: Committee on Small Business 2019, 5) by turning fixed costs into variable costs and providing valuable services to SMEs (e.g. logistics, advertising, publishing, consulting, data analytics) (Swanson and Mehta in: Committee on Small Business 2019, 4–7).

However, this shared preference against "overregulation" doesn't prevent SME representatives from seeing their dependency on platforms and seeking what they perceive as sensible competition policy (Hart and Cavaretta in: Committee on Small Business 2019, 25–27). Most SME representatives acknowledge the infrastructural character of platforms and their importance for their own operations. They compare platforms to electrical power, payment systems (Feld in: Committee on Small Business 2019, 28), characterize them as "unavoidable gatekeeper[s]" (Cavaretta in: Committee on Small Business 2019, 25), and highlight how they influence their business activites: "[w]hen they say jump, we say how high? If Amazon suspends us from the platform, we go bust and we go bust fast." (Hart in: Committee on Small Business 2019, 27). To mitigate these dependencies, they ask Congress "to hardwire a fair playing field for hotels and for small businesses" (Cavaretta in: Committee on Small Business 2019, 25–26) and, while "preceding with caution", to introduce "narrow legislation that addresses the nagging problems on the platform" (Hart Committee on Small Business 2019, 28). The policies and regulations proposed by SME representatives to "level the playing field" range from strengthening (intermediary) liability for intellectual property and products (CreativeFuture and Hart in: Committee on Small Business 2019, 202–8 & 257), FTC investigations into anticompetitive practices (Hart in: Committee on Small Business 2019, 255–73), greater transparency requirements (Cavaretta and Hart in: Committee on Small Business 2019, 26 and 255–73), or preventing marketplaces from

[20] Business associations voice the aggregated preferences of their members. Because the process of preference aggregation is often contested, the aggregated preference is not identical with the preferences of member firms. In the context of this paper, this would be problematic if I quote associations in which downstream firms are silenced in the process of preference aggregation. I therefore only quote from testimonies of associations that specifically act as representatives of downstream firms.

becoming “pay to play” (e.g. searches displaying not the best matching but the highest paying results) (Cavaretta in: Committee on Small Business 2019, 26).

Turning to the policy area of online advertising, Google’s Jane Horvath describes the business case for targeted advertising in her testimony. Google and other platforms “provide users with highly relevant ads, match advertisers with users who are interested in their products, and provide revenue for website publishers who place our ads on their sites.” (Horvath in: Committee on Commerce, Science, and Transportation 2008, 11). While, unfortunately, there are no representatives of complementors in the privacy and advertisement hearings, platforms emphasize the need to maintain advertising ecosystems as a trusted space. Platforms, for instance, highlight that “even though only a tiny portion of ads carry malware, malvertising undermines users’ faith in this ecosystem.” (Salem (see also: Stamos, 7) in: Committee on Homeland Security and Governmental Affairs 2014, 11). A broad business coalition behind self-regulatory standards in advertising becomes evident in the large and varied membership of trade associations such as the digital advertising alliance (DAA) or the Association of National Advertisers (ANA). Members encompass firms from nearly all economic sectors and of all sizes, including Big Tech (ANA 2023a; DAA 2023). Underscoring the preference for self-regulation, the DAA establishes and certifies a code of conduct for responsible advertising. Regarding the bordering policy area of privacy and personal data, DAA member firms share the goal of “[p]reserving an advertising ecosystem that meets the needs of both small and large businesses and at the same time provides consumers ways to address their privacy expectations” (in: Committee on Homeland Security and Governmental Affairs 2014, 38). To this effect platforms (e.g. Amazon 2023; Google 2022), the ANA (ANA 2023b), and business associations of complementors and small businesses (National Small Business Association 2023; NewsMedia Alliance 2021), all lobby for a federal privacy law to replace the patchwork of comprehensive state privacy laws in order to protect targeted advertising and reduce compliance costs. For instance, the NSBA argues that “Small business owners not only use targeted advertising to compete with their larger counterparts, but targeted advertising also helps level the playing field for underserved entrepreneurs. […] Protecting consumers’ privacy should be a top priority. But this can be done without undermining small businesses. We urge policymakers to carefully consider the unintended consequences” (National Small Business Association 2023).

The third policy area that deserves a closer look is taxation, specifically the debate on an extension of an out-of-state sales tax exemption for small businesses selling online. Within these hearings the two sidedness of the community of fate logic becomes evident. A representative of eBay emphasizes that “eBay’s success is tied entirely to the success of the sellers” (Bieron in: Subcommittee on Regulatory Reform and Oversight 2006, 22). Akin to online sellers, who argue that the administrative burden of an out-of-state sales tax poses a barrier of entry into online business (Perry in: Subcommittee on Regulatory Reform and Oversight 2006, 15), eBay argues that “[i]f part of that first hurdle [of creating

an online presence] was to have to take on this whole burden, we think that would stop a number of the small businesses from trying that avenue." (Bieron in: Subcommittee on Regulatory Reform and Oversight 2006, 14). Amazon took a similar view in 2001 expressing its support for "a permanent moratorium" (Comfort in: Committee on Commerce, Science, and Transportation 2001, 53), but changed its position in 2006. Amazon started to view the establishment of an out-of-state sales tax for SMEs selling online as a business opportunity and even a competitive advantage for its platform and supported it accordingly. Already having access to sales data of businesses on its platform, Amazon offers to provide tax collection services to small sellers. They even emphasize that "if Amazon can do it, your platform service provider also can do it […]. If not, certainly you are welcome to come to Amazon." (Misener in: Subcommittee on Regulatory Reform and Oversight 2006, 19). Although such technical solutions would limit the administrative burden on small businesses, SME representatives oppose them on the basis of high costs and fear of lock-in (Perry in: Subcommittee on Regulatory Reform and Oversight 2006, 10).

Three themes are prevalent in the testimonies. First, the policy area does not determine the costs of regulation for upstream and downstream firms. In a narrow sense this speaks against H2. In a wider sense however, it reflects a wrong level of analysis rather than an absence of a community of fate logic because the hearings also show that platforms and dependent businesses recognize that they are part of the same ecosystem and share a common interest in defending the ecosystem against what they perceive as overregulation. Second, downstream firms, especially SMEs, recognize that power relations in this ecosystem are asymmetric and that they are dependent on platforms. They also call for regulation to level the playing field which supports H1b. Third, platforms also recognize this dependency and try to pass on the cost of regulation to complementors and/or exploit their position to create new business opportunities based on regulation.

Conclusion

In this paper I ask the research question of what shapes business preferences in digital capitalism. I argue that the relative position of firms in digital ecosystems shapes their political preferences. Digital ecosystems are groups of interdependent firms structured around data, digital technologies, and digital infrastructure. Intellectual monopoly firms, i.e. the centralized owners of intangible assets, control the core inputs in this ecosystem (they are hubs) and platform firms control the digital infrastructure of the ecosystem (they own the ties). Tie ownership and being a hub enables firms to determine the conditions of access, structure the behavior of others, and appropriate knowledge and value from the ecosystem. Thus, firms that own digital infrastructure and/or intangible assets are in an upstream position. Firms, that own relatively fewer intangible assets or infrastructure are further downstream. I find that this upstream-downstream relation shapes preference formation in digital capitalism in two ways. First, the further the difference between two firms the more likely is preference

divergence, this is enhanced if an upstream firm uses its position to appropriate profit. I call this the exploitative-dependency logic of preference formation in digital ecosystems. Further, there is suggestive evidence that a community-of-fate logic also exists: If the costs of regulation are distributed across the ecosystem preference similarity between upstream-and downstream firms is more likely. This is likely determined by specific clauses within bills.

I contribute to research on business power in three ways. First, by proposing an ecosystem-based explanation of preference formation I take the specificities of capitalist production, exchange, and inter-firm relations in digital capitalism seriously. This approach does not only account for how data, digital technologies, and digital infrastructure shape business preferences. It takes the relational position of firms within digital ecosystems into account. In other words, preferences for government intervention arise not because a firm owns few intangible assets. They arise because a firm owns few intangible assets but is dependent on access to the assets of an upstream firm. Both, accounting for the role of intangible assets and digital infrastructure rather than physical assets in preference formation and accounting for the relational character of preferences are important contributions to the literature.

Second, I find a new dimension of preference formation in digital capitalism. Existing literature on business power in digital capitalism has focused on the alignment of preferences between platforms and consumers (Culpepper and Thelen 2020), studied conflict between incumbent firms and disruptors (e.g. Collier, Dubal, and Carter 2018), or focused on ownership of data (Trampusch 2023). I add to this an ecosystem-based explanation of preference formation structured along upstream-downstream relations between firms. As explained above upstream-downstream relations can result in preference similarity or disagreement based on how the costs of regulation are distributed. The advantage of this explanation over existing research is that it is widely applicable to different business models in digital capitalism. It includes the two predominant firm types of intellectual monopolies and platforms but also encompasses all digital and digitalized sectors from manufacturing to app development by locating them in digital ecosystems based on their ownership of data, digital technologies, and digital infrastructure. Thus, it includes structural and infrastructural causes of preference formation in a single framework and is applicable to firms across sectors.

Third, I propose a new measure of preference similarity based on quantitative text analysis of testimonies in congressional hearings. This measure allows a more nuanced analysis of strategic preferences than conventional one-dimensional measures based on text-as-data approaches or the analysis of lobbying reports. While I use my measure of content similarity (directional component) only descriptively, this is due to missingness on the variables sourced from CompuStat that only include public firms. Comparing the insights, I derived from my measure with the illustrative qualitative

evidence, the measure shows a higher degree of face validity than the statistical activity overlap measure. Additionally, figure A1 depicts a measure of topical similarity that measures the what-to-lobby-on component of preferences. Future studies should further test the validity of this measure and apply it in large-n studies.

Despite these contributions there are important oversights in this paper. First, my measurement of preference similarity as activity overlap is better conceptualized as a measurement of lobbying coalitions. Therefore, it was necessary to triangulate the findings from the statistical analysis with descriptive evidence from a topic model and a qualitative reading of testimonies.

Second, while the testimonies in congressional hearings allow for better insights into the preferences of firms, these are also stated within a specific strategic context. Thus, they do not necessarily represent the ideal preferences of firms. Focusing on strategic preferences is likely to overestimate business unity, because, as theories on the hidden faces of power suggest (Lukes 1974), strategic preferences are influenced by existing power relations. Weaker actors face pressures to adapt their preferences to what is realistically possible or to not speak up at all in fear of retaliation (Korpi 1985). To study ideal preferences, carefully designed case studies that track the evolution of preferences over time and ideally amid changing power relations are required (Pierson 2016).

Third, my analysis only focuses on the effects an upstream-downstream relation has on preference similarity. While I theorize on the mechanisms of preference formation and include interactions in the statistical models, future work should actually examine how the community-of-fate logic produces preference similarity and the exploitative-dependency logic produces preference divergence. I suggest to study the policy area of competition policy as an interesting case for mechanism building as the illustrative evidence presented above revealed extreme ambivalence in the testimonies of downstream firms. In particular process-tracing studies could explore how the costs of regulation are distributed within the ecosystem. In addition to whether a policy targets the entire ecosystem or within ecosystem conflicts, the infrastructural power of platforms could enable them to strategically pass on the costs of targeted regulation to the entire ecosystem in order to actively create preference alignment.

Fourth, my study is only based on evidence from the USA. However, studies on business preferences (Martin and Swank 2012) and on digital capitalism both show cross-country variation. Digitalization was enabled by specific conditions of the US economy and political system (Rahman and Thelen 2019). This has implications on preference formation: US intellectual monopolies and platform firms are the biggest in the world, while US manufacturing firms do possess relatively little digital power resources (Kemmerling and Trampusch 2022). Thus, upstream-downstream relations might be particularly pronounced. To further explore the role of national political economic context Germany could be an

interesting case. First, because the digital power resources of large firms in the manufacturing sector relatively high (Kemmerling and Trampusch 2022). Testing whether an ecosystem-based explanation of preference formation also holds in the non-digital but digitalized manufacturing sector would be interesting. Second, exploring the preferences of manufacturers in upstream positions and digital firms could be an interesting avenue of further research. Does their shared upstream position in digital ecosystems trump sectoral and national differences and produce similar preferences? A strong test case for this question would be preference formation in the emerging policy field of digital sovereignty, because sectoral and national interests of large German manufacturers should differ from those of US Big Tech.

Finally, future studies should consider what the upstream-downstream conflicts – and alliances – mean for the political reproduction of digital capitalism. On the one hand this should consider coalitional dynamics. Do downstream firms ally with other losers of digitalization such as increasingly marginalized and disempowered workers? Or does a stable coalition between highly skilled knowledge workers, upstream firms, and consumers emerge? How are these coalitions influenced by national institutional contexts and growth strategies? On the other hand, the effects of these coalitions on the (re)negotiation of political institutions and compromises in key policy areas such as competition, industrial policy, education, and welfare should be considered.

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Chapter 4: Saving the Internet: Platform Outside Lobbying against the European Union Copyright Directive

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Abstract

Existing research treats framing and issue salience as exogenous moderators of business power, while outside lobbying is considered a weapon of citizen groups. However, I argue that some business models offer unique tools for outside lobbying. Platforms can exploit their intermediary position in centralized networks to reach many and diverse users, shape framing and salience, and mobilize supporters. Using an innovative combination of process-tracing and time-series analysis of textual data, I study how platforms use outside lobbying and the scope conditions under which this influences policy. Comparing the European Union Copyright Directive with a shadow case shows that platforms indeed successfully use outside lobbying. However, strong counterframes in some EU member states and a fragmented public sphere prevented policy influence. In addition to contributing insights into platforms' broad repertoire of lobbying tactics and EU digital policymaking, I highlight avenues for future research on business power in the digital world.

Acknowledgements

I would like to thank Jana Diewald for her indispensable research assistance in validating the dictionary and Christine Trampusch for her helpful comments and suggestions on the draft. I would also like to thank the participants of the "(Online) lobbying and politicization: interest groups' successful adaptation of communication?" panel at the 2021 ECPR General Conference and the "Political Communication and Policymaking in the Age of Digital Media" workshop at the 2023 ECPR Joint Sessions.

Data Availability Statement

Supplementary material for this paper includes an online appendix with a detailed description of the data gathering process, validation of the dictionary, descriptive data on the salience and framing in some EU languages, and full regression results. Replication data and scripts can be accessed online in the Harvard Dataverse: https://doi.org/10.7910/DVN/3CM39M .

Introduction

Copyright regulates the dissemination and reproduction of creative works and is a highly technical, low salience policy area. Still, in the spring of 2019 people across Europe took to the streets to protest article 13 of the European Union Copyright Directive (EUCD). Platforms, influencers, and digital rights organizations heavily mobilised against the proposed extension of intermediary liability, i.e. the degree to which online service providers are accountable for their users' copyright infringements. Using outside lobbying tactics ranging from petitions over targeted ads to blacking out websites, these groups urged users to save the internet and prevent online censorship. Despite considerable efforts to engage the European public on their behalf, mobilisation by the anti-copyright coalition was successful only in some member states. Failing to signal the potential electoral costs to enough MEPs, the opponents of article 13 lost the lobbying battle when the EUCD passed in March 2019.

This paper asks two research questions: How did platforms mobilise the public to influence policy? And why did their outside lobbying efforts fail in some countries? While acknowledging salience and framing as moderators of business power (Culpepper, 2010), previous literature treated them as exogenous (except for: Keller, 2018). Meanwhile, outside lobbying, i.e. the mobilisation of the public to influence policies, is considered a weapon of the weak used *against* and not *by* business interests (Tresch, 2021). Drawing on and contributing to the outside lobbying and business power literatures, I argue that a firm's business model conditions its ability to use outside lobbying successfully. Specifically, online platforms possess unique tools to increase salience, reframe an issue, and mobilise the public. They not only enjoy an initial alignment of preferences with consumers (Culpepper & Thelen, 2020), platforms also occupy an intermediary position in a concentrated network through which they can reach, access, and target many users at low costs.

I develop a causal mechanism of platform outside lobbying explicating how platforms increase salience and reframe policy debates in social and traditional media and mobilise the public to signal discontent to policymakers. I also deduct four potential scope conditions of the mechanism from the lobbying (the strength and diversity of the platform lobbying coalition and the strength of counterframes), communication (the existence of a unified public sphere), and electoral institutions literatures (the insulation of policymakers from public pressure).

To uncover how platform outside lobbying works and when it fails, I compare the EUCD to a successful case of platform outside lobbying. In 2011/12, the Stop Online Piracy Act and the Protect Intellectual Property Act (SOPA/PIPA) were discussed in the US Congress. Using similar tactics as against the EUCD, platforms successfully mobilised the public and derailed SOPA/PIPA. Studying SOPA/PIPA provides a template to bring the specificities of the EUCD to light. Methodologically, I utilise the complementary strengths of process-tracing and time-series analysis. While both generate within-case evidence, process-tracing adds analytical depth and time-series analysis incorporates many actors and

straightforward operationalizations of framing and salience. Next to qualitative evidence from newspapers, legislators' social media, and parliamentary records, I track issue salience and framing by applying an original dictionary to textual data collected from Twitter, newspapers of reference, and interest group websites.

I find that platforms enjoyed social media users' support even before they engaged in outside lobbying. Still, to be successful, platforms had to strategically expand the conflict by increasing salience and reframing reporting in newspapers. When strong counterframes delegitimised platforms or promoted opposing positions, platforms were unable to signal electoral costs to policymakers. In combination with the fragmented European public sphere this prevented successful platform outside lobbying on the EUCD.

The next section introduces the policy area of copyright in the digital world. I then describe the concepts of outside lobbying and platform power to develop a causal mechanism of platform outside lobbying and introduce four potential scope conditions. Section four describes my research design and the process of data collection. Before analysing the EUCD in depth, I briefly lay out SOPA/PIPA. Section five discusses the results and uncovers the scope conditions of platform outside lobbying. Finally, I conclude.

Copyright, Digitalization, and Interest Groups

By transforming an intangible idea into a tangible resource, copyright provides incentives for creativity and innovation. Traditionally, copyright was a technical and low saliency policy area dominated by rightsholders' interests (Haggart, 2014; Sell, 2003). This changed with the advent of digitalization.

The consumer internet, digital storage formats, and content platforms challenged existing legislation and entrenched interests. Digitalization decentralised the reproduction and distribution of content and thereby threatens rightsholders' business models (Haggart, 2014). To address these challenges and strike a balance between enabling new technologies and protecting old business models, the World Intellectual Property Organization passed the Internet Treaties in 1996. The treaties established technical measures to prevent unlawful copying, safe harbours to limit the liability of online intermediaries for copyright infringements by users, and notice-and-take-down mechanisms (Cartwright, 2018).

However, in the late 2000s peer-to-peer filesharing, content platforms like Napster or Megaupload, and marketplaces for counterfeits posed the next challenge for copyright. Both, the EU and the US responded by proposing bills that would increase intermediary liability. Although initially these bills enjoyed almost unanimous support and public interest was low, an intense lobbying battle ensued soon after their introduction.

Rightsholders and *creatives,* such as the music industry, sports leagues, Hollywood (particularly in the US (Sell, 2013)) and press publishers (mainly in the EU (Corporate Europe Observatory, 2018)) lobbied

for stricter copyright and enhanced intermediary liability. To protect their centralised distribution and reproduction channels, rightsholders mobilised vast resources for inside lobbying in the EU and US (figure 1). Creators, while not spending much, enjoy access to the European Parliament and the Commission.

Platforms and a *civil society coalition* were on the other side of the battle. Particularly content platforms, who offer users free access to (user-generated) videos and music, websites, news, or pictures in exchange for behavioural data and targeted ads (Srnicek, 2017) challenge centralised distribution channels and have a vested interest against increased intermediary liability (deBeer, 2009, p. 8). Digitalization also created and empowered a *civil society coalition* consisting of open-source activists, internet users, public libraries, and digital rights groups such as the Electronic Frontier Foundation, Fight for the Future, and European Digital Rights (Dobusch & Quack, 2013; Sell, 2013). While civil society actors employ many lobbyists and enjoy good access to the EP but have negligible lobbying expenditure, platforms are the third biggest spender but lack access and lobbyists in the EU (figure 1).

Overall, the inside lobbying data suggests similarities between the EU and US. If anything, the US pro-copyright coalition was stronger. An exclusive focus on inside lobbying cannot explain why SOPA/PIPA failed and the EUCD passed.

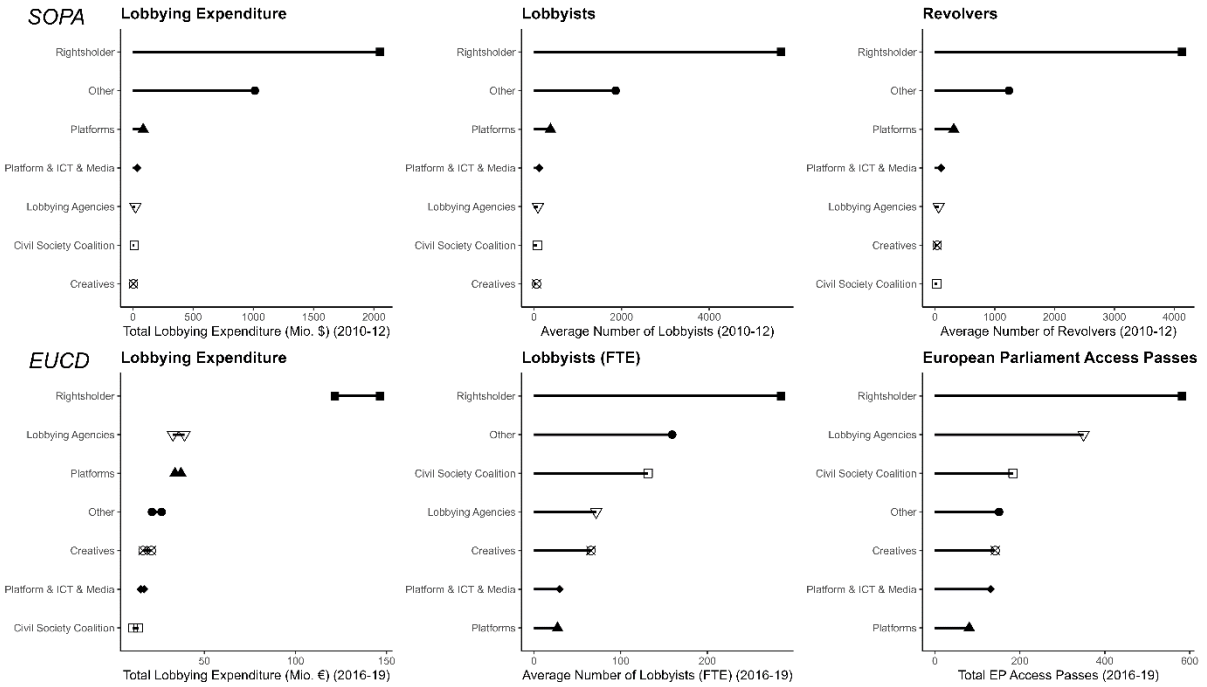

Figure 1. Inside Lobbying by Interest Group Type.

Source: Own compilation based on data from Lobbyfacts.eu and opensecrets.org

Note that the lobbying data does not exclusively refers to COICA/SOPA/PIPA or the EUCD but encompasses all lobbying activity by an interest group active on these bills in a given year.

Outside Lobbying and the Platform Business Model

Outside lobbying are 'attempts by interest group leaders to mobilise citizens outside the policymaking community to contact or pressure public officials inside the policymaking community' (Kollman, 1998, p. 3). Building on the assumption that public opinion on most issues is latent and only manifests itself when activated by policy advocates and elites, outside lobbying has two functions.

First, interest groups engage in *conflict expansion* on an issue to raise awareness (salience), change evaluations (framing), and lower the costs of collective action (mobilisation) (Kollman, 1998, Ch. 5). Framing describes the selection of 'some aspects of a perceived reality and mak[ing] them more salient in a communicating text […] to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation' (Entman, 1993, p. 52). Interest groups use framing to highlight one dimension of a multidimensional policy issue and influence public or elite opinion (e.g. De Bruycker, 2017). Looking at the frames in public communications of the pro- and anti-copyright coalitions on Twitter and their websites, rightsholders and creatives highlighted issues like theft, piracy, counterfeiting, fairness, press freedom, and creator rights. In contrast, platforms and civil society groups focused on censorship, internet freedom and freedom of speech, privacy, cybersecurity, and the EUCD's infamous article 13 that regulates content filtering requirements (figure 2).

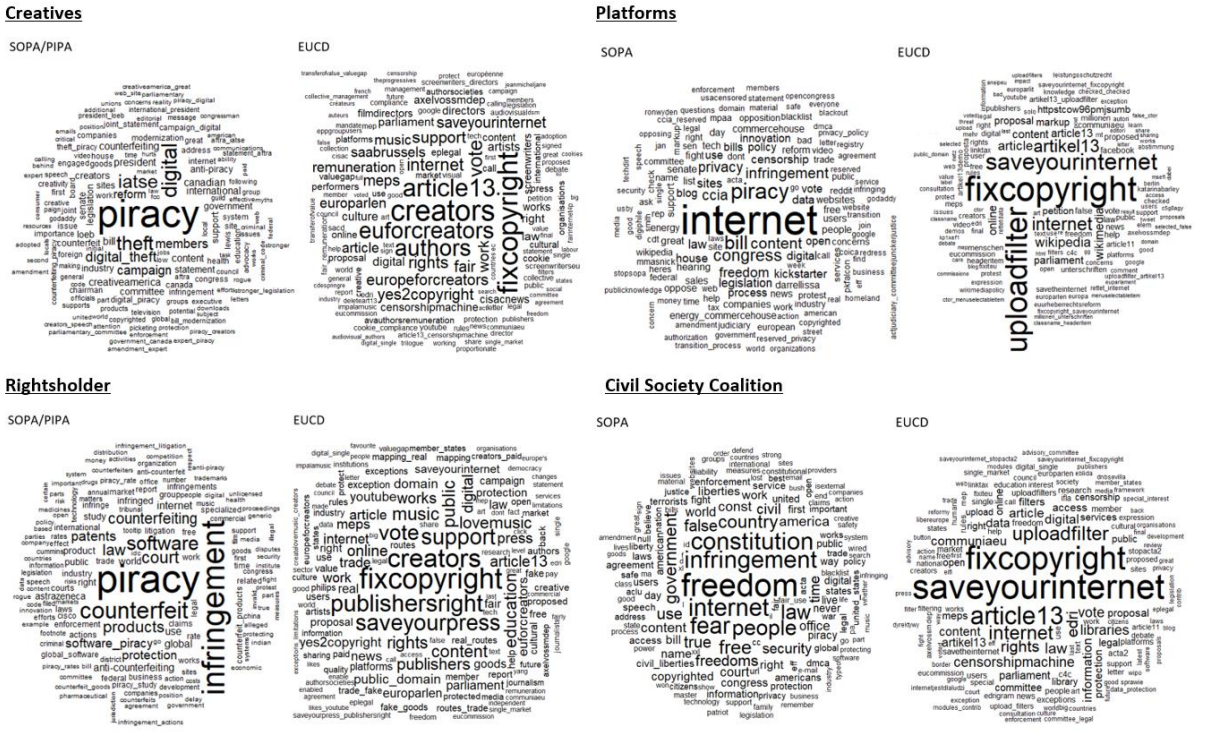

Figure 2. Wordclouds of Interest Groups' Websites and Tweets by Interest Group Type.

Note: Stopwords excluded.

Framing alone, however, does not influence policy. Interest groups need to change the collective definition of an issue which depends on the institutions targeted, the history of the policy area, the danger of being seen as manipulative, and agreement on the same frame within a coalition (Baumgartner & Mahoney, 2008; Binderkrantz, 2020b, 2020a). The effect of framing on public opinion also depends on the strength of counterframes and timing (Chong & Druckman, 2010). While successful framing expands the group of (latent) supporters, interest groups also need to mobilise their supporters by increasing issue salience, providing contact details to legislators, facilitating logistics, or organizing events (Kollman, 1998, pp. 103–104).

Second, interest groups aim to *signal* public opinion and electoral consequences to policymakers. Signal strength is crucial for outside lobbying success (Kollman, 1998, Ch. 3). Kollman (1998) argues that interest groups already supported by public opinion can send more credible signals to policymakers because they face smaller mobilisation costs. While in the absence of outside lobbying campaigns the relationship between public support and lobbying success is negative in the EU (De Bruycker & Beyers, 2019), outside lobbying is indeed more likely (Junk, 2016) and more successful (De Bruycker & Beyers, 2019) when public support is high.

Given that business tends to lobby against public opinion and is more successful when salience is low (Culpepper, 2010; Dür & Mateo, 2023), it is unsurprising that outside lobbying is more frequently used by labour unions and citizen groups (Dür & Mateo, 2013; Kollman, 1998, p. 41). Dür and Mateo (2013, pp. 663–664) argue that citizen groups need to signal their engagement to a diffuse group of supporters to ensure organizational survival, whereas business organizations represent 'a clearly defined constituency for which political decisions have concentrated costs and benefits'. Further, business can typically afford resource intensive inside lobbying and possess specialised information that they can trade information for access (Bouwen, 2004; Dür & Mateo, 2013). In contrast, citizen groups, while poorer, have access to committed volunteers making outside lobbying their go to strategy (Binderkrantz et al., 2015).

To sum up, outside lobbying success depends on (1) initial public opinion and an interest groups' ability to (2) increase issue salience, (3) (re)frame an issue, and (4) mobilise supporters. Although non-business groups use outside lobbying more frequently I argue in the next subsection that this depends on the business model and platform firms are an exception to the rule.

Platform Outside Lobbying

Scholars of business power increasingly study how digitalization, particularly the platform business model, shapes the power resources and influence strategies of firms (Culpepper & Thelen, 2020; Kemmerling & Trampusch, 2022). Platforms are 'digital infrastructures that enable two or more groups to interact' (Srnicek, 2017, p. 43). On content and marketplace platforms, these groups are consumers and suppliers such as content creators or third-party sellers. Consumers (Culpepper & Thelen, 2020)

and suppliers (Cutolo & Kenney, 2021) are dependent on the platform because of its infrastructural character and high degrees of market concentration resulting from network effects (Rahman, 2018). This dependence, in combination with a perceived consumer liberation, creates a permissive consensus and platforms 'largely automatic[ally]' enjoy the support of the public because they are 'integrated into the fabric of [consumers'] daily lives' (Culpepper & Thelen, 2020, pp. 290 & 293). This argument easily can be extended to suppliers as dependencies are even higher (Kenney et al., 2021).

While the permissive consensus might keep issues off the agenda, platforms do not automatically win all lobbying battles. Especially considering the recent 'techlash' – a backlash of public opinion against big tech amid scandals on data privacy, tax avoidance, and hate speech – this permissive consensus might be weakened (cf. Kalyanpur & Newman, 2019). The business power literature treats public opinion largely as exogenous. Salience and framing are either attributed to scandals (Culpepper, 2010), issue characteristics (Culpepper & Thelen, 2020), or institutional context (Thelen, 2018). Business, however, can actively influence public opinion to influence policy (Keller, 2018). I argue that platforms are in a unique position to do so.

Platforms have three advantages for outside lobbying built-in their business model. Through their intermediary position they can *reach* network users easily by posting messages on their apps or websites, while other interest groups have to maintain lists of supporters. Because of the winner-takes-all logic of platforms their reach exceeds that of even the biggest conventional interest groups both in numbers and in diversity. Platforms also have *free and frequent access* to users because they are embedded in users' daily routines. User approach the platform, while conventional interest groups have to approach supporters to expand conflict. Third, because platforms are 'an extractive apparatus for data' (Srnicek, 2017, p. 48) and do surveil all network interactions, messages can easily be *targeted* to users.

This combination of reach, access, and targeting provides platforms with a built-in solution to successfully make people aware of an issue (salience), frame it, and provide users with a course of action (mobilisation). Platforms used this power against copyright legislation by posting censorship banners on their websites or blacking them out entirely, displaying a text on how legitimate content would be censored and the internet as we know it would be destroyed, and asking users to contact legislators or attend protest events. In short, platforms strategically used outside lobbying to prevent unwanted legislation.

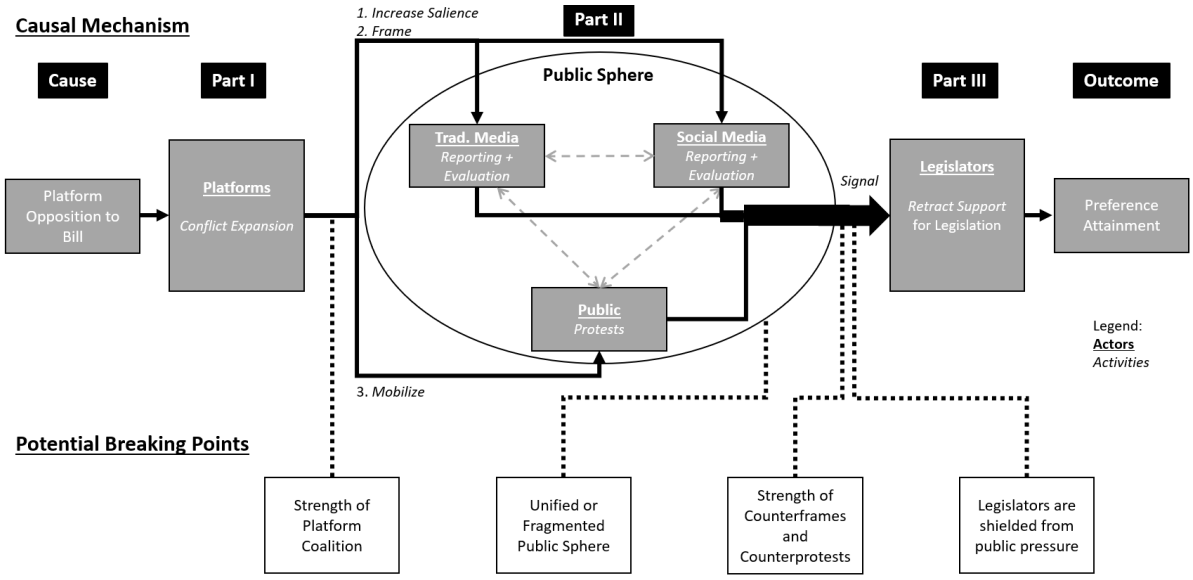

Figure 3. Summary of the Causal Mechanism and Potential Breaking Points.

Figure 3 displays the causal mechanism of platform outside lobbying. The central *causal variable* is platform opposition to legislation. To prevent legislation, platforms engage in conflict expansion (part I), i.e. influence the debate in the public sphere (black oval) by (1) increasing issue salience, (2) transmitting a favourable frame, and (3) mobilizing the public. As a result, traditional and social media increase their reporting and/or change issue evaluations. Additionally, the public is mobilised and joins protest actions such as demonstrations, online petitions, or letters/emails to their representatives (part II). While actions by the traditional media, social media, and the public reinforce each other (grey dashed arrows), the debate in the public sphere signals electoral consequences to legislators. The signal is stronger the more unified the debate. Legislators respond by retracting their support (part III) and platforms attain their preferences (outcome).

Potential Scope Conditions

Figure 3 also depicts four potential scope conditions of the mechanism (white boxes). First, platforms fail to engage in a strong and diverse anti-regulation coalition. Big and united coalitions tend to improve lobbying success (Nelson & Yackee, 2012), especially for weaker or less resourceful actors (Junk, 2020; Phinney, 2017). Further, diverse coalitions signal broad societal support to policymakers and are more successful (Phinney, 2017), especially under conditions of high salience (Junk, 2019). De Bruycker and Beyers (2019) find that outside lobbying success increases with coalition size and heterogeneity (see also Seidl, 2020 for a study on platforms). Since the strength, diverseness, and unity of a coalition depends on shared preferences, platform power is probably more successful in challenging legislation that affects a broad range of platforms.

Second, outside lobbying success depends on whether a coalition can change collective issue definition. Framing is a competitive process and one side is always in contestation with other side(s)

(e.g. Baumgartner & Mahoney, 2008). Thus, using similar frames is important for outside lobbying success (Junk & Rasmussen, 2019), while strong counterframes pushed by opposing sides hinder success (Chong & Druckman, 2010). The strength of counterframes affects whether platforms can create an unambiguous and strong signal to policymakers.

The third potential breaking point is policymakers' insulation from public pressure. Their responsiveness varies with policy arena (Culpepper, 2010) and the electoral system. Policymakers are more responsive to broad societal interests in majoritarian systems and to special interests in proportional systems (Rogowski & Kayser, 2002). Moreover, the literature on the EU's democratic deficit suggests that European policymakers are more insulated from public pressure than their US counterparts because of the second-order character of European elections, the lack of a European party system, the indirect appointment of the Commission and the Council, and the longer legislative process (for an overview: Follesdal & Hix, 2006, pp. 534–537).

The final potential breaking point concerns the existence of a common public sphere. Media and journalism are central in delimiting the public sphere (McQuail, 2013) and analysing (social) media is commonly used to analyse its existence. Despite strong federalism, mass media in the US is largely located at the national level. In contrast, the existence of a European public sphere is more controversial. Pan-European media is rare (Sinardet & Bursens, 2014, p. 253) and EU topics are rarely covered in the national media (Machill et al., 2006). If national media reports on EU topics, some studies find signs of Europeanization (Downey & Koenig, 2006; Van De Steeg, 2006) but others show that national interpretations prevail (Mancini & Mazzoni, 2015). Despite initial optimism for an European digital public sphere, most studies find nationalised discussions also on social media (Rivas-de-Roca & García-Gordillo, 2022). Therefore, the existence of a European public sphere is still contested in academic discussions (Rivas-de-Roca & García-Gordillo, 2022) and platforms or other interest groups likely have to create a topic-specific European public sphere or successfully outside lobby in a majority of EU member states.

Research Design

This paper combines process-tracing and time-series analysis based on textual data to investigate platforms' outside lobbying and its scope conditions.

Combining Process-Tracing and Time-Series Methods

Process-tracing aims to open the black-box of causality by identifying causal mechanisms (Trampusch & Palier, 2016). Mechanisms identify the entities and activities that transmit causal forces between a cause and an outcome (Beach & Pedersen, 2013). Inferences in process-tracing are based on context-specific within-case observations that are evaluated against theoretical priors derived from the mechanism. Quantitative evidence that relies on cross-case inferences, estimates effect sizes rather than processes, and assumes comparability of evidence across contexts cannot identify mechanisms

(Beach & Pedersen, 2013 Ch.5 & Ch. 6). However, I argue that time-series analysis is ontologically compatible with process-tracing because it analyses within-case observations and its central causal assumption is that of temporal precedence. Time-series analysis can therefore produce evidence for/against the sequence proposed in a mechanism (cf. Beach & Pedersen, 2013, p. 99).

Combining process-tracing with time-series analysis is beneficial in two ways. First, by explicitly theorizing the causal mechanism and collecting qualitative evidence, process-tracing adds depth to time-series analysis and contextualises findings of temporal precedence. Second, quantitative analysis is beneficial in situations where too many entities are engaged in a process for an encompassing qualitative analysis (e.g. interest group lobbying) and steps of the mechanism are easier to measure quantitatively (e.g. framing and salience).

To discover scope conditions, Beach and Pedersen (2018) suggest comparing a deviant and a typical case. In a typical case the mechanism works as theorised whereas in a deviant case the mechanism breaks down at some point. A structured comparison between these cases reveals the breaking point from which scope conditions can be derived (Beach & Pedersen, 2018). While my main interest is on the EUCD, a short analysis of SOPA/PIPA is necessary to sharpen my theoretical and empirical contributions.

Data Collection and Dictionary Construction

To quantitatively trace the process, I collected data from Twitter, national newspapers of reference, the EU and US transparency registers, and interest group websites. I collected 1,530,893 tweets and 340 newspaper articles on SOPA/PIPA and 3,000,000 tweets and 1010 newspaper articles from 11 EU countries on the EUCD via the Twitter Academic API, Nexis Uni and Factiva.[21] While both, newspaper publishers and Twitter as an online platform, have a vested interest in copyright policy, studying data from both sources leverages against potential biases in the data. For a list of newspapers and search queries see appendix A1-A2.

Secondly, I collected data on the interest groups active on copyright by scraping the EU and US transparency registers through lobbyfacts.eu and opensecrets.org. I also included interest groups that submitted a non-anonymous answer to the public consultation on the review of the EU copyright rules of 2014. I scraped data on their inside lobbying activities, their website entries referring to the reforms, and their twitter handles (see appendix A3 for a detailed description of data gathering).

Finally, I manually coded the interest groups' type as either *rightsholder* (companies and business associations from media, publishing, telecom, manufacturing, and the chemical sector); *creatives*; *platforms* and their business associations; the *civil society coalition*; *lobbying agencies*; *other* (political

[21] Newspapers from other EU countries are not included in NexisUni or Factiva.

action committees, police associations, and regional/state groups); and a category including firms that are platforms and substantial rightsholders (*Platform & ICT & Media*, e.g. Microsoft, Netflix).

Using interest groups testimonies in parliamentary hearings, their public communications on blogs and websites, and platforms' online protests I constructed an original dictionary. The dictionary aims to identify the frames used in the debate. Based on a list of words associated with each frame, the dictionary identifies frames in each tweet, each paragraph of the newspaper articles, and each paragraph of interest group website entries. I analyse paragraphs rather than full articles or websites because of their greater topical and evaluative coherency. Each text is classified into either including the frame (1) or not (0) and multiple frames can be used within the same text.

A dictionary method is preferable to unsupervised methods of quantitative text analysis as the goal is to trace the prevalence of known frames rather than detecting unknown frames (Grimmer & Stewart, 2013). The full dictionary is available in the reproduction data and table 1 shows all frames, how they depict the legislation, and example key words.

Table 1. Frames used in the Debate on SOPA/PIPA and EUCD.

Frames	**Example Key Words**
Anti-Copyright	
Censorship & Uploadfilter	First Amendment, Freedom of Expression, Speech, Collateral Damage
Break the Internet	Break the Internet, Kill Memes, Link Tax
User Rights & Cybersecurity	Privacy, Hack, Netizen, Redditor, Surveil
Neutral/Mixed	
Economy & Innovation	Job, Growth, Investment, GDP, Start-up, Innovate
Lobbying	Influence, Corruption, Hollywood, Donation
Misinformation	Fake News, Lies, Disinformation
Democracy & Diversity	Participation, Authoritarian, Activist, Independent Press, Pluralism
Reach	Reach Audience, Traffic Loss
Pro-Copyright	
Fair Pay & Creator Rights	Fair pay, Rip-Off, Talent Pipeline, Right to Create
Criminality & Public Safety	Theft, Criminal, Terrorism, Protect Children, Consumer Safety
Bad Platforms & Market Power	Level Playing Field, Monopoly, Tax Avoidance
Astroturfing	Bots, Flood Inboxes

To analyse debates on the EUCD, the English dictionary was translated to Dutch, French, German, Italian, Polish, Portuguese, and Spanish using Google translate. While purpose-specific dictionaries perform well (Grimmer & Stewart, 2013, p. 274) and the automatic translation dictionaries generally

yields good results (Proksch et al., 2019), validation is paramount (Grimmer & Stewart, 2013, p. 275). To validate the English dictionary, a student assistant hand-coded a random sample of 500 tweets and 500 newspaper paragraphs for both cases. The German dictionary was validated in the same way to assess the performance of Google translate. Intercoder agreement (Fleiss' Kappa) ranges between 0.67 (German: 0.5) and 1.0 (German: 1.0) with less frequent frames having lower values. Figure A1-A4 display additional validity measures.

Before applying the dictionary, I converted the text to lower case and removed punctuation, stopwords, and double spaces. To detect multi-word phrases, I included n_grams up to tetragrams.

Time-Series Analysis

To analyse how outside lobbying affected salience and framing, I run time-series regressions. For the EUCD, I run analyses for each language and for the full sample. First, I analyse the quantity of newspaper articles (weekly) and tweets (daily) as dependent variables. The different time intervals reflect more instant reactions on social media and allows by-language analyses also when overall newspaper coverage is small. Both variables are proxies for issue salience and represent discrete counts. Effects can theoretically be negative and data is over-dispersed (mean ≠ variance). Thus, log-linear negative binomial models are appropriate. The time-series start with the first proposal of a bill (SOPA/PIPA: September 2010; EUCD: September 2016). To estimate the effect of platform outside lobbying and control for parliamentary events, i.e. the introduction of PIPA and SOPA, parliamentary hearings and debates, and the proceeding of a bill to the next stage, I created an intervention covariate (Fokianos & Fried, 2010). As the central independent variable, I coded platforms' protest actions such as website blackouts, display of censorship banners, or a coordinated ad campaign on YouTube (see below). I coded the time-period when the event occurred as one and let the effect depreciate by a factor of 0.5 for the following time-periods to model medium-term effects (Fokianos & Fried, 2010).[22] Second, I analyse the effect of platforms' protest actions on framing by running vectorautoregressions (VAR). My endogenous variables are the summed relative frequencies of pro-copyright frames minus the summed relative frequencies of anti-copyright frames on daily intervals. More negative scores indicate a more negative framing. I include five endogenous variables in the models to capture the relative framing in (1) all tweets, (2) newspapers, (3) tweets of legislators, (4) website entries and tweets of pro-copyright interest groups (i.e. rightsholders and creatives), and (5) website entries and tweets of anti-copyright interest groups (i.e. platforms and the civil society coalition). The latter encompass traditional forms of outside lobbying such as press releases, reports on (upcoming) events, or media campaigns. For the EUCD all variables are computed separately by language except for interest group communications. For these I took the full sample, because of insufficient data in most languages and to model the pan-European character of most interest groups websites. The VAR

[22] For the ad campaign I chose a depreciation factor of 0.85, because it was sustained over a longer period.

regressions also include a dummy variable controlling for weekends. As exogenous variables I included the intervention covariates described above. All time-series were tested negatively for a unit root.
In all models, I specified the lag structure to eliminate serial correlation and used heteroscedasticity-robust standard-errors where augmented Dickey-Fuller tests indicated heteroscedasticity. Unless otherwise noted $p<0.05$ is considered significant. Full regression results can be found in tables A1-A14.

How did the Process Evolve?

Stop Online Piracy Act and Protect Intellectual Property Act

In September 2010 the US Senate's Combating Online Infringement and Counterfeits Act (COICA) proposed a new legal framework for copyright. In 2011, COICA was rewritten into PIPA and SOPA (Sell, 2013). These bills enjoyed bipartisan support and were backed by a powerful rightsholders lobby. However, representatives of content platforms and civil society organizations organised an outside lobbying campaign centred on two events: the American Censorship Day (ACD) on November 16, 2011 (Wortham, 2012) and the Internet Blackout on January 18, 2012 (Sopastrike, 2012). Platforms like Google, Amazon, Reddit, Craigslist, Wikipedia, Wordpress, Tumblr, Flickr, or Pinterest blacked out their logos or shut down their services, ran banners highlighting SOPA/PIPA's implications for freedom of speech, and urged users to contact Congresspeople.

Both events substantially boosted salience on Twitter and in Newspapers (Figures 4&5). After the Internet Blackout reporting significantly increased by 1673.6 percent in newspapers and 1161.5 percent on Twitter (figure 5). While the bills were framed negatively on twitter throughout the debate, framing in newspapers became more negative after the platform actions. Anti-copyright frames such as *censorship & uploadfilter* or *breaking the internet* became more frequent, the former even being the most prominent frame after the internet blackout (figure 4). Although the relative framing did not become significantly more anti-copyright after the ACD, the Internet Blackout did have this effect (figure 6). Thus, platform outside lobbying was successful to increase the salience and reshape the debate in the public sphere.

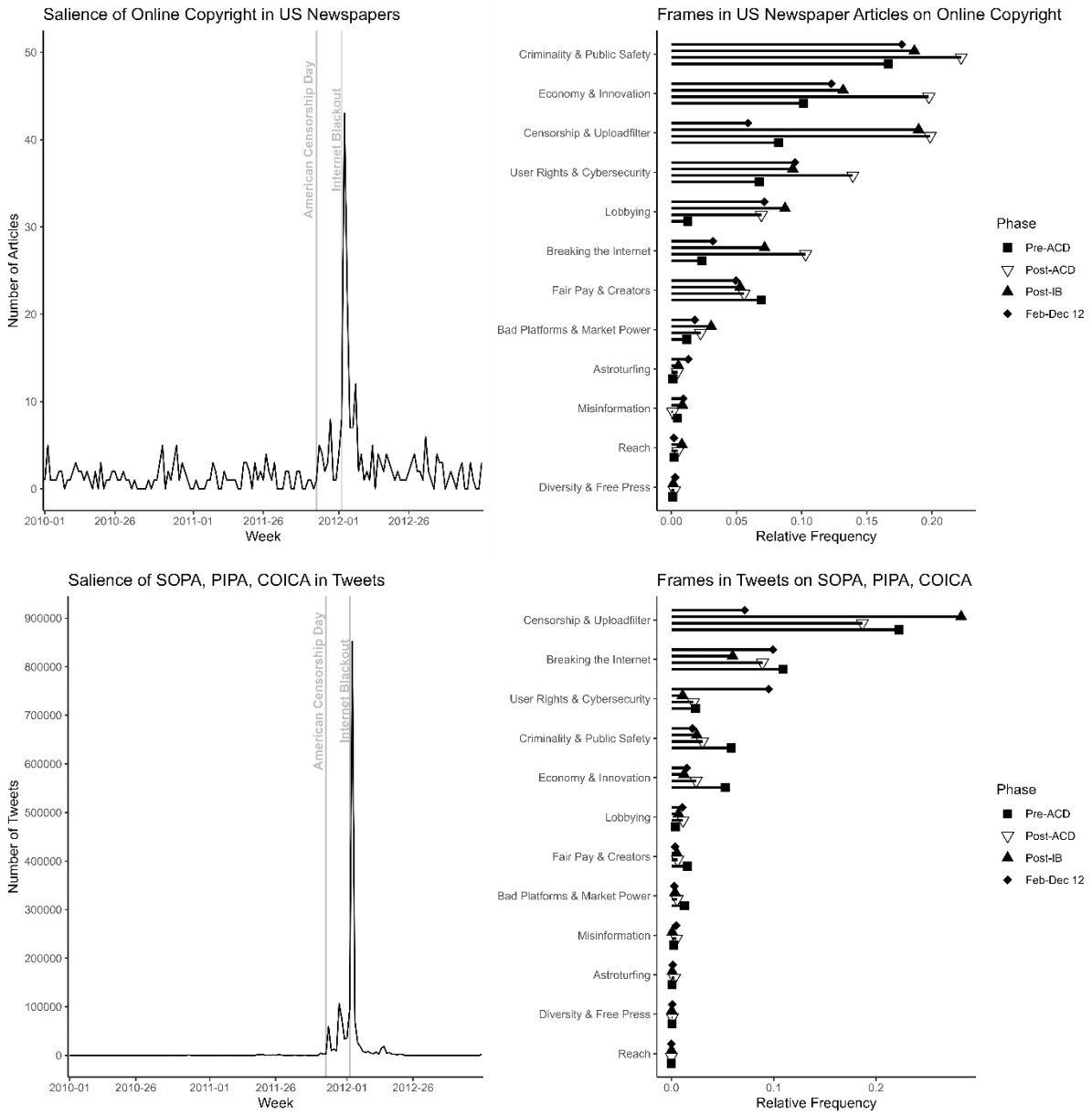

Figure 4. Salience and Framing in Newspaper Articles and Tweets on SOPA/PIPA.

As documented by ProPublica (2012) policymakers also changed their positions in response to the ACD and Internet Blackout. In total, 102 Republicans, 69 Democrats and one independent issued public statements against SOPA/PIPA and six Senators and four Representatives withdrew their co-sponsorships after the Internet Blackout (ProPublica, 2012), referring to 'an outpouring of democracy' against SOPA/PIPA (Gillibrand, 2012) or stating that they 'have increasingly heard from a large number of constituents […] about possible unintended consequences' (Grassley et al., 2012). Also, congresspeople significantly used more anti-copyright frames in their tweets after the IB (figure 6).

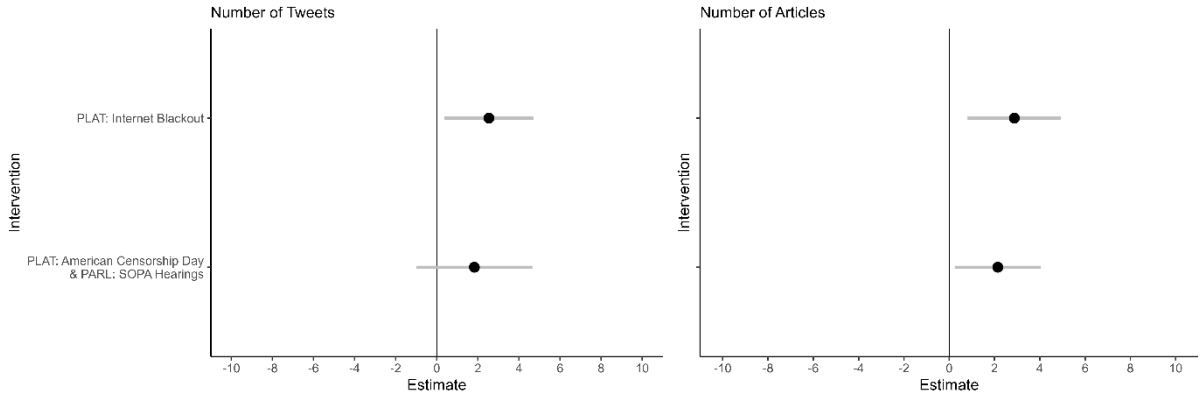

Figure 5. Results of Log-Linear Negative-Binomial Regression on Salience (SOPA/PIPA).

Note: The estimates in the figure are logs and must be transformed by taking the exponent to interpret them as counts.

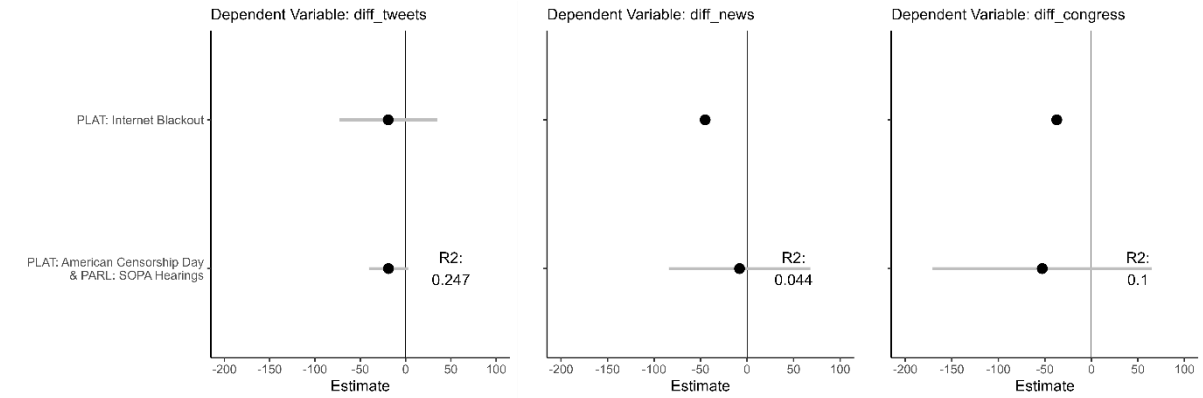

Figure 6. Results of VAR Intervention Analysis on Relative Framing of SOPA/PIPA.

European Union Copyright Directive

The European Commission started its review of copyright legislation in 2012 and drafted a proposal in 2016 after several stakeholder consultations. Until 2018 the legislative process did not raise much public opposition (see figures 7 & 8), although it was shaped by a heated lobbying battle between rightsholders and tech companies (Corporate Europe Observatory, 2018).

Part 1

This changed in June 2018, when the Judiciary Committee of the European Parliament moved the bill to the plenary. Platforms and the civil society coalition started an outside lobbying campaign. Google urged press publishers to contact MEPs and express opposition, YouTube creators began criticizing the directive in their videos, tech pioneers wrote an open letter to the EU, and the digital rights group SaveTheInternet started an online petition which would eventually reach over 5 million signatures (Change.org, 2018; Garrahan & Khan, 2018; Lauchlan, 2018; LeFloid, 2018). On July 4 and 5 the English, Portuguese, Spanish, Italian, Polish, Latvian, and Estonian Wikipedia pages blacked out and/or displayed protests banners against the directive (Wikimedia, 2022). Amid these online protests, the parliament sent the bill back for amendments. However, on September 12, 2018, it adopted the draft and initiated trilogue negotiations to mitigate disagreements between the Council, the Commission, and the Parliament. In October, YouTube CEO Susan Wojcicki urged YouTubers to cover the reform and use #saveyourinternet leading to a spike in videos on the EUCD (D'Onfro, 2018). Twitch made a similar move in December (Twitch, 2018). In November, YouTube displayed ads before videos informing users about the EUCD (Alexander, 2018). Finally, on March 21, 2019, five days before the final vote in the EP, many medium-sized platforms, among them Twitch, Reddit, and PornHub, ran protest banners on their websites (March blackouts) (Vincent, 2019). During these protest events, platforms urged users to contact MEPs and express opposition to the EUCD. In addition, demonstrations took place in 20 countries after the March blackouts (Al-Youssef, 2019). In Germany up to 100,000 people participated and demonstrations were substantial in Austria, Switzerland, Poland, and Sweden (dw.com, 2019). Platforms, thus, engaged in different forms of outside lobbying to expand the conflict around the EUCD.

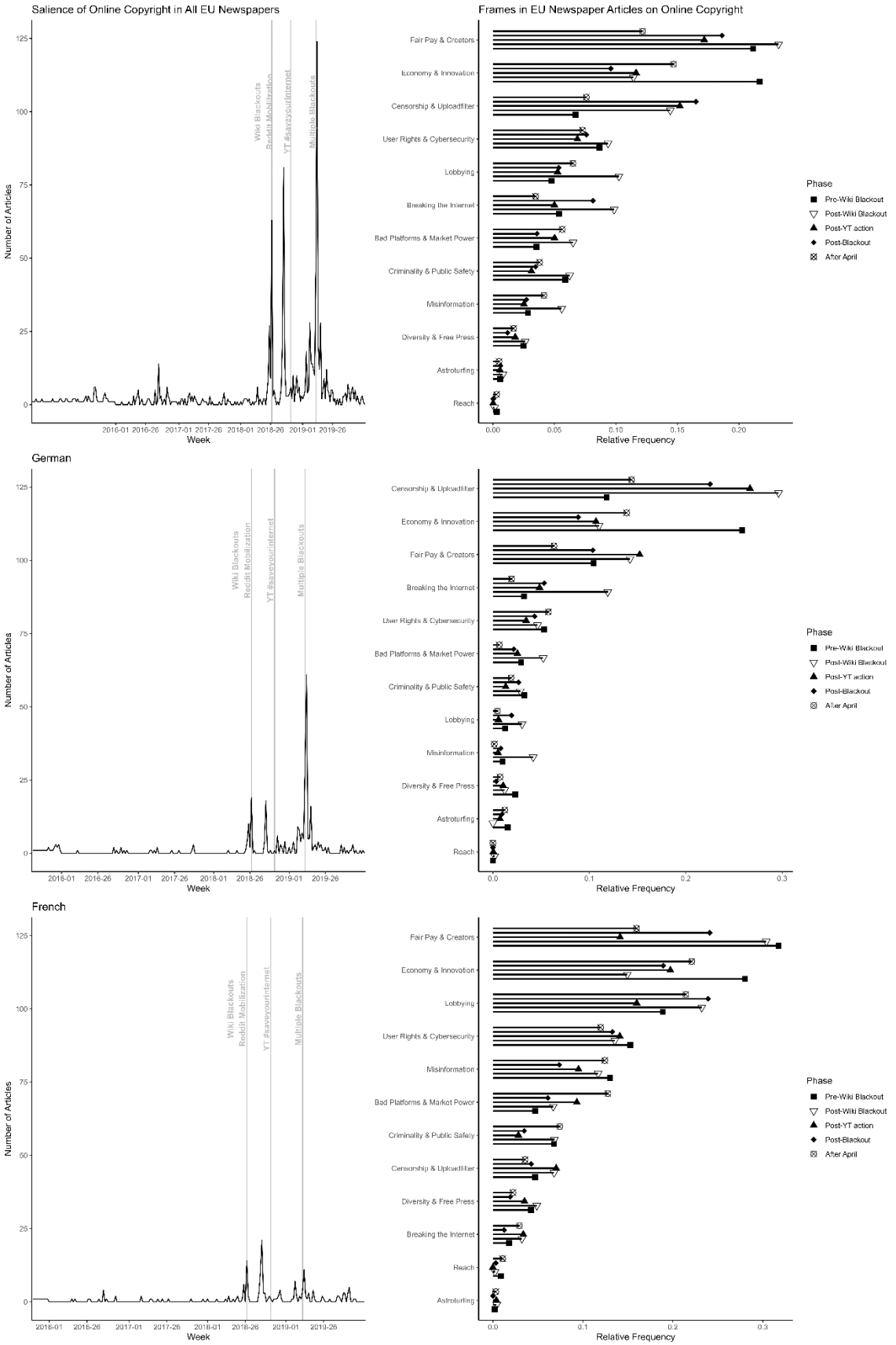

Figure 7. Salience and Framing in Newspaper Articles on EUCD.

Note: Figure A6 depicts salience and framing in English, Polish, Italian, Spanish, Dutch, and Portuguese Newspapers.

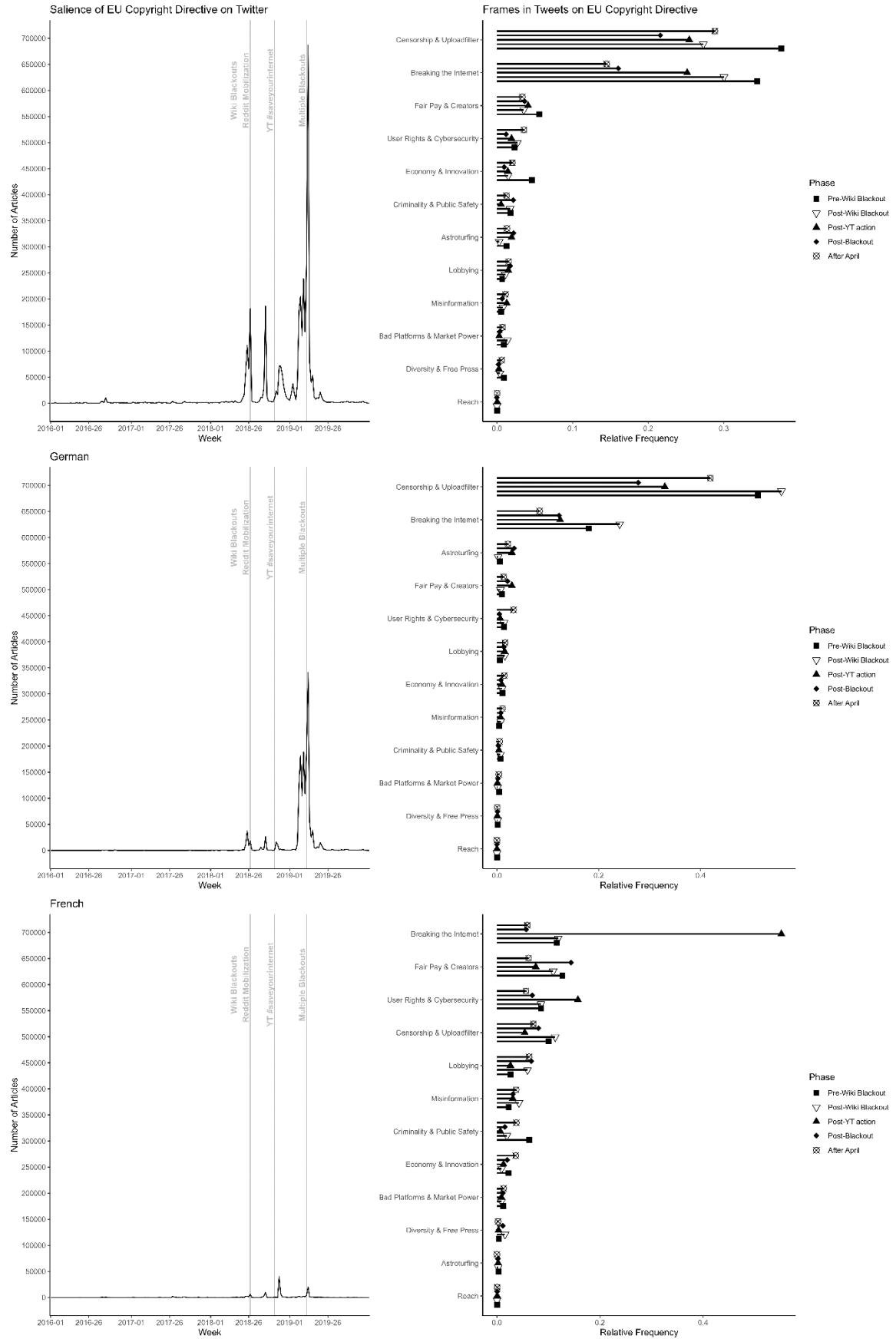

Figure 8. Salience and Framing in Tweets on EUCD.

Note: Figure A7 depicts salience and framing in English, Polish, Italian, Spanish, Dutch, and Portuguese Tweets.

Part 2

Figures 7 & 8 show descriptive results on how successful conflict expansion was in newspapers and tweets across the full, multi-language sample, and in German, and in French. French and German illustrate the great diversity of the debate across EU languages as they are at different ends of the spectrum. The other languages are displayed in figures A6 & A7.

In the full sample, issue salience increased substantially in anticipation and during both the Wikipedia blackouts and the March blackouts. While salience was consistently higher during YouTube's ad campaign than before the Wikipedia blackouts, the EP's adoption of the draft in September 2018 led salience to spike again. The regression results also show a significant increase of tweets after the Wikipedia (491.1 percent) and March blackouts (205.3 percent) and in newspapers after the March blackouts (956.3 percent) (figure 9).

The framing of the debate in the full sample differs between newspapers and Twitter. In newspapers, *fair pay & creator rights* dominated and was used in between 15 and 25 percent of articles throughout the debate (figure 7). While the frequency of *censorship & uploadfilter* and *breaking the internet* increased after the blackouts to 15-17.5 and 7.5-10 percent, the *user rights & cybersecurity*, was relatively strong before the blackouts but it's relative frequency never exceeded ten percent. Finally, the Wikipedia blackout shortly elevated the relative frequency of *lobbying* and *misinformation* (mixed) and *bad platforms & market power* (pro) indicating that allegations of using misinformation to mobilise users against the reform increased in importance (see also below). The regression results find no significant effect of platform actions on the relative frequency of frames in newspapers and on twitter (figure 10).

Turning to the by-language samples, there are substantial differences in salience. Reporting on the EUCD was quite salient in German, Polish, French, English, and Italian but not in Portuguese, Spanish, and Dutch newspapers. On Twitter, the majority of tweets on the EUCD is German or English. Polish, French, Italian, and Spanish tweets were also frequent, but Dutch and Portuguese were not. Platform actions had no significant effect on salience in newspapers in the by-language samples but the Wikipedia blackout increased the number of tweets in English (392.1 percent), Italian (5413.6 percent), and Spanish (5253.3 percent) and the March blackouts increased salience on English Twitter by 302.9 percent (figure 9).

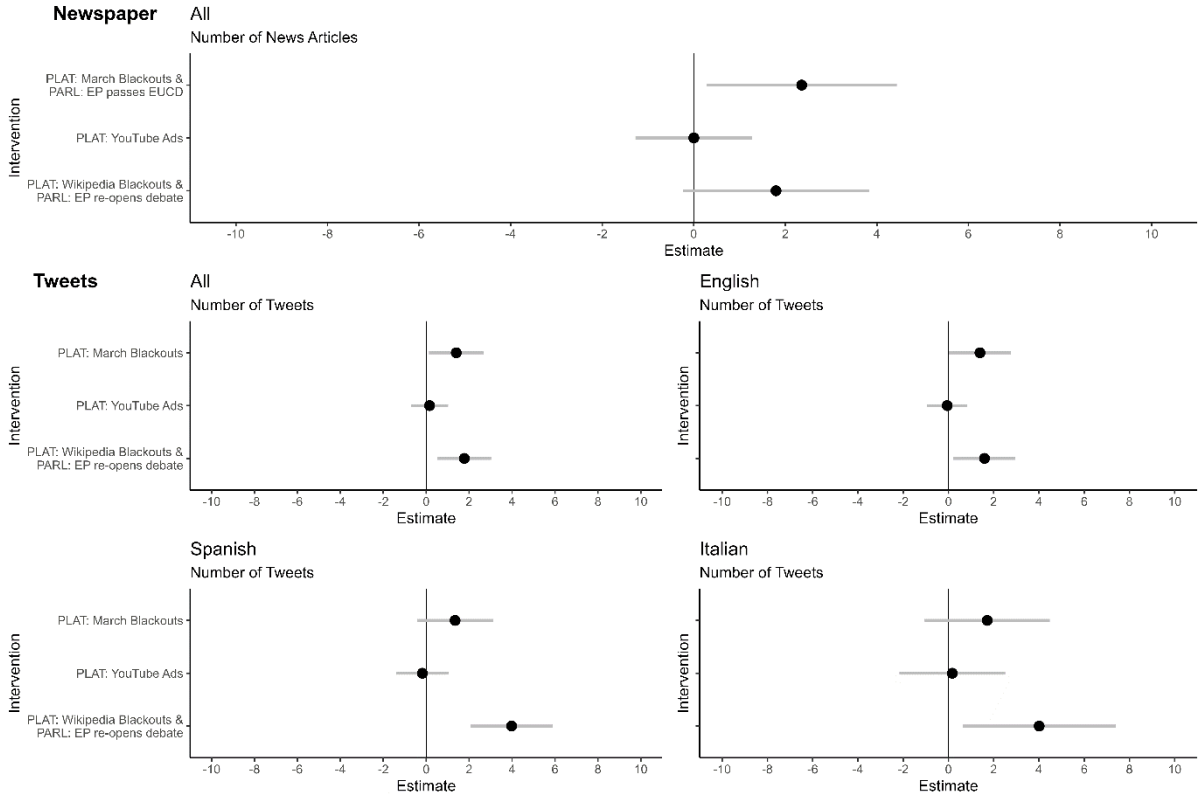

Figure 9. Results of Log-Linear Negative-Binomial Regression on Salience of EUCD.

Note: Only languages where at least one platform intervention was significant are displayed. Full results in appendix.

In addition to salience, framing in newspaper articles also differed substantially across languages. In the first group of languages pro-copyright frames dominated during most of the debate. In French, *fair pay & creators* and *lobbying* were prominent throughout and notably also after the Wikipedia and March blackouts (figure 7). Interestingly, the Wikipedia blackouts even significantly shifted the framing in French newspapers to become more pro-copyright (figure 10). While *user rights & cybersecurity* were also frequent, *misinformation*, *bad platforms & market power*, and *criminality & public safety* were all more prominent than *censorship & uploadfilter* and *break the internet* (figure 7). In Italian newspapers, the picture is similar except for a more prominent role of *economy & innovation* (mixed). Interestingly, in Portuguese *censorship & uploadfilter* was initially far more prominent than anti-copyright frames. After the platform actions, however, the debate shifted and was dominated by *fair pay & creator* rights.

Second, the framing in Dutch and German newspapers tends to be anti-copyright. In German newspapers, *censorship & uploadfilter* is the most frequent frame for most of the debate and *breaking the internet* is prominent after the Wikipedia blackouts (figure 7). Further, the March blackouts significantly increased the relative frequency of anti-copyright frames (figure 10). *Fair pay & creator rights* is consistently around half as frequent as *censorship & uploadfilter* (figure 7). In Dutch, anti-copyright frames are strong as is *fair pay & creator rights*. After the March blackouts, however,

censorship & uploadfilter dominates (figure 7). Also, the *lobbying* frame substantially increased in frequency.

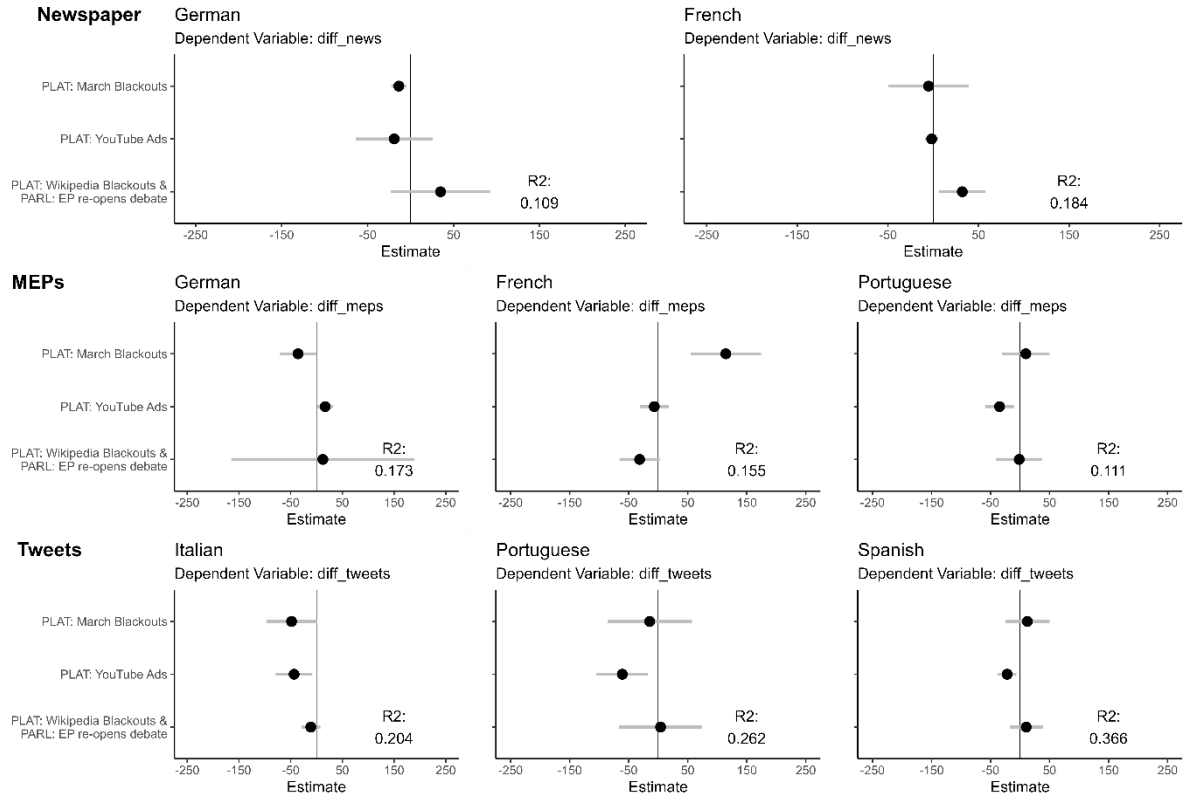

Figure 10. Results of VAR Intervention Analysis on Relative Framing of EUCD.

Note: Only languages where at least one platform intervention was significant are displayed. Full results in appendix.

Third, in Spanish, Polish, and English newspapers framing is mixed. While *fair pay & creator rights* is strongest in all three languages, in Polish and Spanish its dominance is challenged by the combined frequencies of anti-copyright frames. In English the most prominent anti-copyright frame is *censorship & uploadfilter*. Interestingly, in English both *bad platforms & market power* (pro) and *breaking the internet* (anti) increased after the blackouts (figure 7).

On Twitter, framing in the full EUCD sample was decisively anti-copyright from the beginning, as *censorship & uploadfilter* and *breaking the internet* were dominant throughout the debate (figure 8). Despite being the third most frequent frame in the full sample, *fair pay & creator rights* was between 3.5 and 6 times less frequent. The other pro-copyright frames, *criminality & public safety* and *bad platforms & market power*, were unimportant. The relative frequency of most frames declined or remained stable over time. These patterns also hold across most by-language subsamples. However, in French, *lobbying* was the third and *fair pay & creator rights* the most frequent frame after the March blackouts, i.e. directly before the final vote on the EUCD (second: *censorship & uploadfilter*) (figure 8).

Also, framing on Twitter became significantly more anti-copyright after YouTube's ads in Italian, Portuguese, and Spanish (figure 10).

Part 3

Cross-language differences in the debates are largely reflected in the voting behaviour of MEPs on the EUCD on March 26, 2019. Three groups of countries can be distinguished. First, countries where strong support for the directive transcends party lines. More than 80 percent of French MEPs voted in favour and significantly tweeted more pro-copyright after the March blackouts (figure 10). Belgian, Spanish, and Portuguese MEPs also largely voted in favour of the EUCD (figure 11) although YouTube's ads significantly promoted anti-copyright frames in Portuguese MEPs' tweets (figure 10). Secondly, in Italy and the UK the EUCD was contested along partisan lines. While both Labour and the Tories voted in support, smaller UK parties voted against the directive. In Italy, the Movimento 5 Stelle and the Lega Nord voted against the reform. Third, MEPs from Poland, the Netherlands, Austria, and Germany largely voted against the reform (figure 11). Among German-tweeting MEPs the March 2019 blackouts significantly increased the relative frequency anti-copyright frames (figure 10). In Germany, legislators from the CDU/CSU, the party of the directive's rapporteur Axel Voss, are the exception as they largely voted in favour of the reform (figure 11).

Opponents of the reform frequently referred to public protests as justification for their opposition (e.g. Reda, Guoga, Sośnierz, Wölken, Maštálka in: European Parliament, 2019). In contrast, EUCD supporters disregarded demonstrations and concerns of the public as an astroturfing campaign by big platforms. MEPs and the Commission (Griffin, 2019) identified a misinformation campaign (Voss, 2018), alleged platforms to buy demonstrators (Caspary in: Merholz & Kain, 2019), or to 'have bombarded [MEPs] like vulgar cultural intellectual political prisoners' (Cavada in: European Parliament, 2019).

In the Council, national voting patterns are similar to those in parliament with Italy, Poland, the Netherlands, Luxembourg, Sweden, and Finland opposing the reform in the final vote. Despite earlier opposition to article 13 and objections over the inclusion of SMEs Germany voted in favour of the directive – supposedly in exchange for French support for the Nord Stream 2 gas pipeline (Frankfurter Allgemeine Zeitung, 2019).

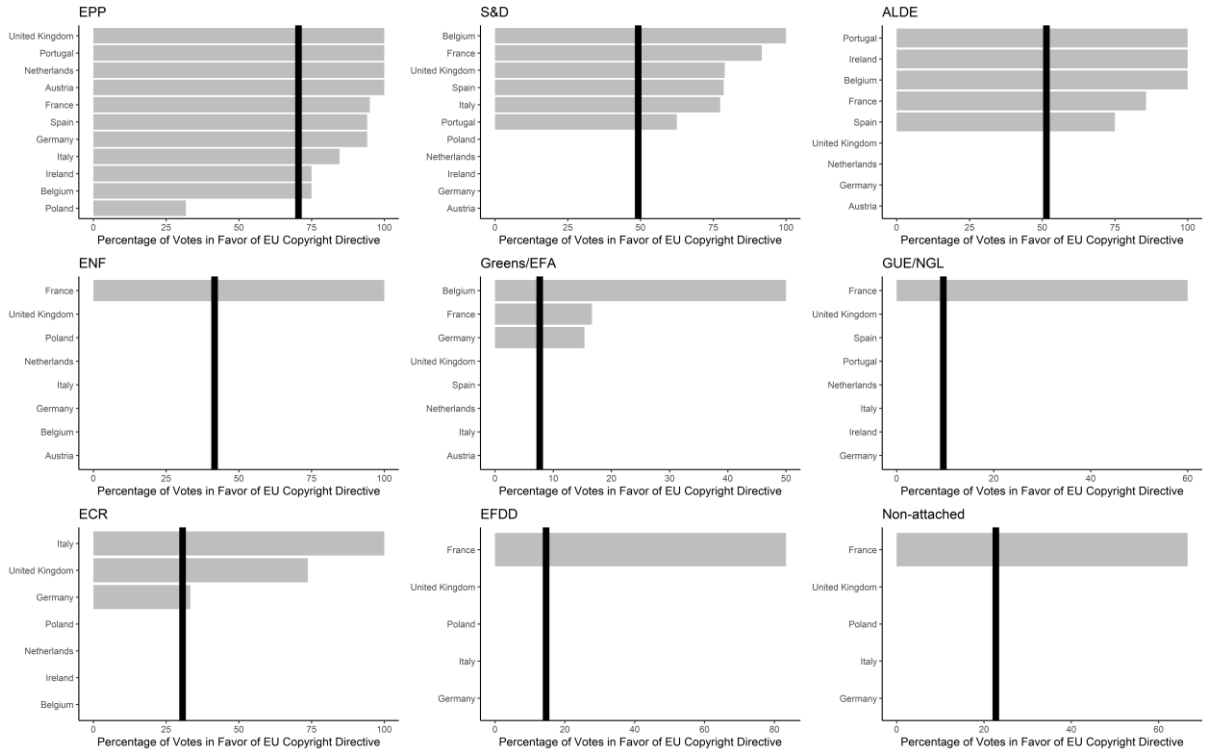

Figure 11. Percentage of MEP Votes in Favour of the EUCD by Country and Party Group.

Source: Own compilation based on data provided by pledge2019.eu

Notes: Black vertical line indicates average by party group

Discussion

What do these results tell about the causal mechanism of platform outside lobbying?

First, platforms indeed enjoy a permissive consensus but only among their users. Twitter users predominantly used anti-copyright frames even before platforms engaged in outside lobbying. However, the analysis also shows that the permissive consensus is not sufficient to prevent legislation. US and EU policymakers not only introduced bills promoting strong copyright provisions but also advanced them across partisan lines until platforms engaged in conflict expansion.

Second, I find that platforms' can use their intermediary position in concentrated networks to successfully use outside lobbying. For SOPA/PIPA the process largely takes place as expected: The anti-copyright coalition faced an uphill battle against rightsholders' interests and a bipartisan consensus. Attempting to reframe the debate and mobilise the public, a broad coalition of platforms and civil society organizations engaged in outside lobbying. Traditional forms of outside lobbying did not affect the framing of the debate (see table A1). But leveraging the platform infrastructure to display banners or shut down access for users did increase the salience of the debates and promoted anti-copyright frames in newspapers and on Twitter. This sent a strong signal to legislators who responded to public pressure by ending their support of the bills.

Third, the analysis reveals scope conditions of the mechanism. Despite a similar baseline scenario to SOPA/PIPA, the EUCD passed. In the theory section, I outlined four potential scope conditions. I will now reconsider them against the empirical evidence.

The first potential scope condition is a weaker and less diverse anti-copyright coalition in the EU. While civil society participation in the EU and US was largely similar suggesting a broad and diverse coalition in both cases, there are differences among the platforms that participated. In the US, the internet economy stood largely united against SOPA/PIPA. Small and large platforms blacked out their websites. In the EU, however, medium-sized platforms like Twitch, Reddit or community driven foundations like Wikipedia or Mozilla were the most active. In fact, the business case for big platforms against stronger copyright is less clear in 2019 than it was in 2012. While the EUCD still interferes with their business models, the costs of content moderation substantially declined for big platforms. Software like YouTube's Content ID not only reduce the load on human moderators. Owning such software also opens business opportunities for big platforms. Smaller competitors often lack the resources to develop their own software and must either license it or face even higher hurdles to market entry (Doctorow, 2018). This might explain why big platforms chose not to participate in outside lobbying. Although it is true that the coalition was weaker in the EU than in the US, I argue that it was not too weak to mobilise the public. Despite owning ContentID, Google and YouTube participated in outside lobbying by running ads, making blogposts, and mobilizing publishers and creators. Most importantly, however, the analysis of newspaper and Twitter data shows that the anti-copyright coalition was successful in raising the salience and reframing the debate in some EU countries. A weak anti-copyright coalition would not have been able to do so.

The second and third potential breaking points are the strength of counterframes and the responsiveness of MEPs to public pressure. Although outside lobbying by the pro-copyright coalition did not change the framing of the debate (table A1) counterframes are strong in some languages, especially French. This is reflected in the voting behaviour of Belgian and French MEPs who voted for the EUCD across parties. While less clear, a similar pattern is observable in Portuguese. Interestingly, in Spanish, where the framing was mixed and salience was generally low, MEPs also largely voted in favour of the EUCD. In countries where framing in newspapers was mixed and salience was high (Italian, English/UK), MEPs votes differed along partisan lines. Finally, in German, and to a lesser extent in Dutch, framing was strongly anti-copyright after platforms' outside lobbying. MEPs from Austria, the Netherlands, and Germany (except for CDU/CSU (see above)) overwhelmingly voted against the EUCD. Poland is somewhat of an outlier. Although the framing of the debate was mixed and salience was high, less than 20 percent of Polish MEPs supported the EUCD. Still, the alignment of MEPs voting behaviour with the framing of the EUCD in a countries' public sphere becomes evident, showing that MEPs are generally responsive to the signal of media reporting. Wherever counterframes were strong,

however, platforms' outside lobbying was not successful in influencing legislators, making the strength of counterframes an important scope condition.

Fourth, the mechanism potentially requires a unified public sphere that can be targeted by platforms' outside lobbying efforts. As argued above platforms have to target or create a public sphere that is in alignment with the electorate. For the EUCD that means either an issue-specific pan-European public sphere or affecting enough national public spheres. They were not successful in doing so. While platform actions increased issue salience in most languages, they did not change the collective issue definition across the EU's nationalised public spheres. The strength of counterframes in French, Portuguese, Italian, and English, and the lack of citizen mobilisation outside of Germany, Austria, Sweden, and Poland did prevent successful outside lobbying at the EU level. Having to run outside lobbying campaigns to target up to 28 public spheres is not only resource intensive. It also multiplies the potential for counterframes to arise from institutionalised national issue evaluations or counterlobbying.

Conclusion

This paper studies the failed attempt of platform outside lobbying against the European Copyright Directive (EUCD) against the template of the successful attempt against the US Stop Online Piracy Act and Protect Intellectual Property Act (SOPA/PIPA). Combining the literatures on outside lobbying and business power, I argue that digital platforms are structurally advantaged to pursue successful outside lobbying campaigns but face strong counterframes and a fragmented issue public as important scope conditions. I contribute in five ways.

First, I endogenize salience and framing which are treated as exogenous by previous business power research. I outline how the organizational characteristics of a specific type of business, digital platforms, possess unique tools to increase salience and frame the debate. Platforms can utilise their intermediary position in a centralised network to reach, access, and target large parts of the public. By limiting user access to their services, providing specific frames, and contact information they can expand conflicts and signal public opposition to policymakers – at least under certain conditions. Second, this finding also adds nuance to the lobbying literature by showing business heterogeneity in the successful use of outside lobbying. While not all businesses are equally positioned to use outside lobbying, it is not only a weapon of the weak. Third, I refine the concept of platform power by showing that a permissive consensus is insufficient to create preference attainment. Like other interest groups with popular policy positions, platforms have to strategically activate their supporter base through outside lobbying. Fourth, I not only deduct a causal mechanism of platforms' outside lobbying by combining two largely separate literatures, I also discover two important scope conditions of the mechanism which are rooted in and contribute to the lobbying and communications literatures: the strength of counterframes and whether the targeted public sphere is unified or fragmented.

My fifth contribution is methodological. By combining process-tracing with time-series analysis of textual data I propose a novel mixed-methods design which utilises complementary strengths without sacrificing ontological rigor. Combining these methods increases the robustness of time-series analysis by theorizing a causal process and adding context to findings of temporal precedence. Process-tracing is enhanced by adding time-series analysis when the mechanism includes many entities and its parts cannot be encompassingly operationalised with qualitative data.

Future research can draw on the findings in this study in the following ways.

First, while my study shows how strong counterframes broke down platform outside lobbying in some EU states, it does not answer why these counterframes arose. The strongest supporters of the EUCD share a tradition of *droits d'auteur*. In contrast to Anglo-Saxon *copyright* which focuses on exploitative rights, an author's moral right of self-expression is central in this tradition. Whether these institutional differences in copyright regimes affect the framing and support of the EUCD should be studied in more detail.

Second, platform lobbying does not stop with the passing of the EUCD. It requires implementation into national laws creating opportunities for platforms to water down the directive. In fact, implementation has been slow in many member states and analysing differences in the strictness of national legislation provides an interesting opportunity for comparative studies. Further, platforms' after losing the legislative battle, can also try to hinder enforcement as they did in the case of the General Data Protection Regulation (Goujard, 2023).

Third, I have largely focused on the mobilisation of the public. Particularly platform strategies against the EUCD suggest that platform-dependent entrepreneurs also are important in amplifying platform messages. Future studies should thus investigate platform-dependent entrepreneurs in platforms' lobbying strategies.

Finally, the use and success of platform lobbying across different policy areas should be studied. My results are generalizable to cases were platforms do not face initial opposition by the public, face an opposing side strongly focused on inside lobbying, and fight a defensive battle against proposed legislation. It is unclear in how far platforms' use outside lobbying in policy areas were the preferences of consumers and platforms are not initially aligned, e.g. data privacy or competition policy, and how successful they are. The recently passed Digital Services Act Package in the EU and US debates on antitrust and data privacy are interesting test cases for this. Considering their vast resources for inside lobbying and their structural advantage for outside lobbying, platforms not only possess a large toolbox of lobbying strategies but also combine key strengths of citizen groups and businesses.

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Appendix

Appendix for "Business power in digital(ized) capitalism: The political economy of structural and infrastructural digital power resources"

Table A1: List of firms included in our sample and description of the selection procedure

We selected the six largest independent companies (i.e. non-subsidiaries) by turnover in the US, the UK, Germany, and France from five sectors: (1) Manufacturing of motor vehicles, (2) manufacturing of machinery and equipment, (3) Internet Service Providers, (4) ICT hardware and consultancy, and (5) digital companies. Turnover data was collected from the AMADEUS and Compustat databases. For the first three sectors we largely relied on the NACE and NAICS industry classifications. However, since the NACE and NAICS codes included in the databases sometimes identified companies as a holding when their main business was clearly located in one of our sectors and the databases did not classify family or foundation-owned enterprises as independent, we had to reassign some companies manually. For the classification of ICT hardware and consultancy companies and digital companies we largely followed UNCAT's (2017) definition of these sectors and identified firms manually. The only deviation from UNCAT is that we classified software companies as digital companies as they increasingly shift their business online thereby diminishing the clarity of UNCAT's classification criteria.

Sector (NACE code)	Company name	Company abbreviation	Company ID (AMADEUS or Compustat)	Country
Manufacture of Motor Vehicles, Trailers, and Semi-Trailers (29); Manufacture of other Transport Equipment (30)	United Technologies	UNT	10983	USA
	Lockheed Martin	LOC	6774	USA
	Boeing	BOE	2285	USA
	Lear	LEA	16477	USA
	Ford Motor Co	FOR	4839	USA
	General Motors Co	GM	5073	USA
	Freudenberg	FRB	DE7170001092	DE
	Continental AG	CON	DE2190001578	DE
	Volkswagen AG	VW	DE2070000543	DE
	Daimler AG	DAI	DE7330530056	DE
	Bayerische Motoren Werke AG	BMW	DE8170003036	DE
	Hella	HEL	DE4290000215	DE
	Thales	THA	FR552059024	FR
	Valeo	VAL	FR552030967	FR
	Michelin	MIC	FR855200887	FR
	Safran	SAF	FR562082909	FR
	Peugeot	PEU	FR552100554	FR
	Renault	REN	FR441639465	FR
	Senior PLC	SEN	GB00282772	GB
	Halfords Group PLC	HAL	GB04457314	GB
	Meggit PLC	MEG	GB00432989	GB
	Rolls Royce	ROL	GB07524813	GB
	BAE Systems	BAE	GB01470151	GB
	Aston Martin	AST	GB11488166	GB
Manufacture of Machinery and Equipment (28), Repair of Machinery and Equipment (33), and Manufacture of Computer, Electronic, and	Thermo Fisher Scientific INC	TFS	10530	USA
	Raytheon CO	RAY	8972	USA
	Northorp	NOR	7985	USA
	Caterpillar INC	CAT	2817	USA
	Deere CO	DEE	3835	USA
	General Electric CO	GE	5047	USA
	Siemens AG	SIE	DE2010000581	DE
	Robert Bosch GmbH	BOS	DE7330000658	DE
	Schaeffler	SAE	DE8190034860	DE
	Mahle GmbH	MAH	DE7330000869	DE
	Kion	KIO	DE6250214475	DE
	UEE Holding	UEE	DE2250266729	DE

Optical Products (partly: 26.1 (except semiconductors), 26.4, 26.5, 26.6, 26.7)	J.C.B. SERVICE	JCB	GB00564955	GB
	Smiths Group PLC	SMI	GB00137013	GB
	Spectris PLC	SPE	GB02025003	GB
	IMI PLC	IMI	GB00714275	GB
	Sensata Technologies Holding PLC	SST	GB10900776	GB
	Aggreko PLC	AGG	GBSC177553	GB
	Schneider Electric	SE	FR542048574	FR
	Manitou BF	MAN	FR857802508	FR
	Exel Industries	EXE	FR095550356	FR
	SCOPELEC	SCO	FR784176026	FR
	SOITEC	SOI	FR384711909	FR
	Lectra	LEC	FR300702305	FR
Telecommunications (61, thereof: Internet Service Providers)	Verizon Communications INC	VER	2136	USA
	Centurylink INC	CYL	2884	USA
	Comcast CORP	COM	3226	USA
	Frontier Communications	FRO	135484	USA
	AT&T INC	ATT	9899	USA
	Charter Communications INC	CHA	126136	USA
	Net Group Beteiligungen	NET	DE2090181336	DE
	United Internet	UNI	DE5170123491	DE
	Freenet	FRE	DE2290224311	DE
	Tele Columbus AG	TEL	DE2012362297	DE
	Deutsche Telekom AG	DEU	DE5030147137	DE
	Ecotel Communication AG	ECO	DE5050387834	DE
	Orange	ORN	FR380129866	FR
	Mint	MIN	FR422716878	FR
	Sewan	SEW	FR452363153	FR
	Eutelsat	EUT	FR481043040	FR
	Bouygues Telecom	BOU	FR397480930	FR
	Afone	AFO	FR411068737	FR
	Liberty Global	LIB	GB08379990	GB
	Cobham PLC	COB	GB00030470	GB
	Vodafone Group PLC	VOD	GB01833679	GB
	BT Group PLC	BT	GB04190816	GB
	Arqiva Group Ltd	ARQ	GB05254001	GB
	TalkTalk Telecom Group PLC	TAL	GB07105891	GB
ICT Hardware and Consultancy	Apple INC	APP	1690	USA
	Dell Technologies INC	DEL	14489	USA
	Cisco Systems INC	CIS	20779	USA
	Hewlett Packard Enterprise	HP	26156	USA
	IBM Corp	IBM	6066	USA
	Intel	INT	6008	USA
	Infineon Technologies AG	INF	DE8330359160	DE
	Bechtle AG	BEC	DE7070210543	DE
	Scheidt & Bachmann GmbH	S&B	DE5230000634	DE
	Cancom	CAN	DE8170916086	DE
	MSG Group	MSG	DE8330391975	DE
	Allgeier	ALL	DE8170610709	DE
	Computacenter PLC	COC	GB03110569	GB
	Paypoint PLC	PPO	GB03581541	GB
	Endava PLC	END	GB05722669	GB
	Emis Group PLC	EMI	GB06553923	GB
	First Derivatives PLC	FIR	GBNI030731	GB
	Centerprise International Holdings Limited	CPR	GB07333982	GB
	Sopra Steria Group	SOP	FR326820065	FR
	Alten	ALT	FR348607417	FR

	Worldline	WOR	FR378901946	FR
	Devoteam	DEV	FR402968655	FR
	Atos	ATO	FR323623603	FR
	Capgemini	CAP	FR330703844	FR
Digital Companies (Software, E-Commerce, Social Media, Search Engines, Fintech, Online Advertisement, and Other Online Businesses)	Microsoft CORP	MS	12141	USA
	Oracle CORP	ORC	12142	USA
	Amazon.com INC	AMA	64768	USA
	Alphabet INC	ALP	160329	USA
	Facebook INC	FAC	170617	USA
	PayPal	PAY	24616	USA
	Zalando SE	ZAL	DE2011938494	DE
	Hellofresh SE	HFR	DE2012573982	DE
	Software AG	SOF	DE6050002673	DE
	SAP SE	SAP	DE7050001788	DE
	Wirecard AG	WIR	DE8330365063	DE
	Eventim	CTS	DE8170524017	DE
	InfoPro Digital	IDI	FR818813412	FR
	Criteo	CRI	FR484786249	FR
	Ingenico Group	ING	FR317218758	FR
	Dassault Systemes	DAS	FR322306440	FR
	Ubisoft Entertainment	UBI	FR335186094	FR
	Cegedim	CEG	FR350422622	FR
	The Sage Group PLC.	SAG	GB02231246	GB
	Asos PLC	ASO	GB04006623	GB
	BET365 Group Ltd	BET	GB04241161	GB
	Micro Focus International PLC	MFO	GB05134647	GB
	Playtech PLC	PLA	GBIM008505V	GB
	Shop Direct Holding Ltd	SHO	GB05059352	GB

Table A2: Most important consortia and initiatives setting standards for the Internet of Things

Consortium	Description
Alliance for the Internet of Things Innovation	The Alliance for the Internet of Things Innovation (AOITI) was set up in 2015 by the European Commission with 21 founding members. Currently, it has more than 190 members from industry and academia. Its purpose is to channel standard setting in the domain of IoT (www.aioti.eu).
Alliance Industrie du Futur	*Industrie du futur* was created in 2015 and has three core areas that encompass the promotion of digital technologies in SMEs, the development of skills and technologies, and the setting of standards for the Industrial Internet. However, its membership includes associations and governmental organizations but not individual firms (www.industrie-dufutur.org).
Eclipse Foundation	The Eclipse Foundation was founded by IBM in the early 2000s and provides "the global community of individuals and organizations with a mature, scalable and commercially-friendly environment for open source software collaboration and innovation" (www.eclipse.org).
Industrial Internet Consortium	The II Consortium (or IIC) was founded in 2014 by AT&T, Cisco, GE, IBM, and Intel to "bring together the organizations and technologies necessary to accelerate the growth of the Industrial Internet by identifying, assembling, testing and promoting best practices" (www.iiconsortium.org/members.htm). It is not a formal standard-setting organization but managed by the Object Management Group (OMG), which is a standards consortium of the computer industry, established in 1989 (www.omg.org). In June 2015, IIC published its Industrial Internet Reference Architecture, which is similar to the German RAMI 4.0 (see below).
OneM2M	OneM2M was founded in 2012 with the goal of developing standards in M2M communication. The major ICT standard-setting organizations are all involved in the initiative (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC) (www.onem2m.org).

OSGi	OSGi, founded in 1999, is a standard consortium founded by Ericsson, IBM, Motorola, and Sun Microsystems. Its purpose is to "open specifications that enable the modular assembly of software built with Java technology" (www.osgi.org).
Plattform Industrie 4.0	The goal of Plattform Industrie 4.0 is to shape the digital transformation of German industry and to assist companies, in particular SMEs, in the adoption of digital technologies. It also sets standards and developed the reference architecture RAMI 4.0. The initiative was founded in 2013 (https://www.plattform-i40.de/PI40/Navigation/EN/Home/home.html).
Gaia-X	Gaia-X, founded 2020, is an initiative that develops a software framework of control and governance. Its goal is to implement a common set of policies and rules that can be applied to any existing cloud/edge technology stack to obtain transparency, controllability, portability, and interoperability across data and services. https://www.gaia-x.eu/
Catena-X	Catena-X was founded in 2021. The goal of the consortium is to enable continuous data exchange for all contributors along the automotive value chain. It aims to ensure the economic viability of all network partners—from small and medium-sized enterprises (SME) to corporate groups, Europe-wide. https://catena-x.net/en/

Table A3: Platforms operated by firms

Firm	Name of platform	Source of user data
Product platforms		
United Technologies	Predikto	
	Otis One	
Lockheed Martin	SAS Plattform	https://www.sas.com/ro_ro/company-information/discover/lockheed-martin.html (last accessed: 12.03.2021)
Boeing	AnalytX (Airplane Health Management)	https://worldaviationfestivalblog.com/the-less-sexy-side-of-big-data-may-prove-the-most-profitable/ (last accessed: 12.03.2021)
Lear	Xevo	https://www.lear.com/Press-Room/5690/lear-corporation-to-acquire-xevo-a-leader-in-connected-car-software-and-data-dri.aspx (last accessed: 12.03.2021)
FORD MOTOR CO	Transportation Mobility Cloud	https://media.ford.com/content/fordmedia/fna/us/en/news/2019/04/23/ford-motor-company-autonomic-amazon-web-services-collaboration.html (last accessed: 12.03.2021)
GENERAL MOTORS CO	Maven car sharing	
	GM OnStar	https://www.networkworld.com/article/3183090/12m-connected-cars-gives-general-motors-a-massive-iot-fleet.html (last accessed: 12.03.2021)
Continental AG	Continental.cloud	
	eHorizon	https://www.continental.com/de/presse/pressemitteilungen/commercial-vehicle-aftermarket/2019-06-06-savings-ehorizon-174734 (last accessed: 12.03.2021)
VOLKSWAGEN AKTIENGESELLSCHAFT	Automotive Cloud	https://azure.microsoft.com/de-de/blog/microsoft-connected-vehicle-platform-trends-and-investment-areas/#:~:text=More%20than%205%20million%20new,all%20Group%20brands%20and%20models. (last accessed: 12.03.2021)
DAIMLER AG	FreeNow	https://www.daimler-mobility.com/de/unternehmen/news/your-now-2019-wachstum/ (last accessed: 12.03.2021)
	Moovel	
BAYERISCHE MOTOREN WERKE AKTIENGESELLSCHAFT	FreeNow	https://www.daimler-mobility.com/de/unternehmen/news/your-now-2019-wachstum/ (last accessed: 12.03.2021)
	ConnectedDrive & Connected+ & Open Mobility Cloud	https://www.bmwgroup.com/en/innovation/technologies-and-mobility/connectivity.html#:~:text=BMW%20ConnectedDrive%20is%20currently%20available,on%20roads%20around%20the%20world. (last accessed: 12.03.2021)
Thales	Cinterion IoT Suite	
Valeo	CloudMade	
Michelin	Sascar	https://www.michelin.com/en/press-releases/michelin-completes-the-acquisition-of-sascar/ (last accessed: 12.03.2021)
	NexTraq	http://cdnmedia.endeavorsuite.com/images//organizations/9f89ed55-9211-42e8-a830-949e92e81337/NexTraq%20FAQs.pdf?v=20120305144427 (last accessed: 12.03.2021)

	Masternaut	https://www.telegraph.co.uk/finance/yourbusiness/8516366/Chancellor-backs-UK-grab-for-data-analytics-market.html (last accessed: 12.03.2021)
	Michelin Solutions - EFFIFUEL	
Safran	Safran Analytics/CASSIOPÉE	
Peugeot	Connected Vehicle Modular Platform	https://www.huawei.com/minisite/iot/en/vehicle-networking.html (last accessed: 12.03.2021)
RENAULT	Alliance Intelligent Cloud	
Rolls Royce	Total Care	https://customers.microsoft.com/fr-fr/story/rollsroycestory (last accessed: 12.03.2021)
	Connected Ships	
CATERPILLAR INC	Cat Connect Technology	https://theleadershipnetwork.com/article/caterpillar-s-five-proven-steps-to-digital-excellence (last accessed: 12.03.2021)
DEERE & CO	MyJohnDeere	
Kion	Kion Cloud	
	Dematic IQ InSights	
J.C.B. SERVICE	Off-Highway Intelligent Power Management	
	LiveLink	https://www.jcb.com/en-gb/news/2019/06/jcb-celebrates-as-250000-machines-go-telematics-live (last accessed: 12.03.2021)
SENSATA TECHNOLOGIES HOLDING PLC	Vehicle Area Network	
Verizon Communications INC	Fios TV	https://www.verizon.com/about/sites/default/files/2019-Verizon-Annual-Report.pdf (last accessed: 12.03.2021)
	Verizon Smart Cities	
Comcast Corp	Sky	https://www.cmcsa.com/news-releases/news-release-details/comcast-reports-1st-quarter-2020-results#:~:text=Total%20Customer%20Relationships%20increased%20by%20371%2C000%20to%2031.9%20million%20in,customer%20relationships%20increased%20by%2011%2C000. (last accessed: 12.03.2021)
Frontier Communications	Pay-TV	https://www.leichtmanresearch.com/wp-content/uploads/2019/04/LRG-Research-Notes-1Q-2019.pdf (last accessed: 12.03.2021)
AT&T INC	Premium TV & AT&T NOW	https://investors.att.com/~/media/Files/A/ATT-IR/financial-reports/annual-reports/2019/complete-2019-annual-report.pdf (last accessed: 12.03.2021)
Freenet	freenet TV	https://blob.freent.de/contentblob/8027910/2/data/20201105-quartalsmitteilung-q3-2020.pdf (last accessed: 12.03.2021)
	waipu.tv	https://blob.freent.de/contentblob/8027910/2/data/20201105-quartalsmitteilung-q3-2020.pdf (last accessed: 12.03.2021)
Deutsche Telekom AG	Magenta TV	
	Magenta Gaming	
Ecotel Communication AG	routermiete.de	
	TalkTalk Plus TV	

TalkTalk Telecom Group PLC	YouView	
PayPoint PLC	PayPoint One	
Worldline	Payment Terminals	
Microsoft	Xbox Live	
Amazon.com INC	Amazon Prime	
INGENICO GROUP	Ingenico Payment Platform	https://www.ingenico.com/omnichannel?utm_source=ingenico.com&utm_medium=hp-img&utm_campaign=Large%20Retailers (last accessed: 12.03.2021)
UBISOFT ENTERTAINMENT	Uplay	https://www.gamesindustry.biz/articles/2013-02-19-ubisoft-expands-uplay-store-with-other-publishers#:~:text=Ubisoft%20says%20Uplay%20currently%20has,achievements%20across%20those%20different%20machines (last accessed: 12.03.2021)
BET365 GROUP LIMITED	bet365.com	https://www.yogonet.com/international/noticias/2020/05/20/53293-led-by-bet365-top-gambling-websites-traffic-see-monthly-drop-in-april (last accessed: 12.03.2021)
Operating systems		
Apple INC	iOS	https://9to5mac.com/2020/01/28/apple-hits-1-5-billion-active-devices-with-80-of-recent-iphones-and-ipads-running-ios-13/ (last accessed: 12.03.2021)
	MacOS	https://techcrunch.com/2018/10/30/there-are-now-100-million-macs-in-use/?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_sig=AQAAAAtgTCtxwy0bxmiRR-G1kYlz83GO-myMZZNzJYHIh6vDh0gHkHd1LnjK0tR9974jdOugOzqF7nOskRHSZy82PKCzoSz_8zyKCYEmaa42vvoKcxCFQxoEbBRywY1iOHHt725YlRvGx8w7v1i56SvdJK2eM3agcCUeScooP_hF7ODs (last accessed: 12.03.2021)
Microsoft Corp	Windows 10	https://blogs.windows.com/windowsexperience/2020/03/16/windows-10-powering-the-world-with-1-billion-monthly-active-devices/ (last accessed: 12.03.2021)
Alphabet INC	Android	Kenney, M. and Zysman, J. (2020): The Platform Economy: Restructuring the Space of Capitalist Accumulation. Cambridge Journal of Regions, Economy and Society, 13(1). 55–76. https://doi.org/10.1093/cjres/rsaa001
Advertising platforms		
AT&T INC	XANDR	
EMIS Group PLC	patientaccess.com	https://www.emisgroupplc.com/media/1482/emis-group-final-results-2018-preliminary-announcement.pdf (last accessed: 12.03.2021)
Microsoft Corp	Skype	Kenney, M. and Zysman, J. (2020): The Platform Economy: Restructuring the Space of Capitalist Accumulation. Cambridge Journal of Regions, Economy and Society, 13(1). 55–76. https://doi.org/10.1093/cjres/rsaa001
	LinkedIn	
	GitHub	
Amazon.com INC	Twitch	https://videogamesstats.com/twitch-stats-facts/ (last accessed: 12.03.2021)
Alphabet INC	Google Search	https://support.google.com/google-ads/answer/7299965?hl=en (last accessed:

		12.03.2021); Kenney, M. and Zysman, J. (2020): The Platform Economy: Restructuring the Space of Capitalist Accumulation. Cambridge Journal of Regions, Economy and Society, 13(1). 55–76. https://doi.org/10.1093/cjres/rsaa001
	Google Chrome	Kenney, M. and Zysman, J. (2020): The Platform Economy: Restructuring the Space of Capitalist Accumulation. Cambridge Journal of Regions, Economy and Society, 13(1). 55–76. https://doi.org/10.1093/cjres/rsaa001
	YouTube	https://de.statista.com/statistik/studie/id/6921/dokument/google-statista-dossier/ (last accessed: 12.03.2021)
	Gmail	Kenney, M. and Zysman, J. (2020): The Platform Economy: Restructuring the Space of Capitalist Accumulation. Cambridge Journal of Regions, Economy and Society, 13(1). 55–76. https://doi.org/10.1093/cjres/rsaa001
	Google Pay	
	Google Ads	
	Google Drive	Kenney, M. and Zysman, J. (2020): The Platform Economy: Restructuring the Space of Capitalist Accumulation. Cambridge Journal of Regions, Economy and Society, 13(1). 55–76. https://doi.org/10.1093/cjres/rsaa001
	Google Maps	Kenney, M. and Zysman, J. (2020): The Platform Economy: Restructuring the Space of Capitalist Accumulation. Cambridge Journal of Regions, Economy and Society, 13(1). 55–76. https://doi.org/10.1093/cjres/rsaa001
FACEBOOK INC	Facebook	https://www.statista.com/statistics/264810/number-of-monthly-active-facebook-users-worldwide/ (last accessed: 12.03.2021)
	Instagram	https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/ (last accessed: 12.03.2021)
	WhatsApp	https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/ (last accessed: 12.03.2021)
	Messenger	https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/ (last accessed: 12.03.2021)
PayPal	PayPal	https://investor.paypal-corp.com/static-files/ec252376-4083-4ffd-bd50-77b43b5a5424 (last accessed: 12.03.2021)
E-commerce platforms		
HALFORDS GROUP PLC	halfords.com	
Schaeffler	medias	
United Internet	Sedo	
Intel	Intel Solutions Marketplace	
AMAZON.COM INC	Amazon Marktplace	Kenney, M. and Zysman, J. (2020): The Platform Economy: Restructuring the Space of Capitalist Accumulation. Cambridge Journal of Regions, Economy and Society, 13(1). 55–76. https://doi.org/10.1093/cjres/rsaa001

ZALANDO SE	Zalando	https://www.statista.com/statistics/370657/zalando-active-buyers/ (https://corporate.zalando.com/sites/default/files/media-download/Zalando-SE_Half-Year-Report_2019.pdf)
HELLOFRESH SE	HelloFresh	https://ir.hellofreshgroup.com/download/companies/hellofresh/Quarterly%20Reports/DE000A161408-Q2-2020-EQ-E-00.pdf
Eventim	Eventim	
ASOS PLC	asos.com	https://www.asosplc.com/~/media/Files/A/Asos-V2/reports-and-presentations/fy-2019-results-presentation.pdf
SHOP DIRECT HOLDINGS LTD	Very.co.uk	https://theverygroup.com/wp-content/uploads/2020/10/The-Very-Group-FY20-Annual-Report.pdf (last accessed: 12.03.2021)
	Littlewoods	https://theverygroup.com/wp-content/uploads/2020/10/The-Very-Group-FY20-Annual-Report.pdf
Cloud Platforms		
Lockheed Martin	Black Cloud	
Volkswagen	Industrial Cloud	
Thales	Guavus analytics	https://www.guavus.com/ (last accessed: 12.03.2021)
Bayerische Motoren Werke AG	Open Manufacturing Platform	
BAE Systems	Secure Cloud	
	DataRetain	
THERMO FISHER SCIENTIFIC INC	Platform for Science	
	Thermo Fisher Connect Platform	
RAYTHEON CO	Intersect	
Northorp	Unified Platform	
GENERAL ELECTRIC CO	Predix	https://www.ge.com/news/press-releases/ge-open-predix-industrial-internet-platform-all-users (last accessed: 12.03.2021)
SIEMENS AG	Mindsphere	https://siemens.mindsphere.io/content/dam/mindsphere/partners/overview/MindSphere_Brochure.pdf (last accessed: 12.03.2021)
Robert Bosch GmbH	IoT Cloud & IoT Suite	https://www.bosch-iot-suite.com/ (last accessed: 12.03.2021)
Schaeffler	Smart EcoSystem	
SMITHS GROUP PLC	CORSYS (Smiths Detection)	
SPECTRIS PLC	Omega IIoT Platform	
Schneider Electric	EcoStruxure	https://www.prnewswire.com/news-releases/schneider-electric-announces-next-generation-of-ecostruxure-building-the-open-ip-architecture-for-iot-devices-in-buildings-300688885.html (last accessed: 12.03.2021)
SCOPELEC	Exzo solutions	
Verizon Communications	Verizon Cloud	
United Internet	1&1 IONOS	
Deutsche Telekom AG	T-Systems	
Ecotel Communications AG	Colocation Service	

Sewan	Sewan Cloud	https://www.sewan.fr/grands-comptes/ (last accessed: 12.03.2021)
Dell Technologies INC	Dell Technologies Cloud	
CISCO SYSTEMS INC	Cisco IoT	
HEWLETT PACKARD ENTERPRISE	Greenlake	https://www.hpe.com/us/en/newsroom/press-release/2020/06/hpe-helps-customers-accelerate-transformation-with-breakthrough-hpe-greenlake-cloud-services.html#:~:text=Edge%20Services%20Platform).-,HPE%20GreenLake%20is%20one%20of%20the%20fastest%2Dgrowing%20businesses%20in,partners%20selling%20HPE%20GreenLake%20today (last accessed: 12.03.2021)
INTL BUSINESS MACHINES CORP	IBM Cloud	https://www.prnewswire.com/news-releases/industry-leaders-worldwide-embrace-ibm-clouds-to-transform-business-processes-119388749.html (last accessed: 12.03.2021); https://www.ibm.com/annualreport/assets/downloads/IBM_Annual_Report_2018_Letter.pdf (last accessed: 12.03.2021)
INTEL	Intel Edge Controls for Industrial	
	Intel Edge Insights for Industrial	
Cancom	CANCOM Manufacturing Solutions	
Microsoft Corp	Azure	https://petri.com/microsoft-azure-numbers#:~:text=Microsoft%20says%20that%20they%20are,services%2C%20and%2040%20percent%20of (last accessed: 12.03.2021)
ORACLE CORP	Oracle Cloud Platform	
Alphabet INC	Google Cloud	
SOFTWARE AKTIENGESELLSCHAFT	Software AG Cloud	https://investors.softwareag.com/~/media/Files/S/Software-AG-IR/result-center/2019/20200324_SAG_GB_2019_EN_s.pdf (last accessed: 12.03.2021)
	Cumulocity	
SAP SE	SuccessFactors	https://www.sap.com/documents/2017/04/4666ecdd-b67c-0010-82c7-eda71af511fa.html (last accessed: 12.03.2021)
	SAP Cloud Platform	https://www.sap.com/documents/2017/04/4666ecdd-b67c-0010-82c7-eda71af511fa.html (last accessed: 12.03.2021)
	Digital manufacturing	
CEGEDIM	Activ'Cloud Services	

Table A4: Cloud providers used by the manufacturing firms from our sample

Firm	Name of cloud provider	Source
General Electric	AWS	https://aws.amazon.com/de/solutions/case-studies/general-electric/ (last accessed: 12.03.2021)
	MS Azure	MarketLine NewsWire (2018): GE and Microsoft Expand Partnership to Accelerate IIoT Adoption. July 17, 2018.
Thermo Fisher Scientific	AWS	ENP Newswire (2015): Thermo Fisher Scientific adds Proteomics Data Module to Thermo Fisher Cloud Platform. June 2, 2015.

Siemens	Alibaba Cloud	https://developer.mindsphere.io/concepts/concept-architecture.html (last accessed: 12.03.2021)
	AWS	https://developer.mindsphere.io/concepts/concept-architecture.html (last accessed: 12.03.2021)
	MS Azure	https://developer.mindsphere.io/concepts/concept-architecture.html (last accessed: 12.03.2021)
Bosch	AWS	https://blog.bosch-si.com/bosch-iot-suite/bosch-iot-suite-now-publicly-available-aws-marketplace/ (last accessed: 12.03.2021)
	Huawei Cloud	https://www.bigdata-insider.de/strategische-kooperation-im-bereich-internet-of-things-a-768250/ (last accessed: 12.03.2021)
	IBM Cloud	https://www.elektroniknet.de/elektronik/embedded/bosch-setzt-auf-cloud-von-ibm-138852.html (last accessed: 12.03.2021) https://blog.bosch-si.com/bosch-iot-suite/bosch-iot-rollouts-available-at-ibm-marketplace-and-ibm-cloud-catalog/ (last accessed: 12.03.2021)
	SAP Cloud	https://blog.bosch-si.com/bosch-iot-suite/bosch-iot-device-management-sap-cloud-platform/ (last accessed: 12.03.2021)
	Bosch IoT Cloud	https://www.bosch-presse.de/pressportal/de/de/das-internet-der-dinge-iot-aus-einer-hand-bosch-startet-cloud-fuer-seine-iot-services-44802.html (last accessed: 12.03.2021)
Schaeffler	MS Azure	https://www.computerwoche.de/a/die-plattformoekonomie-entwickelt-sich-langsam-aber-sicher,3546458,2 (last accessed: 12.03.2021)
Kion Groups	MS Azure	https://www.kiongroup.com/en/Careers/Job-Opportunities/Job-Detail.html?job=16502&title=Azure%20Cloud%20Developer%20/%20Software%20Engineer (last accessed: 12.03.2021)
Mahle	SAP Cloud	https://news.sap.com/germany/2020/02/digitalisierung-automobilproduktion/ (last accessed: 12.03.2021)
Schneider Electric	MS Azure	https://customers.microsoft.com/en-us/story/schneider-electric-power-utilities-azure (last accessed: 12.03.2021)
Soitec	AWS	https://www.soitec.com/media/documents/149/file/soitec_adopte_l_ia_en_paas_pour_le_controle_qualite.pdf (last accessed: 12.03.2021)
JCB	Wipro	Market News Publishing (2016): Cloud Based IoT Platform Helps Connect Over 10,000 JCB India Construction Equipment Machines. February 1, 2016.
Smiths	MS Azure	https://customers.microsoft.com/en-us/story/769823-smiths-group-manufacturing-azure (last accessed: 12.03.2021)
AGGREKO	INNIO (General Electric)	Business Wire (2019): INNIO Helps Aggreko Boost Fleet Monitoring Capacity across Three Major Power Plants, Ahead of Schedule. June 12, 2019.
Spectris	VI-Grade	https://www.vi-grade.com/en/solutions/software_on_demand/ (last accessed: 12.03.2021)
	Rescale	https://www.vi-grade.com/en/solutions/software_on_demand/ (last accessed: 12.03.2021)
Ford	AWS	https://www.crn.com/news/cloud/aws-in-expanded-deal-to-power-ford-backed-transportation-cloud (last accessed: 12.03.2021) https://siliconangle.com/2019/04/23/ford-partners-amazon-build-cloud-services-connected-cars/ (last accessed: 12.03.2021)
	IBM Cloud	https://www.techrepublic.com/article/ford-taps-ibm-for-data-analytics-to-win-the-connected-car-race/ (last accessed: 12.03.2021)
	MS Azure	https://www.computerweekly.com/news/2240242523/Ford-drives-connected-car-push-forward-with-Microsoft-Azure (last accessed: 12.03.2021)
	OpenXC	https://www.cloudcomputing-insider.de/splunk-und-ford-bringen-fahrzeugdaten-in-die-cloud-a-425607/ (last accessed: 12.03.2021)
	Alibaba Cloud	https://www.alibabacloud.com/de/customers/ford (last accessed: 14.02.2022)

Boeing	MS Azure	https://www.geekwire.com/2016/microsoft-azure-wins-big-piece-of-boeings-cloud-computing-business/ (last accessed: 12.03.2021)
United Technologies	MS Azure	https://news.microsoft.com/2017/11/01/united-technologies-chooses-microsoft-cloud-to-enhance-customer-experience-and-accelerate-digital-transformation/ (last accessed: 12.03.2021)
Lockheed Martin	AWS	https://aws.amazon.com/de/solutions/case-studies/Lockheed-martin/ (last accessed: 12.03.2021)
Volkswagen	MS Azure	https://www.media.vw.com/releases/1084 (last accessed: 12.03.2021)
	AWS	https://www.volkswagenag.com/de/news/2020/07/Industrial_Cloud.html (last accessed: 12.03.2021)
Daimler	MS Azure	https://techcrunch.com/2019/02/20/why-daimler-moved-its-big-data-platform-to-the-cloud/ (last accessed: 12.03.2021)
	T-Systems	https://www.t-systems.com/de/de/referenzen/cloud-und-infrastructure/daimler-retrofit-mercedes-me (last accessed: 12.03.2021)
	IBM Cloud	https://www.computerwoche.de/a/paas-to-go-bei-der-daimler-tochter-moovel,3214516 (last accessed: 12.03.2021)
	AWS	Beydilli, E. and Lenz, T. (2018): Insights Into An Integrated HCM Solutions: Daimler's Transformation. Presentation at Oracle Open World. Slide 20. Available at: https://static.rainfocus.com/oracle/oow18/sess/1535078439519001yKn8/PF/CAS6563_Insights%20Into%20An%20Integrated%20HCM%20Solution_Daimlers%20Transformation_19Oct2018%20Final_1540219053877001 9ncj.pdf (last accessed: 12.03.2021)
	SAP Cloud	
	Oracle	
BMW	MS Azure	https://www.bmwgroup.com/en/company/bmw-group-news/artikel/bmw-und-microsoft.html (last accessed: 12.03.2021)
Continental	T-Systems	https://www.t-systems.com/de/de/referenzen/cloud-und-infrastructure/hybrid-cloud-continental (last accessed: 12.03.2021)
	SAP Cloud	
	MS Azure	
Peugeot	Samsung Arctic Cloud	Romain Gueugneau (2017): Quand les constructeurs automobiles partent à la conquête des geeks, Les Echos.fr, March 6, 2017.
	Huawei Cloud	Business Wire Français (2017): Groupe PSA: toujours plus de services pour faciliter la mobilité au quotidien; Le Groupe PSA élargit son champ d'action dans le cadre du deuxième pilier du plan Push to Pass Des services concrets pour une mobilité pratique et facile, November 14, 2017.
	SierraWireless	Business Wire Français (2015): Sierra Wireless et PSA Peugeot Citroën collaborent pour mettre en oeuvre de nouvelles applications et services pour les voitures connectées; En plus des appels d'urgence, PSA développe des applications et services pour le véhicule connecté avec les modules embarqués, la plateforme LegatoTM, et le cloud AirVantage® de Sierra Wireless. June 3, 2015.
Renault	MS Azure	La Correspondance de la Publicité (2016): Renault-Nissan / Microsoft / voitures connectées : Renault-Nissan annonce s'être allié à Microsoft pour développer des technologies dans le domaine des voitures connectées. Cet accord "mondial" et "pl. September 27, 2016.
Valeo	Apollo (Baidu)	https://votreargent.lexpress.fr/bourse-de-paris/valeo-cooperation-strategique-avec-la-plateforme-apollo_2022659.html (last accessed: 12.03.2021)
Rolls-Royce	Google Cloud	https://www.rolls-royce.com/media/press-releases/2017/03-10-2017-rr-joins-forces-with-google-cloud-to-help-make-autonomous-ships-a-reality.aspx (last accessed: 12.03.2021)
	MS Azure	https://customers.microsoft.com/en-us/story/rollsroycestory (last accessed: 12.03.2021)
Meggitt	IBM Cloud	https://www.ibm.com/blogs/industries/this-smart-workbench-is-revolutionizing-component-assembly/. (last accessed: 12.03.2021)

Appendix for "Communities of Fate and Exploitative Dependencies: An Ecosystem Explanation of Business Preferences in Digital Capitalism."

Table A1: Results of the MRQAPs on Whether Firms Lobby a Bill on the Same Issues

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
				Same Issue			
Platform Dependency	0.07 ***	0.07 ***	0.06 ***	0.07 ***	0.07 ***	0.07 ***	0.08 ***
Δ Intangible Assets	0	-0.02 *	-0.01	-0.01	-0.01	0	0
Sectoral Similarity	0.41 ***	0.41 ***	0.41 ***	0.41 ***	0.41 ***	0.41 ***	0.41 ***
Δ Markup	-0.05 ***	-0.05 ***	-0.06 ***	-0.05 ***	-0.05 ***	-0.05 ***	-0.05 ***
Δ Employees	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04
Δ Sales	0	0	0	0	0	0	0
Δ Trade Exposure	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Number of Organizations	-0.37 **	-0.37 **	-0.37 **	-0.37 **	-0.37 **	-0.37 **	-0.37 **
Umbrella Organization	0.13 ***	0.13 ***	0.13 ***	0.13 ***	0.13 ***	0.13 ***	0.13 ***
House	0.37	0.37	0.37	0.37	0.37	0.37	0.37
Policy Areas							
- Miscellaneous	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
- Within Ecosystem	1.28	1.28	1.28	1.28	1.28	1.27	1.28
- Entire Ecosystem	-0.76	-0.75	-0.75	-0.75	-0.75	-0.76	-0.71
- Trade	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.1
- Security	0.63	0.63	0.63	0.63	0.63	0.63	0.63
- Tax	2.03	2.03	2.04	2.03	2.03	2.03	2.03
- Economy	-0.31	-0.31	-0.31	-0.31	-0.31	-0.31	-0.31
- Social	0.13 *	0.13 *	0.13 *	0.13 *	0.13 *	0.13 *	0.13
- Politics	0.12	0.12	0.13	0.13	0.12	0.12	0.12
- Energy/Environment	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Δ Intangible Assets * Sectoral Similarity		-0.04 ***					
Platform Dependency * Δ Markup			0.05 **				
Δ Intangible Assets * Δ Markup				0.01 *			
Platform Dependency * Δ Intangible Assets					0.06 ***		
Platform Dependency * Within Ecosystem Policies						0.05	
Platform Dependency * Entire Ecosystem Policies							-0.24
Intercept	-0.94	-0.94	-0.94	-0.94	-0.94	-0.94	-0.94
Session Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.088	0.088	0.088	0.088	0.088	0.088	0.088
Dyads	185174	185174	185174	185174	185174	185174	185174
Bills	4534	4534	4534	4534	4534	4534	4534
Unique Firms	680	680	680	680	680	680	680

Note: *** p < 0.01; ** p < 0.05; * p < 0.1

Table A2: Results of Multi-Level Logit Regressions on Activity Overlap

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
	Activity Overlap (Same Issue and Same Lobbyists)						
Platform Dependency	-0.13***	-0.12**	-0.34***	-0.12**	-0.13***	-0.16***	-0.12**
	(0.049)	(0.049)	(0.061)	(0.049)	(0.05)	(0.051)	(0.05)
Δ Intangible Assets	0.01	0.01	0.01	0	0.02	0.01	0.01
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Sectoral Similarity	0.62***	0.63***	0.61***	0.63***	0.63***	0.63***	0.63***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Δ Markup	-0.2***	-0.2***	-0.14***	-0.21***	-0.2***	-0.2***	-0.21***
	(0.023)	(0.023)	(0.022)	(0.024)	(0.023)	(0.023)	(0.023)
Δ Employees	-0.04	-0.05**	-0.05**	-0.05*	-0.05**	-0.05**	-0.04*
	(0.023)	(0.024)	(0.024)	(0.023)	(0.023)	(0.024)	(0.023)
Δ Sales	-0.05**	-0.04*	-0.04*	-0.04*	-0.04*	-0.04*	-0.04*
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Δ Trade Exposure	0.06***	0.07***	0.07***	0.06***	0.06***	0.06***	0.07***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Number of Organizations	-0.35**	-0.32**	-0.32*	-0.33**	-0.33**	-0.33**	-0.31*
	(0.159)	(0.162)	(0.163)	(0.161)	(0.162)	(0.161)	(0.162)
Umbrella Organization	-0.48***	-0.5***	-0.51***	-0.5***	-0.5***	-0.5***	-0.52***
	(0.114)	(0.115)	(0.116)	(0.115)	(0.116)	(0.115)	(0.115)
House	-0.11	-0.12	-0.13	-0.14	-0.1	-0.13	-0.13
	(0.156)	(0.157)	(0.157)	(0.157)	(0.157)	(0.157)	(0.157)
Policy Areas							
- Miscellaneous	-0.67**	-0.66**	-0.59**	-0.63**	-0.64**	-0.63**	-0.67**
	(0.284)	(0.286)	(0.287)	(0.286)	(0.286)	(0.286)	(0.287)
- Within Ecosystem	-0.22	-0.15	-0.18	-0.14	-0.18	-0.22	-0.19
	(0.325)	(0.328)	(0.33)	(0.328)	(0.328)	(0.329)	(0.328)
- Entire Ecosystem	0.72*	0.7*	0.65	0.66	0.66	0.6	0.62
	(0.422)	(0.426)	(0.428)	(0.426)	(0.426)	(0.425)	(0.427)
- Trade	-0.38	-0.47	-0.44	-0.43	-0.41	-0.45	-0.4
	(0.317)	(0.322)	(0.323)	(0.321)	(0.322)	(0.322)	(0.32)
- Security	0.56***	0.54***	0.54***	0.53***	0.55***	0.55***	0.56***
	(0.193)	(0.196)	(0.196)	(0.195)	(0.196)	(0.195)	(0.195)
- Tax	0.42*	0.38	0.4	0.38	0.44*	0.39	0.41*
	(0.241)	(0.244)	(0.245)	(0.244)	(0.244)	(0.244)	(0.244)
- Economy	-0.23	-0.25	-0.25	-0.25	-0.21	-0.23	-0.25
	(0.215)	(0.217)	(0.218)	(0.217)	(0.217)	(0.217)	(0.217)
- Social	-0.68***	-0.74***	-0.72***	-0.73***	-0.73***	-0.76***	-0.76***
	(0.167)	(0.169)	(0.169)	(0.169)	(0.169)	(0.169)	(0.169)
- Politics	-0.05	-0.08	-0.04	-0.08	-0.04	-0.03	-0.03
	(0.162)	(0.163)	(0.164)	(0.163)	(0.163)	(0.163)	(0.163)
- Energy/Environment	-1.26***	-1.17***	-1.16***	-1.24***	-1.19***	-1.12***	-1.17***
	(0.287)	(0.286)	(0.287)	(0.288)	(0.288)	(0.285)	(0.287)
Δ Intangible Assets * Sectoral Similarity		-0.03**					
		(0.016)					
Platform Dependency * Δ Markup			-1.56***				
			(0.161)				
Δ Intangible Assets * Δ Markup				0.03***			
				(0.007)			
Platform Dependency * Δ Intangible Assets					-0.33***		
					(0.126)		
Platform Dependency * Within Ecosystem Policies						0.42**	
						(0.177)	
Platform Dependency * Entire Ecosystem Policies							0.23
							(0.217)
Intercept	-3.91***	-3.87***	-3.88***	-3.86***	-3.92***	-3.87***	-3.88***
	(0.278)	(0.281)	(0.282)	(0.28)	(0.281)	(0.28)	(0.282)
Session Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log Likelihood	-23173.43	-23170.51	-23100.33	-23167.65	-23167.83	-23170.11	-23172.23
Dyads	185174	185174	185174	185174	185174	185174	185174
Bills	4534	4534	4534	4534	4534	4534	4534
Unique Firms	680	680	680	680	680	680	680

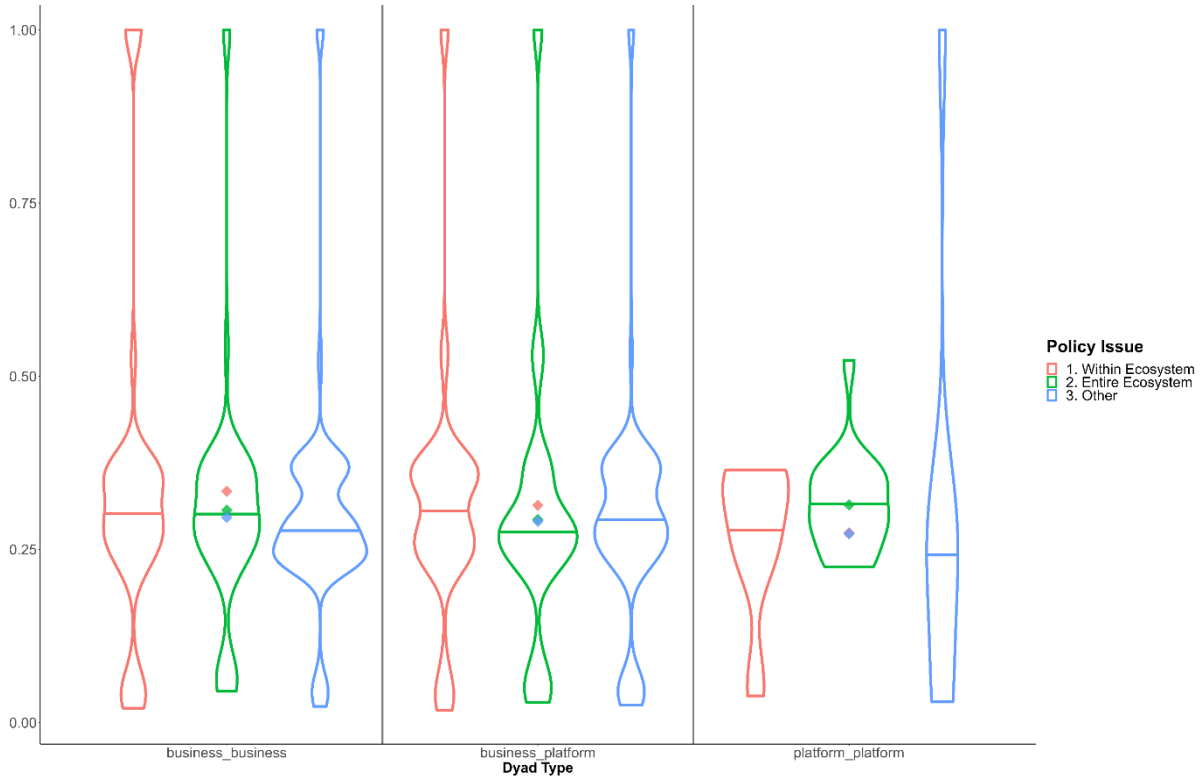
Note: *** p < 0.01; ** p < 0.05; * p < 0.1; Standard Errors in Parentheses

Table A3: Results of Multi-Level Logit Regressions on Whether Firms Lobby a Bill on the Same Issues

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
				Same Issue			
Platform Dependency	0.21***	0.21***	0.2***	0.21***	0.2***	0.21***	0.22***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Δ Intangible Assets	-0.01	-0.01	-0.01	-0.01	-0.01**	-0.01	-0.01
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Sectoral Similarity	0.2***	0.2***	0.2***	0.2***	0.2***	0.2***	0.2***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Δ Markup	-0.06***	-0.06***	-0.07***	-0.06***	-0.07***	-0.06***	-0.06***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Δ Employees	-0.02**	-0.02**	-0.02**	-0.02**	-0.02**	-0.02**	-0.02**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Δ Sales	0.02**	0.02***	0.02***	0.02**	0.02***	0.02***	0.02***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Δ Trade Exposure	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Number of Organizations	-0.31**	-0.32**	-0.31**	-0.31**	-0.32**	-0.31**	-0.32**
	(0.132)	(0.13)	(0.132)	(0.131)	(0.13)	(0.131)	(0.131)
Umbrella Organization	-0.07	-0.06	-0.07	-0.07	-0.07	-0.06	-0.07
	(0.083)	(0.083)	(0.083)	(0.083)	(0.083)	(0.083)	(0.083)
House	0.09	0.09	0.09	0.09	0.09	0.09	0.09
	(0.108)	(0.107)	(0.108)	(0.107)	(0.107)	(0.108)	(0.108)
Policy Areas							
- Miscellaneous	-0.16	-0.16	-0.16	-0.15	-0.16	-0.16	-0.17
	(0.187)	(0.187)	(0.187)	(0.186)	(0.187)	(0.187)	(0.187)
- Within Ecosystem	0.66***	0.67***	0.68***	0.67***	0.67***	0.67***	0.67***
	(0.234)	(0.233)	(0.233)	(0.233)	(0.233)	(0.233)	(0.233)
- Entire Ecosystem	-0.41	-0.41	-0.41	-0.41	-0.42	-0.41	-0.38
	(0.302)	(0.3)	(0.301)	(0.3)	(0.301)	(0.3)	(0.301)
- Trade	0.11	0.11	0.11	0.11	0.12	0.11	0.1
	(0.219)	(0.218)	(0.218)	(0.218)	(0.218)	(0.218)	(0.218)
- Security	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11	-0.11
	(0.145)	(0.145)	(0.145)	(0.145)	(0.145)	(0.145)	(0.145)
- Tax	1.94***	1.93***	1.94***	1.94***	1.93***	1.94***	1.93***
	(0.192)	(0.191)	(0.192)	(0.191)	(0.191)	(0.192)	(0.191)
- Economy	-0.24	-0.25	-0.25*	-0.25	-0.25	-0.25*	-0.25
	(0.151)	(0.151)	(0.151)	(0.15)	(0.151)	(0.151)	(0.151)
- Social	0.05	0.04	0.04	0.04	0.04	0.03	0.04
	(0.114)	(0.114)	(0.114)	(0.114)	(0.114)	(0.114)	(0.114)
- Politics	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12
	(0.119)	(0.118)	(0.118)	(0.118)	(0.118)	(0.118)	(0.118)
- Energy/Environment	-0.21	-0.21	-0.21	-0.21	-0.21	-0.21	-0.21
	(0.172)	(0.172)	(0.172)	(0.172)	(0.172)	(0.172)	(0.172)
Δ Intangible Assets *		0					
Sectoral Similarity		(0.008)					
Platform Dependency *			0.06***				
Δ Markup			(0.016)				
Δ Intangible Assets *				0.01*			
Δ Markup				(0.004)			
Platform Dependency *					0.08***		
Δ Intangible Assets					(0.021)		
Platform Dependency *						-0.01	
Within Ecosystem Policies						(0.085)	
Platform Dependency *							-0.17*
Entire Ecosystem Policies							(0.092)
Intercept	-0.1	-0.1	-0.11	-0.11	-0.1	-0.11	-0.1
	(0.207)	(0.203)	(0.207)	(0.204)	(0.204)	(0.206)	(0.207)
Session Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log Likelihood	-98257	-98256.79	-98250.93	-98255.37	-98249.17	-98256.98	-98255.22
Dyads	185174	185174	185174	185174	185174	185174	185174
Bills	4534	4534	4534	4534	4534	4534	4534
Unique Firms	680	680	680	680	680	680	680

Note: *** p < 0.01; ** p < 0.05; * p < 0.1; Standard Errors in Parentheses

Figure A1: Topical Similarity of Statements by Dyad Type and Policy Issue



Note: The topical similarity measure reflects the what-to-lobby-on component of preferences. The measure takes topical prevalence, i.e. how often is a topic mentioned, and topical similarity, how similar are the mentioned topics, into account. Topical prevalence is measured as the estimated likelihood of a sentence belonging to a given topic. The higher this likelihood, the higher the proportion of a sentence that is associated with the topic. Topical similarity, in turn, is the distance between two topical clusters. My measure of topical overlap takes the top three most prevalent issues for each interest group within a hearing and compares how similar each of the three topics is to its closest match from the top three issues of another interest group. The similarity vector is then multiplied with a vector containing the similarity of topical prevalence between the closest matches. To create a single score for each interest group dyad, I take the mean of the topical overlap vector. The measure ranges between 0 (complete divergence) and 1 (complete overlap).

Appendix for "Saving the Internet: The Success and Scope Conditions of Platform Outside Lobbying in US and EU Copyright Legislation"

Appendix A1: List of Newspapers and Factiva/Nexis Search Queries

SOPA/PIPA

Country	Paper	Type	Orientation	Database
USA	Washington Post	Quality	Liberal	Factiva
	New York Times		Liberal	Factiva
	Wall Street Journal		Conservative	Factiva

Language	Search Query
English (Factiva)	((Stop adj Online adj Piracy adj Act) OR (Protect adj IP adj Act) OR (Protect adj Intellectual adj Property adj Act) OR (Combating adj Online adj Infringement adj2 Counterfeits adj Act)) OR ((counterfeit* OR infringe* OR pirat* OR pirac*) near5 (onlin* OR internet OR web*))

EUCD

Country	Paper	Type	Orientation	Database
Germany	Sueddeutsche Zeitung (SZ)	Quality	Centre-left	Factiva
	Die Welt		Centre-right	Factiva
	Bild	Boulevard		Factiva
UK	The Guardian	Quality	Centre-left	Factiva
	The Times	Quality	Centre-right	Factiva
	The Sun	Boulevard		Factiva
France	Le Figaro	Quality	Right-wing	Factiva
	Le Monde		Centre-left	Nexis
Spain	El Pais	Quality	Centre-left	Factiva
	El Mundo		Centre-right	Factiva
Italy	Corriere della Sera	Quality	Centre-right	Factiva
	La Repubblica		Centre-left	Factiva
	Nazione	Boulevard	Right-wing	Factiva
Austria	Der Standard	Quality	Centre-Left	Factiva

	Die Presse		Centre-Right	Factiva
Polen	Gazeta Wyborcza	Quality	Centre-left	Factiva
	Rzeczpospolita		Centre-right	Factiva
	Fakt	Boulevard		Factiva
Netherlands	De Volkskrant	Quality	Centre-left	Nexis
	NRC Handelsblad		Centre-left	Nexis
	De Telegraaf	Boulevard		Nexis
Belgium (Wallonia)	Le Soir	Quality	Centre-left	Factiva
	La Libre (Belgique)		Centre-right	Factiva
	La Dernière Heure	Boulevard		Factiva
Luxembourg	Luxemburger Wort	Quality	Centre-right	Factiva
	Tageblatt		Centre-left	Factiva
Portugal	Publico	Quality	?	Factiva
	Jornal de Notícias		Centre-left	Factiva
	Correio da Manhã	Boulevard		Factiva
Ireland	The Irish Times	Quality	Liberal	Factiva
	Irish Examiner		Centrist	Factiva
Malta	Malta Today (biweekly)	Quality	Liberal	Factiva
	The Malta Independent		Liberal	Nexis

Notes:

- In case the newspaper of record could not be identified the largest two general themed, non-boulevard papers are selected. Size is determined by circulation.
- In Germany, Frankfurter Allgemeine Zeitung was not available through Nexis and Factiva and Die Welt, the second largest center right newspaper, was included instead.
- In France, Ireland, and Austria the biggest Boulevard papers (Le Parisien, The Irish Sun, and Kronen-Zeitung) are not available in the databases.
- In Malta, The Times of Malta is not available in the databases, instead I included Malta Today.
- In Spain, Luxembourg and Malta no large boulevard paper could be identified.

Language	**Search Query**
German	((urheberrechtsreform or urheberrechtsrichtlinie) near15 (EU or Europ*)) or ((urheberrecht* or copyright* or (geistig* adj eigentum)) near15 (((reform* or direktiv*) near15 (EU or Europ*)) or (digital* adj Binnenmarkt))) or (((urheberrecht* or copyright* or (geistig* adj eigentum)) near15 (EU or Europ*)) and ((Artikel* adj3 13) or (Artikel* adj3 11) or (Artikel adj3 15) or (Artikel adj3 17)))
English (Factiva)	((copyright* or (intellectual* adj propert*)) near15 (((reform* or directiv*) near15 (EU or europ*)) or (digital* adj single* adj market*))) or (((copyright* or (intellectual* adj propert*)) near15 (EU or europ*)) and ((articl* adj3 13) or (articl* adj3 11) or (articl* adj3 15) or (articl* adj3 17)))
English (Nexis)	((copyright! or (intellectual! PRE/1 propert!)) W/15 (((reform! or directiv!) W/15 (EU or europ!)) or (digital! PRE/1 single! PRE/1 market!))) or (((copyright! or (intellectual! PRE/1 propert!)) W/15 (EU or europ!)) and ((articl! PRE/3 13) or (articl! PRE/3 11) or (articl! PRE/3 15) or (articl! PRE/3 17)))
Spanish	((copyright* or (derech* adj de adj autor*) or (propiedad* adj intelectual*)) near15 (((directiv* or reform*) near15 (europ* or UE)) or (mercad* adj únic* adj digital*))) or ((copyright* or (derech*

		adj de adj autor*) or (propiedad* adj intelectual*)) and ((artícul* adj3 11) or (artícul* adj3 13) or (artícul* adj3 15) or (artícul* adj3 17)))
	French (Nexis)	((copyright! or (droit! PRE/1 d'auteur!) or (propriété! PRE/1 (littéraire! or artistique! or intellectuelle!))) W/15 (((directiv! or reform!) W/15 (europ! or UE)) or (marché! PRE/1 unique! PRE/1 numérique!))) or (((copyright! or (droit! PRE/1 d'auteur!) or (propriété! PRE/1 (littéraire! or artistique! or intellectuelle!))) W/15 (europ! or UE)) and ((articl! PRE/3 11) or (articl! PRE/3 13) or (articl! PRE/3 15) or (articl! PRE/3 17)))
	French (Factiva)	((copyright* or (droit* adj d'auteur*) or (propriété* adj (littéraire* or artistique* or intellectuelle*))) near15 (((directiv* or réform*) near15 (europ* or UE)) or (marché* adj unique* adj numérique*))) or (((copyright* or (droit* adj d'auteur*) or (propriété* adj (littéraire* or artistique* or intellectuelle*))) near15 (europ* or UE)) and ((articl* adj3 11) or (articl* adj3 13) or (articl* adj3 15) or (articl* adj3 17)))
	Italian	((copyright* or (diritt* adj d'autor*) or (propriet* adj intellettual*)) near15 (((direttiv* or riform*) near15 (europ* or UE)) or (mercat* adj unic* adj digital*))) or ((copyright* or (diritt* adj d'autor*) or (propriet* adj intellettual*)) and ((articol* adj3 11) or (articol* adj3 13) or (articol* adj3 15) or (articol* adj3 17)))
	Dutch (Nexis)	((copyright! or auteursrecht! or (intellectuel! PRE/1 eigendom!)) W/15 (((hervorm! or richtlijn!) W/15 (EU or Europ!)) or (digital! PRE/1 eengemaakt! PRE/1 markt!))) or (((copyright! or auteursrecht! or (intellectuel! PRE/1 eigendom!)) W/15 (EU or Europ!)) and ((artikel! PRE/3 11) or (artikel! PRE/3 13) or (artikel! PRE/3 15) or (artikel! PRE/3 17)))
	Dutch (Factiva)	((copyright* or auteursrecht* or (intellectuel* adj eigendom*)) near15 (((hervorm* or richtlijn*) near15 (EU or europ*)) or (digital* adj eengemaakt* adj markt*))) or (((copyright* or auteursrecht* or (intellectuel* adj eigendom*)) near15 (EU or Europ*)) and ((artikel* adj3 11) or (artikel* near3 13) or (artikel* near3 15) or (artikel* near3 17)))
	Portuguese	((copyright* or (direit* adj de adj autor*) or (propriedad* adj intelectual*)) near15 (((diretiv* or reform*) near15 (europ* or UE)) or (mercad* adj únic* adj digital*))) or (((copyright* or (direit* adj de adj autor*) or (propriedad* adj intelectual*)) near15 (europ* or UE)) and ((artigo* adj3 11) or (artigo* adj3 13) or (artigo* adj3 15) or (artigo* adj3 17)))
	Polish	((copyright* or (praw* adj autorsk*) or (własność* adj intelektual*)) near15 (((reform* or dyrektyw*) near15 (europ* or UE)) or (jednolit* adj rynku* adj cyfrow*))) or ((copyright* or (praw* adj autorsk*) or (własność* adj intelektual*)) and ((Artykuł* adj3 11) or (Artykuł* adj3 13) or (Artykuł* adj3 15) or (Artykuł* adj3 17)))

Appendix A2: List of Twitter Search Queries

SOPA/PIPA

Language	Search Query
English	#sopa OR (stop online piracy act) OR #pipa OR #protectip OR (protect IP act) OR (protect intellectual property act) OR #coica OR (combatting online infringement and copyright act)

EUCD

Language	Search Query
English	- (Copyright OR #copyrightreform OR #copyrightdirective) ((EU OR Commission OR Brussels OR Europe OR European OR euro OR Reda OR Oettinger OR Voss) OR ((Single Market) OR (Internal Market))) (directive OR reform OR proposal OR debate OR law OR bill OR initiative) - (Copyright OR #copyrightreform OR #copyrightdirective) ((#article13 OR #article11 OR #article17 OR #article15) OR ((article 11) OR (article 13) OR (article 17) OR (article 15)))
French	- (Copyright OR #copyrightreform OR #copyrightdirective OR (droit d'auteur) OR (droits d'auteur)) ((UE OR Commission OR Bruxelles OR Europe OR Européenne OR euro OR Reda OR Oettinger OR Voss) OR ((marché unique))) (directive OR réforme OR loi OR proposition OR débat OR (projet de législation) OR initiative) - ((droit d'auteur) OR (droits d'auteur)) ((#article13 OR #article11 OR #article17 OR #article15) OR ((article 11) OR (article 13) OR (article 17) OR (article 15)))
German	- (Copyright OR #copyrightreform OR #copyrightdirective OR Urheberrecht OR Urheberrechte) (EU OR Kommission OR Brüssel OR Europa OR Europäisch OR euro OR Reda OR Oettinger OR Voss OR Binnenmarkt) (richtlinie OR reform OR Gesetz OR entwurf OR Gesetzesentwurf OR Gesetzentwurf OR Debatte OR Initiative) - (Urheberrechtsreform OR Urheberrechtsrichtlinie OR Urheberrechtsgesetz) (EU OR Kommission OR Brüssel OR Europa OR Europäisch OR euro OR Reda OR Oettinger OR Voss OR Binnenmarkt) - (Copyright OR #copyrightreform OR #copyrightdirective OR Urheberrecht OR Urheberrechte OR Urheberrechtsreform OR Urheberrechtsrichtlinie) ((#article13 OR #artikel13 OR #article11 OR #artikel11 OR #article17 OR #artikel17 OR #article15 OR artikel15) OR ((Artikel 11) OR (artikel 13) OR (artikel 17) OR (artikel 15)))
Italian	- (Copyright OR #copyrightreform OR #copyrightdirective OR (diritto d'autore) OR (diritti d'autore)) ((UE OR Commissione OR Bruxelles OR Europa OR Europea OR euro OR Reda OR Oettinger OR Voss) OR ((mercato unico))) (direttiva OR riforma OR legge OR proposizione OR dibattito OR (disegno di legge) OR iniziativa) - (Copyright OR #copyrightreform OR #copyrightdirective OR (diritto d'autore) OR (diritti d'autore)) ((#article13 OR #articolo13 OR #article11 OR #articolo11 OR #article17 OR #articolo17 OR #article15 OR #articolo15) OR ((articolo 11) OR (articolo 13) OR (articolo 17) OR (articolo 15)))
Spanish	- (Copyright OR #copyrightreform OR #copyrightdirective OR (derecho de autor) OR (derechos de autor)) ((UE OR Comisión OR Bruselas OR Europa OR Europea OR euro OR Reda OR Oettinger OR Voss) OR ((mercado único))) (directiva OR reforma OR ley OR propuesta OR debate OR (proyecto de ley) OR iniciativa) - (Copyright OR #copyrightreform OR #copyrightdirective OR (derecho de autor) OR (derecho de autor)) ((#article13 OR #artículo13 OR #article11 OR #artículo11 OR #article17 OR #artículo17 OR #article15 OR #artículo15) OR ((artículo 11) OR (artículo 13) OR (artículo 17) OR (artículo 15)))
Portuguese	- (Copyright OR #copyrightreform OR #copyrightdirective OR (direito de autor) OR (direitos de autor)) ((UE OR Comissão OR Bruxelas OR Europa OR Europeia OR euro OR Reda OR Oettinger OR Voss) OR ((mercado comum))) (diretiva OR reforma OR lei OR rascunho OR debate OR (projeto de lei) OR iniciativa) - (Copyright OR #copyrightreform OR #copyrightdirective OR (direito de autor) OR (direitos de autor)) ((#artigo13 OR #artigo 13 OR #artigo11 OR #artigo11 OR #artigo17 OR #artigo17 OR #artigo15 OR #artigo15) OR ((artigo 11) OR (artigo 13) OR (artigo 17) OR (artigo 15)))
Polish	- (Copyright OR #copyrightreform OR #copyrightdirective OR (prawo autorskie) OR (prawa autorskie) OR (praw autorskich) OR (prawach autorskich)) ((UE OR Komisja OR Bruksela OR Europa OR Europejska OR euro OR Reda OR Oettinger OR Voss) OR ((jednolity rynek))) (dyrektywa OR reforma OR ustawa OR propozycja OR debata OR (projekt ustawy) OR inicjatywa) - ((prawo autorskie) OR (prawa autorskie) OR (praw autorskich) OR (prawach autorskich)) ((#article13 OR #artykuł13 OR #article11 OR #artykuł11 OR #article17 OR #artykuł17 OR #article15 OR #artykuł15) OR ((artykuł 11) OR (artykuł 13) OR (artykuł 17) OR (artykuł 15)))
Dutch	- (Copyright OR #copyrightreform OR #copyrightdirective OR auteursrecht OR auteursrechten) ((EU OR Commissie OR Brussel OR Europa OR Europese OR euro OR Reda OR Oettinger OR Voss) OR ((eengemaakte markt))) (richtlijn OR hervorming OR wet OR propositie OR debat OR Wetsvoorstel OR initiatief) - (Copyright OR #copyrightreform OR #copyrightdirective OR auteursrecht OR auteursrechten) ((#article13 OR #artikel13 OR #article11 OR #artikel11 OR #article17 OR #artikel17 OR #article15 OR artikel15) OR ((Artikel 11) OR (artikel 13) OR (artikel 17) OR (artikel 15)))
Hashtags	- #publishersright OR #Europeforcreators OR #Europeforcreativity OR #EUforCreators OR #yes2copyright OR #yes2creativity OR #manifesto4copyright OR #NoCreatorsNoContent OR #CreateyourInternet OR #WeNeedCopyrightDirective OR #creatorsrights OR #saveoursound OR #article13 OR #copyrightdirective OR #article11 OR #artikel13 OR #urheberrechtsreform OR

	#urheberrechtsrichtline OR #ACTA2 OR #StopActa2 OR #uploadfilter OR #uploadfilters OR #saveyourinternet OR #linktax OR #fixcopyright OR #censorshipmachine OR #savethelink

Appendix A3: Description of Data Gathering on Interest Inside and Outside Lobbying

The steps described below were executed in the R files "1. Identify IGs and scrape IG contact info and inside lobbying data" and "2. Scrape Interest Group Websites" for the EU and "1. SOPA_Scrape Open Secrets" and "2. SOPA_Scrape Interest Groups Websites" for the US.

1. Identify all interest groups that were active on copyright legislation

In the US, opensecrets.org curates data from the lobbying register. Interest groups have to indicate on which bills and topics they lobbied in a standardized way. I scraped the urls to all opensecrets.org interest group profiles for groups that lobbied either on SOPA, COICA/PIPA, or on copyright, trademarks, patents. I then manually added interest groups that send a letter in support of opposition to Congress.

In the EU, it is not possible to easily identify interest groups lobbying a specific legislation. However, the transparency register collects textual information on the goals/remit of an interest group and the main EU files targeted. Interest groups do not have to follow a standardized reporting procedure and reports are voluntary. To identify all interest groups that non-anonymously lobbied on copyright legislation, I used three methods. All methods focus on current and historic data cards curated by lobbyfacts.eu from data from the EU transparency register. First, I identified the urls leading to all data cards of interest groups that included the term "copyright" in the current reporting period (usually a year but depending on the interest group). I used the on-site search function. Second, I identified the urls leading to all historic data cards of interest groups that included the term "copyright". While there is no on-site function to search through historic data cards, Google can be used to do so. I programmed a Google Custom Search for https://lobbyfacts.eu/representative/* and searched for the term "copyright". To respect rate limits of the Google Custom Search API, I broke down searches to small time periods. Third, I extracted the transparency register identification number from all non-anonymous submissions to the public consultation on the review of the EU copyright rules in 2014. By appending the transparency register id to https://lobbyfacts.eu/search/node/ , I was able to retrieve interest groups' data card urls. I then combined the urls from these three methods and deleted duplicates.

2. Scrape their Contact Information and Inside Lobbying Activities

Using the list of urls, I scraped information on interest groups contact details and inside lobbying activities for the years between 2010 and 2012 (US) and 2015 and 2020 (EU). This includes their name, website, registration id, address, category/industry, subcategory (only EU), goal (only EU), issues (only EU), the reporting year, lobbying expenditure, hired lobbyists, revolvers (only US), access passes to the European Parliament (only EU), Meetings with European Commission officials (only EU), Inclusion in expert groups and industry forums (only EU), total budget (only EU), and affiliated members (only EU).

3. Identify Twitter Handles of Interest Groups

To get a first overview of interest group twitter handles, I extracted all twitter handles from their websites. After deleting duplicates, I exported the result and manually cleaned twitter handles that do not belong to a given interest groups and added those that were not included on their websites.

4. Use Google's Custom Search API to search websites and retrieve links to webpages referring to SOPA/PIPA/COICA or the EUCD

I then built a custom Google Search for all urls from the interest group websites (mainpages) and queried that search with the Google Custom Search API. For the US, I searched for "'Stop Online Piracy Act' OR 'Protect IP Act' OR 'Protect Intellectual Property Act'" and "'Combating Online Infringement and Counterfeits Act'". For the EU, I searched for "(copyright OR "intellectual property") AROUND(15) (EU OR Europe OR directive OR reform)" and its translations to the EU languages included in the sample. I broke down searches by language and time periods to respect rate limits. The search yielded subpages and documents referring to the bills. After identifying the links to these subpages I scraped the html contents of the links and/or download the linked files. If the link neither refers to html or a file, I copied and pasted the text from the link to a txt file.

Figure A1: Validity Measures English Dictionary (Newspapers)

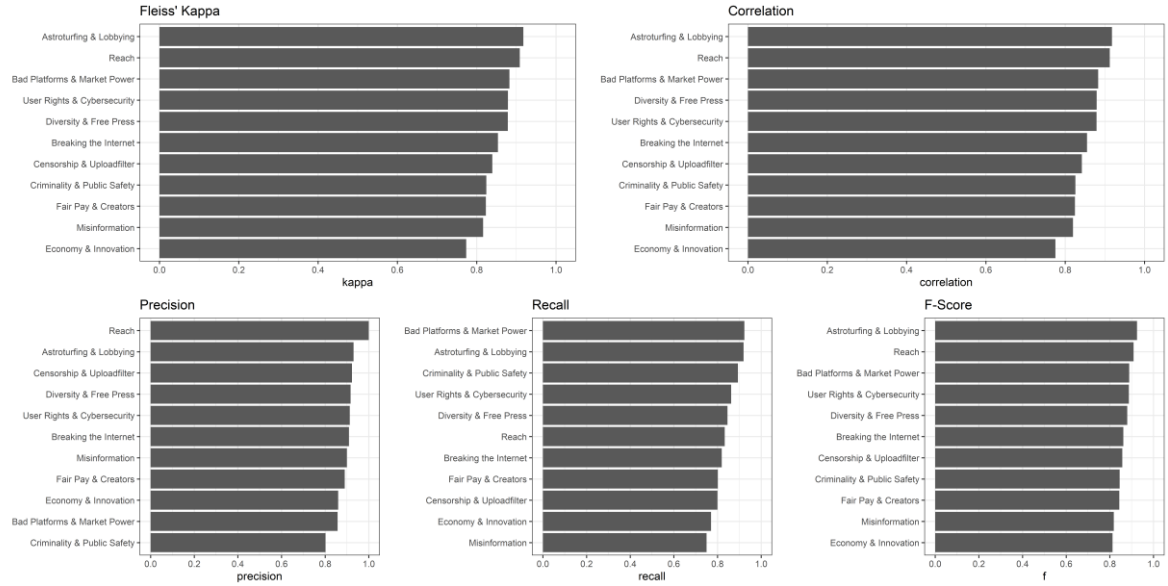
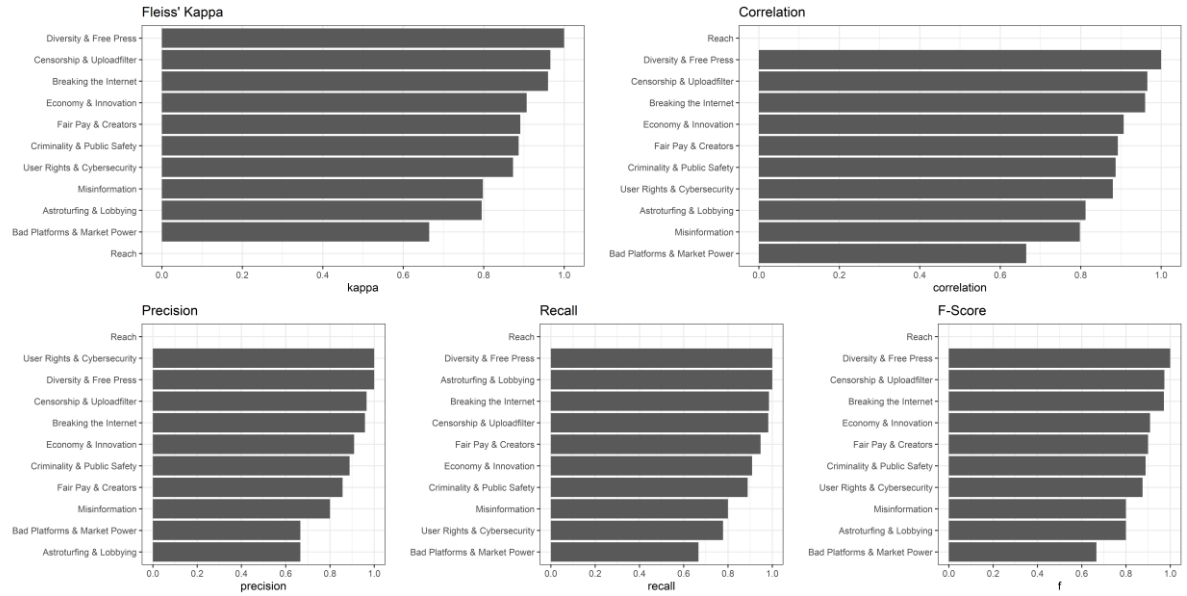


Figure A2: Validity Measures English Dictionary (Tweets)



Note: None of the English tweets in the hand-coding sample included the *Reach* frame.

Figure A3: Validity Measures German Dictionary (News)

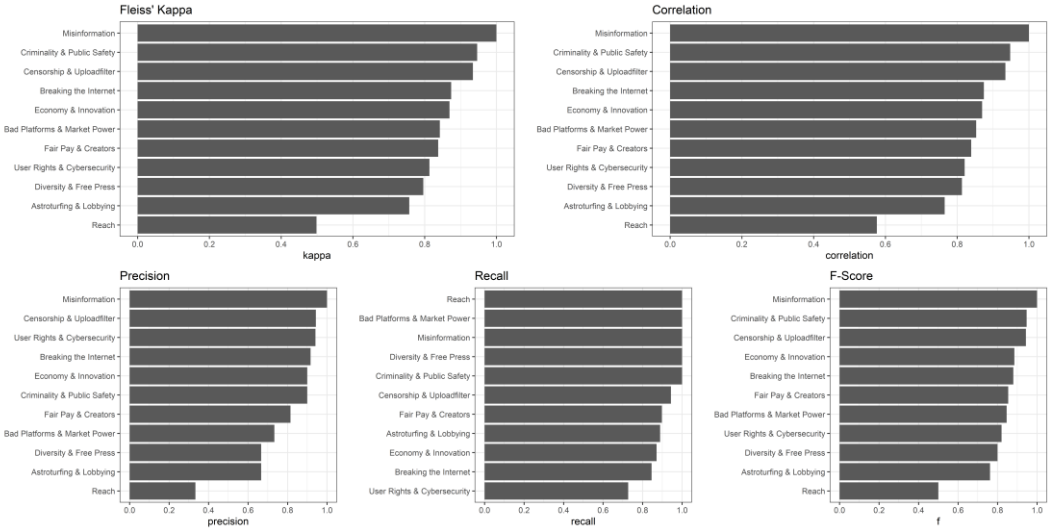
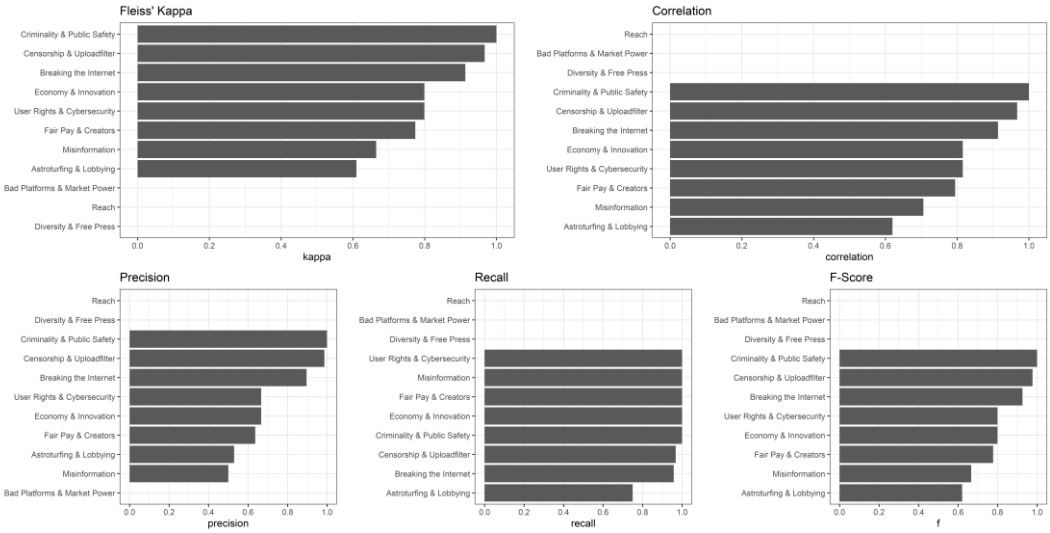


Figure A4: Validity Measures German Dictionary (Tweets)



Note: None of the German tweets in the hand-coding sample included the *Reach*, *Diversity & Free Press*, and *Bad Platforms & Market Power* frames.

Figure A5: Salience and Framing in Congresspeople's Tweets on SOPA/PIPA

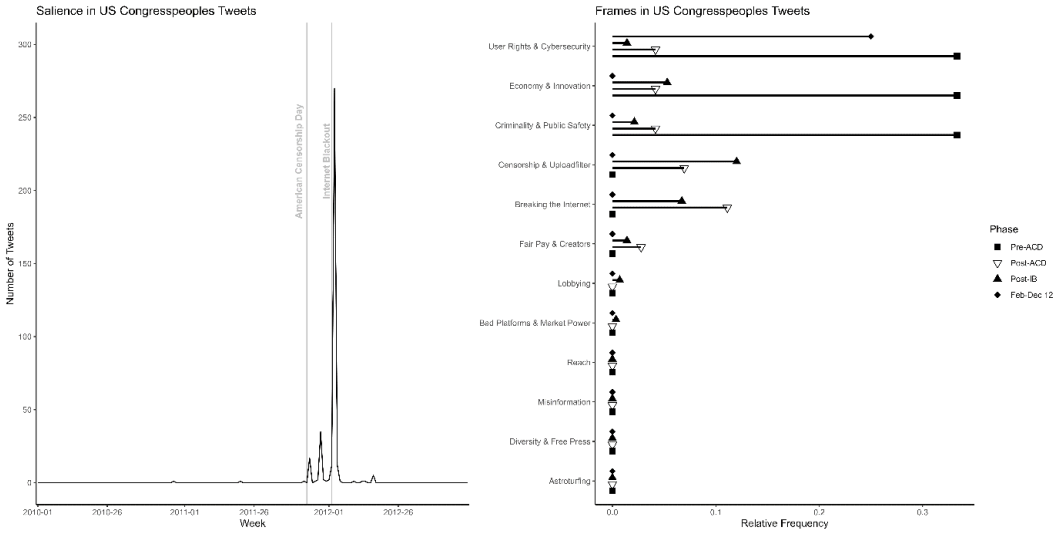


Figure A6: Salience and Framing in Newspaper Articles on EUCD

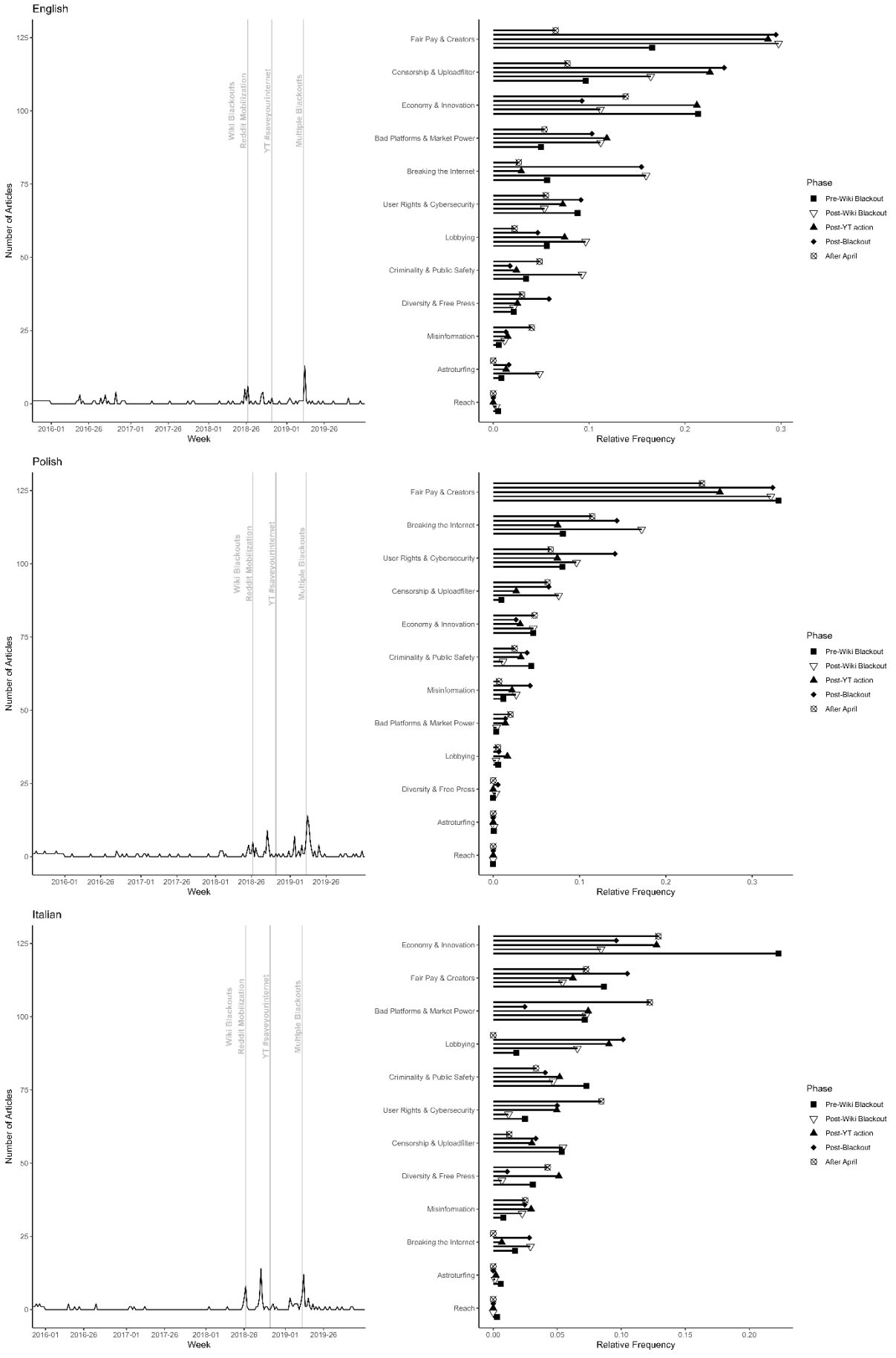


Figure A6: Salience and Framing in Newspaper Articles on EUCD (continued)

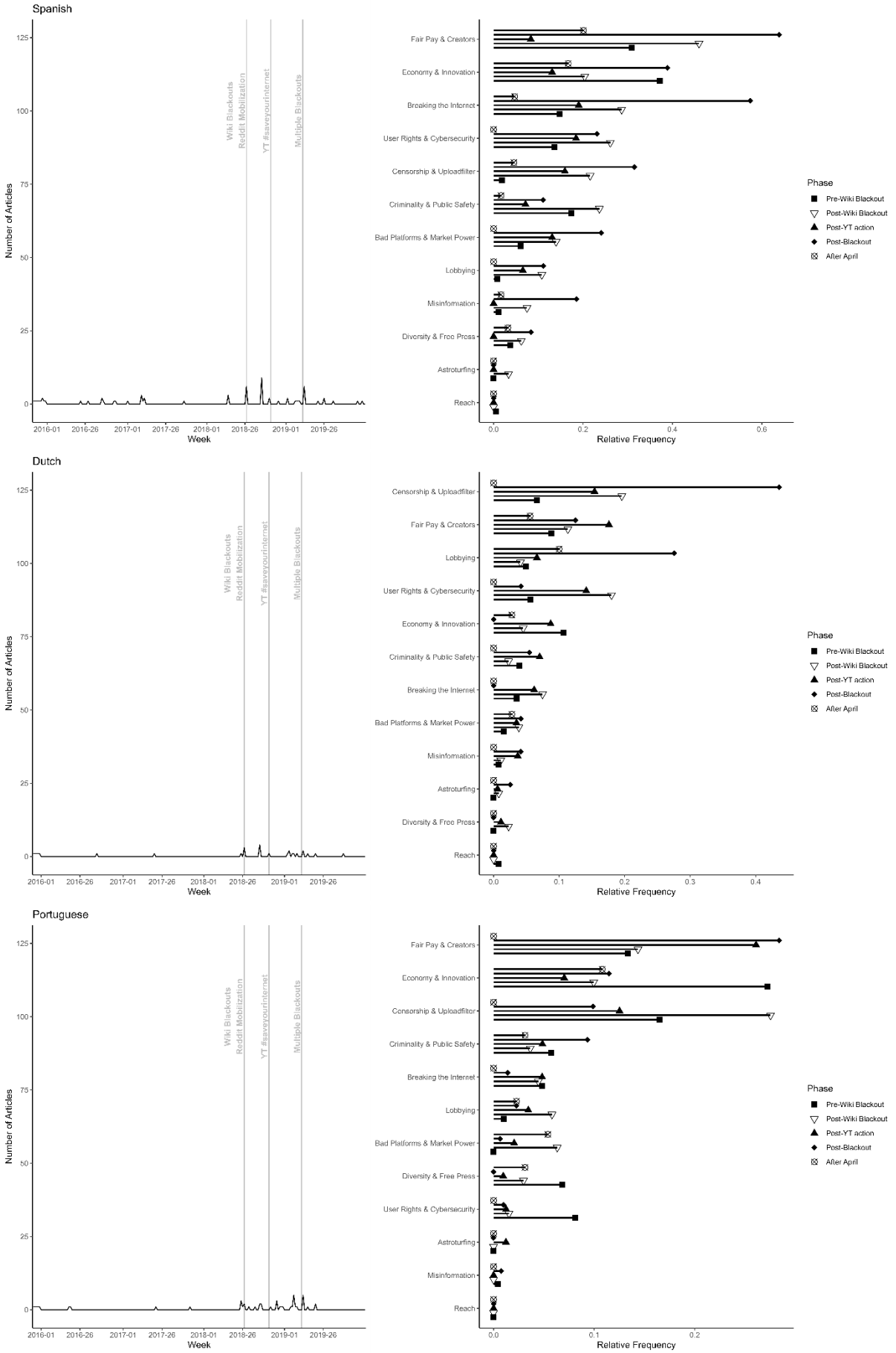


Figure A7: Salience and Framing in Tweets on EUCD

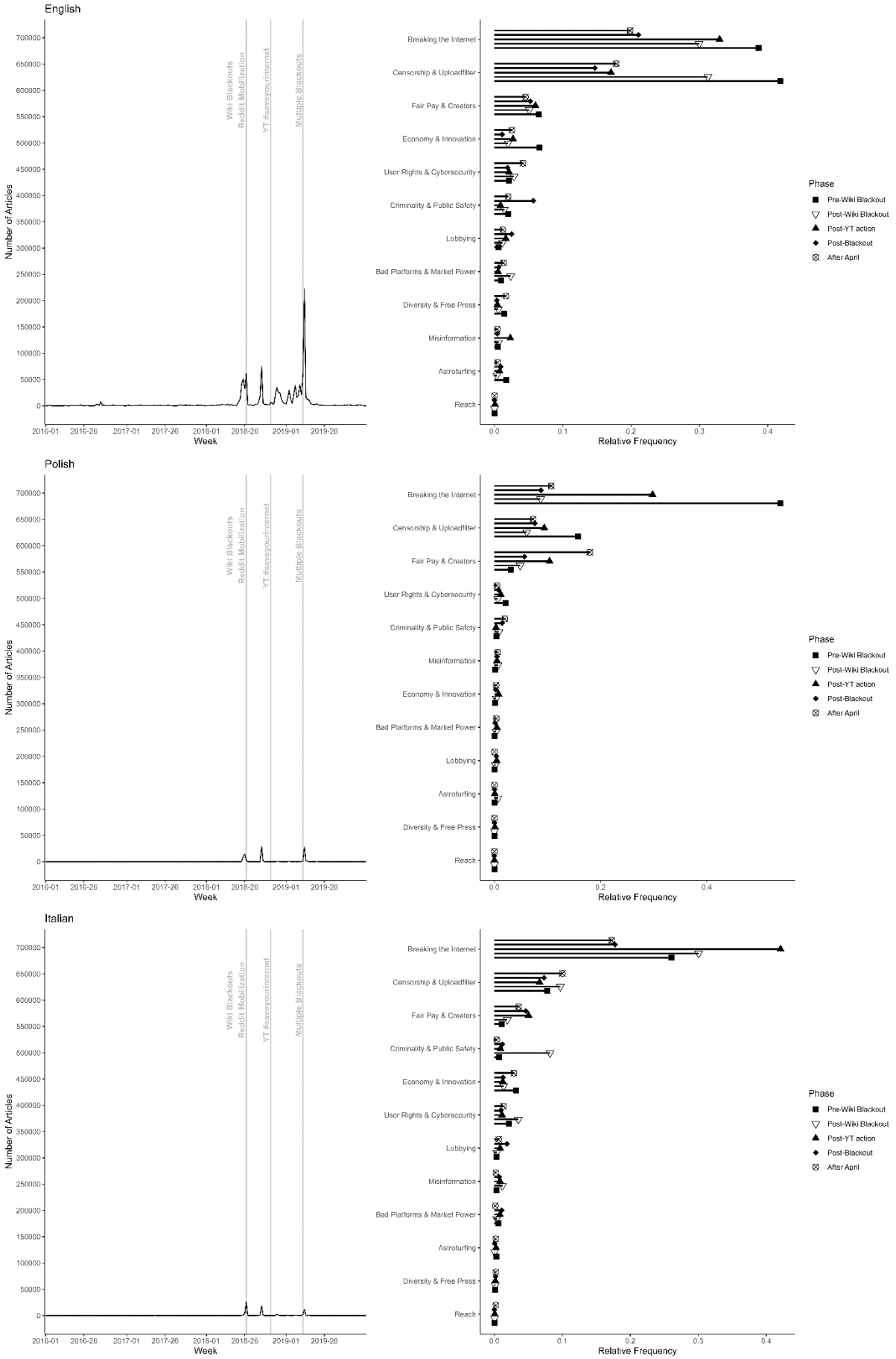


Figure A7: Salience and Framing in Tweets on EUCD (continued)

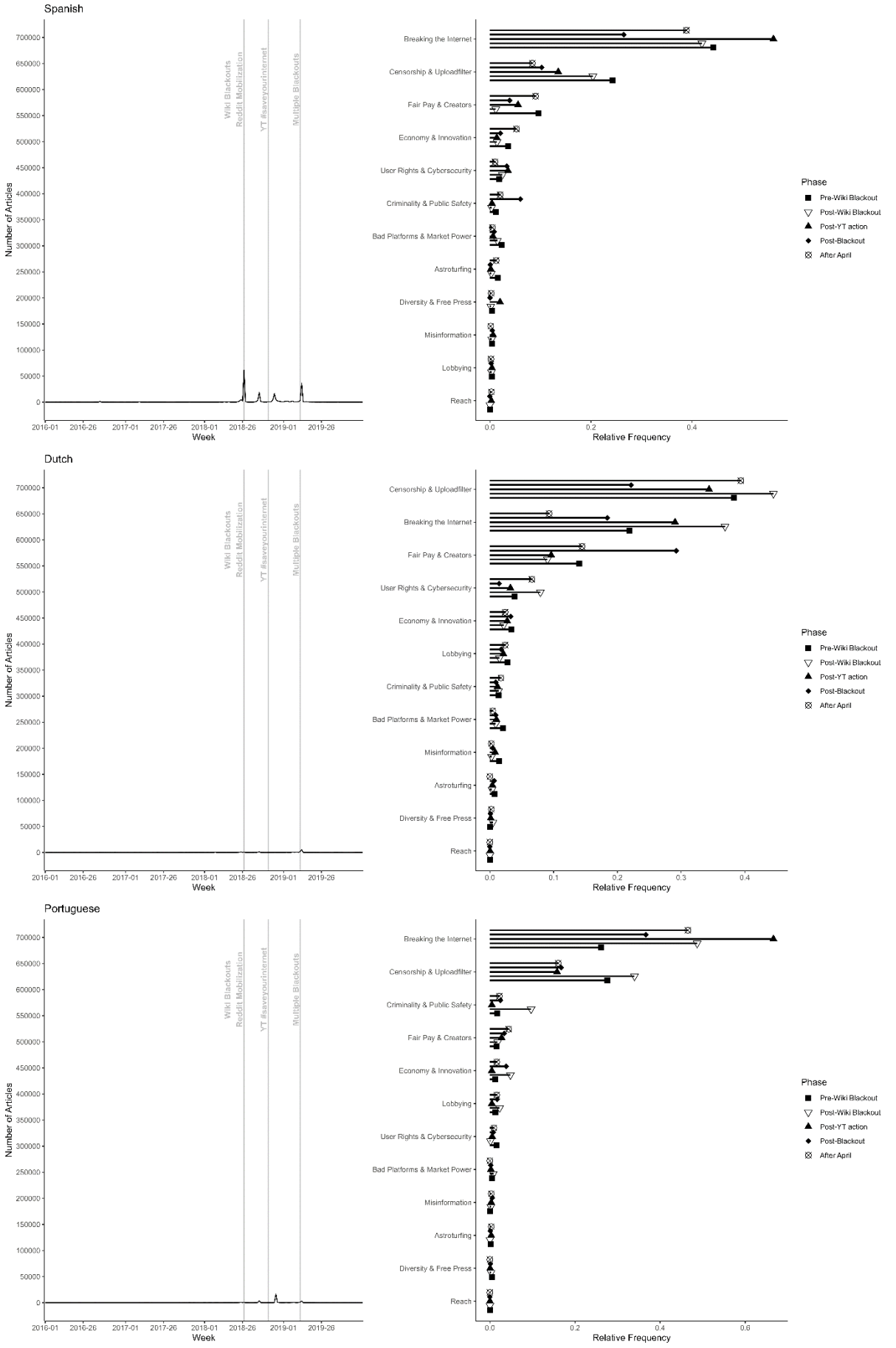


Table A1: Results of Granger-Causality Tests

Case and Language	Variables		F-Statistic	p
SOPA/PIPA	**diff_tweets**	→ diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_congress	1.45	0.21
	diff_news	→ diff_tweets, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_congress	1.00	0.40
	diff_IG_plat&civsoc	→ diff_tweets, diff_news, diff_IG_rh_cr, diff_congress	0.04	1.0
	diff_IG_rh_cr	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_congress	0.63	0.64
	diff_congress	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr	0.47	0.76
EUCD, All	**diff_tweets**	→ diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_meps	3.14	0.00**
	diff_news	→ diff_tweets, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_meps	3.56	0.00**
	diff_IG_plat&civsoc	→ diff_tweets, diff_news, diff_IG_rh_cr, diff_meps	1.66	0.10
	diff_IG_rh_cr	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_meps	0.48	0.87
	diff_meps	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr	1.98	0.05*
EUCD, EN	**diff_tweets**	→ diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_meps	4.80	0.00
	diff_news	→ diff_tweets, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_meps	0.43	0.91
	diff_IG_plat&civsoc	→ diff_tweets, diff_news, diff_IG_rh_cr, diff_meps	1.73	0.09*
	diff_IG_rh_cr	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_meps	0.37	0.93
	diff_meps	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr	0.64	0.75
EUCD, DE	**diff_tweets**	→ diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_meps	2.10	0.01*
	diff_news	→ diff_tweets, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_meps	0.80	0.65
	diff_IG_plat&civsoc	→ diff_tweets, diff_news, diff_IG_rh_cr, diff_meps	0.62	0.83
	diff_IG_rh_cr	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_meps	0.54	0.89
	diff_meps	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr	2.00	0.02*
EUCD, FR	**diff_tweets**	→ diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_meps	0.56	0.98
	diff_news	→ diff_tweets, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_meps	1.38	0.06.
	diff_IG_plat&civsoc	→ diff_tweets, diff_news, diff_IG_rh_cr, diff_meps	0.85	0.73
	diff_IG_rh_cr	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_meps	0.91	0.62
	diff_meps	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr	2.07	0.00**
EUCD, PL	**diff_tweets**	→ diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_meps	0.87	0.58
	diff_news	→ diff_tweets, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_meps	0.99	0.45
	diff_IG_plat&civsoc	→ diff_tweets, diff_news, diff_IG_rh_cr, diff_meps	1.51	0.11
	diff_IG_rh_cr	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_meps	1.00	0.44
	diff_meps	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr	0.99	0.46
EUCD, NL	**diff_tweets**	→ diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_meps	1.54	0.10
	diff_news	→ diff_tweets, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_meps	3.30	0.00**
	diff_IG_plat&civsoc	→ diff_tweets, diff_news, diff_IG_rh_cr, diff_meps	0.89	0.56
	diff_IG_rh_cr	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_meps	0.43	0.95
	diff_meps	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr	2.67	0.00**
EUCD, IT	**diff_tweets**	→ diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_meps	0.66	0.83
	diff_news	→ diff_tweets, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_meps	1.98	0.01*
	diff_IG_plat&civsoc	→ diff_tweets, diff_news, diff_IG_rh_cr, diff_meps	1.04	0.40
	diff_IG_rh_cr	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_meps	0.89	0.58
	diff_meps	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr	1.29	0.19
EUCD, ES	**diff_tweets**	→ diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_meps	2.54	0.01**
	diff_news	→ diff_tweets, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_meps	0.88	0.54
	diff_IG_plat&civsoc	→ diff_tweets, diff_news, diff_IG_rh_cr, diff_meps	1.96	0.05*
	diff_IG_rh_cr	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_meps	0.67	0.72
	diff_meps	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr	12.62	0.00**
EUCD, PT	**diff_tweets**	→ diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_meps	1.36	0.15
	diff_news	→ diff_tweets, diff_IG_plat&civsoc, diff_IG_rh_cr, diff_meps	1.47	0.10
	diff_IG_plat&civsoc	→ diff_tweets, diff_news, diff_IG_rh_cr, diff_meps	1.77	0.03*
	diff_IG_rh_cr	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_meps	0.98	0.48
	diff_meps	→ diff_tweets, diff_news, diff_IG_plat&civsoc, diff_IG_rh_cr	0.56	0.91

p-values: ** p< 0.01, * p<0.05, . p <0.1 ; Results of Granger Causality Tests on Vectorautoregressions.

Table A2: Negative Binomial Regression (SOPA)

	Newspaper Articles	Tweets
PLAT: American Censorship Day & PARL: SOPA Hearings	2.147*	1.829
	(0.972)	(1.438)
PLAT: Internet Blackout	2.876**	2.535*
	(1.052)	(1.101)
PARL: PIPA introduced	1.524	-1.1
	(0.978)	(1.031)
PARL: PIPA & COICA hearings	0.065	-0.76
	(0.904)	(1.436)
PARL: SOPA introduced	-0.664	0.364
	(1.037)	(1.277)
PARL: PIPA proceeds	0.958	-0.63
	(0.931)	(0.998)
Constant	2.459**	1.859.
	(0.474)	(0.948)
Count Newspaper Articles/Tweets$_{t-1}$	0.138	0.752*
	(0.106)	(0.33)
Count Newspaper Articles/Tweets$_{t-2}$	0.191.	0.03
	(0.098)	(0.29)
sigmasq	1.005	1.067
Observations	88	618
Log Likelihood	-413.783	-3696.928
Akaike's Information Criterion	847.567	7413.856
Bayesian Information Criterion	872.565	7458.153
Quasi Information Criterion	5871.086	2299439.698

Note: . p<0.1, * p<0.05, ** p<0.01

Table A3: Negative Binomial Regression (EUCD – Newspaper Articles)

	Full sample	German	English	Spanish	French	Italian	Dutch	Polish	Portuguese
	Count Newspaper Articles								
PLAT: Wikipedia Blackouts &	1.796.	1.932	1.922	3.065	2.906.	2.207	2.062	1.124	0.216
PARL: EP re-opens debate	(1.037)	(1.89)	(2.21)	(2.59)	(1.735)	(1.879)	(3.595)	(1.88)	(2.159)
PLAT: YouTube Ads	0.002	0.45	-0.485	-0.502	-0.037	-0.153	1.057	-0.264	0.986
	(0.651)	(1.361)	(1.302)	(1.77)	(1.179)	(1.142)	(2.36)	(1.223)	(1.388)
PLAT: Multiple Platforms Blackout &	2.357*	2.726	2.366	1.713	1.959	2.437	1.182	2.348	2.119
PARL: EP passes EUCD	(1.06)	(2.074)	(2.195)	(2.433)	(1.811)	(1.73)	(3.856)	(2.055)	(2.184)
PARL: EP proceeds to trilogue	1.913.	1.414	1.78	3.707	2.774	2.294	3.698	2.228	1.758
	(1.088)	(1.888)	(2.209)	(2.603)	(2.108)	(1.904)	(3.699)	(1.997)	(2.136)
PARL: Council approves EUCD	0.54	0.902	-0.082	-10.37	0.043	1.188	-1.206	-0.047	0.961
	(1.008)	(1.957)	(1.961)	(13.337)	(1.723)	(1.721)	(3.632)	(1.885)	(2.1)
Constant	2.696**	1.897**	1.643**	0.377	1.969**	1.382**	0.406	2.167**	1.325**
	(0.455)	(0.448)	(0.314)	(0.372)	(0.335)	(0.306)	(0.593)	(0.319)	(0.324)
Count Newspaper Articles$_{t-1}$	0.355**	0.363.	0.14	-0.51	0.167	0.291	0.124	0.151	0.104
	(0.131)	(0.212)	(0.213)	(0.368)	(0.204)	(0.208)	(0.458)	(0.17)	(0.209)
Count Newspaper Articles$_{t-2}$							0.262		
							(0.413)		
Count Newspaper Articles$_{t-3}$							0.302		
							(0.43)		
sigmasq	1.151	3.974	4.671	6.589	3.541	3.143	14.653	4.201	5.381
Observations	86	86	86	86	86	86	86	86	86
Log Likelihood	-438.841	-266.047	-188.937	-95.275	-253.563	-216.466	-94.851	-239.771	-151.817
Akaike's Information Criterion	893.682	548.095	393.874	206.55	523.125	448.933	209.701	495.542	319.634
Bayesian Information Criterion	913.501	567.913	413.692	226.369	542.944	468.752	234.475	515.36	339.452
Quasi Information Criterion	12298.939	9958.885	3875.624	1880.734	5842.433	3921.606	5086.418	5595.791	2546.149

Note: . p<0.1, * p<0.05, ** p<0.01

Table A4: Negative Binomial Regression (EUCD – Tweets)

	Full sample	German	English	Spanish	French	Italian	Dutch	Polish	Portuguese
					Count Tweets				
PLAT: Wikipedia Blackouts &	1.777**	0.62	1.593*	3.98**	1.236	4.01*	1.401	-0.833	0.795
PARL: EP re-opens debate	(0.638)	(1.104)	(0.701)	(0.973)	(2.164)	(1.729)	(1.278)	(1.904)	(1.809)
PLAT: YouTube Ads	0.155	0.872	-0.055	-0.178	0.695	0.171	-1.291	-1.306	-0.346
	(0.443)	(2.06)	(0.451)	(0.622)	(1.728)	(1.193)	(1.107)	(1.258)	(1.411)
PLAT: Multiple Platforms Blackout	1.399*	1.23	1.393*	1.345	0.306	1.715	1.819	1.401	0.319
	(0.649)	(1.136)	(0.703)	(0.903)	(2.16)	(1.41)	(1.357)	(1.773)	(1.675)
PARL: EP proceeds to trilogue	1.881**	1.309	1.708*	1.629	1.11	3.262.	1.56	4.531*	1.231
	(0.671)	(1.192)	(0.741)	(0.996)	(2.241)	(1.756)	(1.417)	(2.051)	(2.25)
PARL: EP passes EUCD	2.13**	1.593	2.748**	2.717**	1.877	2.267	2.453	3.386.	1.041
	(0.683)	(1.16)	(0.792)	(1.03)	(2.279)	(1.767)	(1.597)	(1.887)	(1.998)
PARL: Council approves EUCD	1.336*	1.339	1.065	0.643	1.042	1.707	2.057	-0.348	-0.098
	(0.634)	(1.123)	(0.687)	(1.085)	(2.363)	(1.621)	(1.387)	(1.751)	(2.486)
Constant	2.097**	1.678**	2.638**	2.386**	1.627.	1.843**	1.223*	1.388**	0.959
	(0.467)	(0.634)	(0.521)	(0.434)	(0.947)	(0.528)	(0.52)	(0.467)	(0.624)
Count $Tweets_{t-1}$	0.531**	0.563*	0.527**	0.709**	0.596.	0.575	0.539*	0.48	1**
	(0.164)	(0.279)	(0.196)	(0.187)	(0.359)	(0.359)	(0.252)	(0.331)	(0.318)
Count $Tweets_{t-2}$	0.02	0.083	0.122	-0.133	0.147	-0.001	0.104	-0.114	-0.211
	(0.179)	(0.321)	(0.16)	(0.164)	(0.324)	(0.295)	(0.151)	(0.342)	(0.292)
Count $Tweets_{t-3}$	0.192	0.248						0.152	
	(0.169)	(0.303)						(0.365)	
Count $Tweets_{t-4}$	0.02	-0.086						0.13	
	(0.121)	(0.197)						(0.409)	
Count $Tweets_{t-5}$								0.081	
								(0.356)	
Count $Tweets_{t-6}$								0.177	
								(0.35)	
Count $Tweets_{t-7}$								-0.138	
								(0.239)	
sigmasq	0.488	1.504	0.575	0.988	5.714	2.274	1.98	3.768	3.376
Observations	606	606	606	606	606	606	606	606	606
Log Likelihood	-4932.717	-4049.889	-4503.868	-3316.66	-3409.449	-2449.245	-2167.506	-2240.608	-2047.939
Akaike's Information Criterion	9889.434	8123.778	9027.735	6653.319	6838.899	4918.489	4355.013	4511.215	4115.878
Bayesian Information Criterion	9942.356	8176.7	9071.837	6697.421	6883	4962.591	4399.114	4577.368	4159.979
Quasi Information Criterion	2120837.713	1833692.275	741320.93	362295.011	483678.341	211270.626	33021.807	415728.167	100322.698

Note: . p<0.1, * p<0.05, ** p<0.01

Table A5: Vectorautoregression (SOPA)

	Endogenous Variables:				
	Framing Tweets	**Framing News**	**Framing Anti-Copyright Coalition**	**Framing Pro-Copyright Coalition**	**Framing Congresspeople**
Framing Congresspeople$_{t-1}$	0.039 (0.033)	-0.015 (0.054)	0.051 (0.073)	0.03 (0.197)	0.035 (0.078)
Framing Anti-Copyright Coalition$_{t-1}$	-0.004 (0.049)	0.005 (0.013)	0.046 (0.048)	0.002 (0.035)	-0.001 (0.013)
Framing Pro-Copyright Coalition$_{t-1}$	0.004 (0.05)	0.02 (0.013)	-0.01 (0.071)	0.116* (0.051)	0 (0.008)
Framing News$_{t-1}$	0.065 (0.068)	0.002 (0.051)	0.067 (0.068)	0.052 (0.112)	0.033 (0.021)
Framing Tweets$_{t-1}$	0.483** (0.061)	0.02. (0.011)	0.008 (0.032)	0.034 (0.03)	0.009 (0.006)
Constant	-9.893** (1.849)	0.603 (0.616)	-8.84** (1.595)	6.99** (1.46)	0.079 (0.452)
	Exogenous Variables				
PLAT: American Censorship Day & PARL: SOPA Hearings	-18.901. (11.058)	-8.115 (38.827)	-13.384 (59.57)	-26.541 (42.31)	-52.828 (60.097)
PLAT: Internet Blackout	-19.233 (27.534)	-45.037** (2.864)	-24.696** (7.945)	-27.75 (43.686)	-37.187** (2.519)
PARL: PIPA introduced	1.679 (10.596)	11.72 (37)	3.219 (96.53)	42.765 (52.332)	0.026 (0.768)
PARL: PIPA/COICA Hearings	7.161 (39.808)	-0.902 (1.052)	73.482 (113.229)	-16.196 (28.367)	-0.031 (0.518)
PARL: SOPA introduced	-42.406** (12.546)	1.988 (5.016)	-72.271** (13.014)	19.615 (79.921)	0.331 (1.974)
PARL: PIPA proceeds	1.951 (8.427)	0.982 (1.529)	-0.24 (12.072)	-19.729 (13.436)	0.507 (0.761)
Weekend	0.199 (2.414)	-0.984 (1.006)	6.824** (2.033)	-6.769** (1.963)	-0.002 (0.552)
Observations			619		
R2	0.247	0.044	0.06	0.045	0.1
Resid. Std. Error	27.364 (df=606)	11.537 (df=606)	25.394 (df=606)	26.907 (df=606)	9.196 (df=606)
F-Statistic	16.53 (df=12;606)	2.31 (df=12;606)	3.21 (df=12;606)	2.38 (df=12;606)	5.64 (df=12;606)
Log Likelihood			-13316.409		

Note: . p<0.1, * p<0.05, ** p<0.01

Table A6: Vectorautoregression (EUCD – Full Sample)

	Framing Tweets	Framing News	Framing Anti-Copyright Coalition	Framing Pro-Copyright Coalition	Framing MEPs
Endogenous Variables:					
Framing $Tweets_{t-1}$	0.632** (0.065)	-0.038 (0.041)	0.192 (0.121)	0.049 (0.091)	0.306* (0.132)
Framing $News_{t-1}$	0.056* (0.027)	0.024 (0.033)	0.047 (0.081)	-0.191** (0.068)	0.088 (0.096)
Framing Anti-Copyright $Coalition_{t-1}$	0 (0.015)	0.018 (0.013)	0.107* (0.047)	-0.022 (0.03)	0.066 (0.04)
Framing Pro-Copyright $Coalition_{t-1}$	-0.023 (0.022)	-0.003 (0.024)	-0.001 (0.059)	0.141** (0.044)	-0.05 (0.053)
Framing $MEPs_{t-1}$	0.014 (0.017)	0.032. (0.017)	0.096. (0.052)	-0.01 (0.041)	0.109* (0.047)
Framing $Tweets_{t-2}$	0.129* (0.058)	0.052 (0.056)	0.178 (0.137)	0.14 (0.098)	-0.087 (0.128)
Framing $News_{t-2}$	0.061 (0.052)	0.026 (0.035)	0.105 (0.09)	-0.092 (0.085)	0.005 (0.144)
Framing Anti-Copyright $Coalition_{t-2}$	0.024 (0.015)	-0.01 (0.012)	0.06 (0.044)	-0.043 (0.03)	0.03 (0.042)
Framing Pro-Copyright $Coalition_{t-2}$	-0.015 (0.024)	0.016 (0.022)	0.032 (0.054)	0.056 (0.04)	0.019 (0.053)
Framing $MEPs_{t-2}$	-0.024 (0.015)	-0.009 (0.026)	0.07 (0.043)	0.024 (0.034)	0.08. (0.046)
Constant	-8.961** (2.183)	3.242 (2.698)	-20.288** (5.105)	11** (4.045)	-4.199 (4.816)
Exogenous Variables					
PLAT: Wikipedia Blackouts & PARL: EP re-opens Debate	2.416 (10.607)	25.704 (27.936)	-6.609 (36.016)	-0.051 (25.426)	-20.664 (62.534)
PLAT: YouTube Ads	1.279 (16.804)	-8.868 (26.103)	-0.871 (17.478)	1.899 (16.383)	31.001 (26.852)
PLAT: March Blackouts	7.09 (4.828)	-10.42 (19.26)	-19.071 (12.394)	24.007 (49.853)	2.317 (11.256)
PARL: Trilogue	4.438 (22.472)	2.254 (9.968)	-24.843 (36.298)	-11.71 (42.621)	15.606 (56.276)
PARL: EP passes EUCD	10.742 (15.023)	-10.581 (9.567)	-32.016 (21.974)	11.813 (34.206)	1.953 (21.161)
PARL: Council approves EUCD	13.983 (9.868)	-28.667 (49.05)	8.296 (40.066)	7.827 (13.573)	-8.31 (34.004)
Weekend	-5.845** (1.475)	-2.186 (1.59)	11.037* (4.261)	0.423 (3.338)	10.468** (3.594)
Observations			606		
R2	0.569	0.026	0.122	0.069	0.093
Resid. Std. Error	15.86 (df=588)	17.988 (df=588)	44.138 (df=588)	32.131 (df=588)	40.234 (df=588)
F-Statistic	45.6 (df=17;588)	0.93 (df=17;588)	4.8 (df=17;588)	2.56 (df=17;588)	3.55 (df=17;588)
Log Likelihood			-14281.383		

Note: . p<0.1, * p<0.05, ** p<0.01

Table A7: Vectorautoregression (EUCD – German)

	Endogenous Variables:				
	Framing Tweets	**Framing News**	**Framing Anti-Copyright Coalition**	**Framing Pro-Copyright Coalition**	**Framing MEPs**
Framing $Tweets_{t1}$	0.333**	0.019	0.121.	0.12*	0.049
	(0.059)	(0.017)	(0.072)	(0.053)	(0.063)
Framing $News_{t-1}$	-0.031	0.072	0.055	-0.027	-0.163.
	(0.048)	(0.081)	(0.122)	(0.106)	(0.096)
Framing Anti-Copyright $Coalition_{t-1}$	-0.012	0.003	0.11*	-0.021	0.028
	(0.025)	(0.009)	(0.049)	(0.03)	(0.041)
Framing Pro-Copyright $Coalition_{t-1}$	-0.012	0.002	0.036	0.152**	0.005
	(0.033)	(0.016)	(0.056)	(0.045)	(0.051)
Framing $MEPs_{t-1}$	0.023	0.063*	0.051	0.008	0.215**
	(0.022)	(0.03)	(0.048)	(0.045)	(0.061)
Framing $Tweets_{t-2}$	0.142*	-0.001	0.017	-0.012	-0.027
	(0.065)	(0.016)	(0.083)	(0.052)	(0.055)
Framing $News_{t-2}$	0.034	-0.024	0.098	-0.087	0.126
	(0.044)	(0.039)	(0.122)	(0.122)	(0.106)
Framing Anti-Copyright $Coalition_{t-2}$	-0.001	-0.003	0.05	-0.035	0.03
	(0.028)	(0.008)	(0.044)	(0.031)	(0.034)
Framing Pro-Copyright $Coalition_{t-2}$	0.015	0.012	0.05	0.07.	-0.062
	(0.035)	(0.021)	(0.053)	(0.041)	(0.045)
Framing $MEPs_{t-2}$	-0.007	0	0.139**	0.05	0.087.
	(0.023)	(0.015)	(0.052)	(0.046)	(0.049)
Framing $Tweets_{t-3}$	0.196**	-0.02	0.163*	-0.093.	-0.04
	(0.052)	(0.021)	(0.075)	(0.056)	(0.057)
Framing $News_{t-3}$	-0.035	0.022	-0.058	0.071	-0.031
	(0.042)	(0.062)	(0.076)	(0.085)	(0.17)
Framing Anti-Copyright $Coalition_{t-3}$	0.036	0.014	0.096*	0.025	0.014
	(0.026)	(0.011)	(0.043)	(0.03)	(0.033)
Framing Pro-Copyright $Coalition_{t-3}$	0.002	0.025	0.012	0.063	0.034
	(0.034)	(0.02)	(0.055)	(0.041)	(0.053)
Framing $MEPs_{t-3}$	-0.015	0.012	0.002	-0.009	0.164**
	(0.021)	(0.016)	(0.046)	(0.04)	(0.054)
Constant	-16.1**	0.239	-16.843**	3.842	-12.356**
	(3.396)	(1.409)	(5.289)	(4.544)	(4.489)
	Exogenous Variables				
PLAT: Wikipedia Blackouts & PARL: EP re-opens Debate	-12.589	34.9	-0.272	-2.444	12.332
	(13.192)	(29.479)	(19.061)	(28.095)	(90.464)
PLAT: YouTube Ads	-21.966.	-19.026	-5.727	-0.874	16.85*
	(11.328)	(23.006)	(15.656)	(16.642)	(7.889)
PLAT: March Blackouts	8.67	-13.66**	-19.937	26.339	-35.694*
	(7.272)	(4.517)	(12.43)	(58.101)	(17.741)
PARL: Trilogue	-14.691**	-21.998*	0.882	-8.945	-45.006
	(4.111)	(8.96)	(63.806)	(44.21)	(100.843)
PARL: EP passes EUCD	12.596	-18.264	-20.85	14.097	-7.303
	(10.837)	(22.596)	(15.131)	(28.744)	(44.937)
PARL: Council approves EUCD	14.959**	-38.283	23.89	15.606.	-11.405
	(4.319)	(31.435)	(67.877)	(8.634)	(23.815)
Weekend	-5.56*	0.029	11.974**	1.09	14.466**
	(2.453)	(1.114)	(4.236)	(3.4)	(3.051)
Observations	605				
R2	0.325	0.109	0.132	0.062	0.173
Resid. Std. Error	24.972 (df=582)	13.986 (df=582)	44.069 (df=582)	32.405 (df=582)	37.119 (df=582)
F-Statistic	12.73 (df=22;582)	3.25 (df=22;582)	4.03 (df=22;582)	1.75 (df=22;582)	5.54 (df=22;582)
Log Likelihood	-14342.272				

Note: . p<0.1, * p<0.05, ** p<0.01

Table A8: Vectorautoregression (EUCD – English)

Endogenous Variables:

	Framing Tweets	Framing News	Framing Anti-Copyright Coalition	Framing Pro-Copyright Coalition	Framing MEPs
Framing $Tweets_{t-1}$	0.641**	0.007	0.189.	-0.105	0.277**
	(0.042)	(0.023)	(0.105)	(0.076)	(0.101)
Framing $News_{t-1}$	0.009	0.021	0.091	-0.037	0.175
	(0.075)	(0.041)	(0.189)	(0.137)	(0.182)
Framing Anti-Copyright $Coalition_{t-1}$	0	-0.003	0.12**	-0.025	0.035
	(0.017)	(0.009)	(0.041)	(0.03)	(0.04)
Framing Pro-Copyright $Coalition_{t-1}$	-0.015	0.013	-0.003	0.156**	-0.046
	(0.023)	(0.012)	(0.057)	(0.042)	(0.055)
Framing $MEPs_{t-1}$	0.009	0.006	0.083.	0.005	0.052
	(0.017)	(0.01)	(0.044)	(0.032)	(0.042)
Framing $Tweets_{t-2}$	0.106*	0.002	0.148	0.261**	-0.069
	(0.042)	(0.023)	(0.105)	(0.076)	(0.101)
Framing $News_{t-2}$	0.107	-0.016	0.006	-0.008	0.009
	(0.075)	(0.041)	(0.188)	(0.137)	(0.181)
Framing Anti-Copyright $Coalition_{t-2}$	0.036*	0.001	0.079.	-0.048	0.066.
	(0.016)	(0.009)	(0.041)	(0.03)	(0.04)
Framing Pro-Copyright $Coalition_{t-2}$	0.005	0.001	0.042	0.05	0.041
	(0.023)	(0.012)	(0.057)	(0.042)	(0.055)
Framing $MEPs_{t-2}$	-0.007	0.007	0.012	0.012	0.122**
	(0.018)	(0.01)	(0.044)	(0.032)	(0.042)
Constant	-8.518**	0.816	-22.9**	8.614**	-1.647
	(1.742)	(0.951)	(4.375)	(3.179)	(4.21)
Exogenous Variables					
PLAT: Wikipedia Blackouts & PARL: EP re-opens Debate	-7.753	13.119	-3.502	0.895	-7.827
	(15.572)	(8.497)	(39.099)	(28.408)	(37.627)
PLAT: YouTube Ads	5.374	5.799	-2.346	3.72	17.724
	(9.463)	(5.164)	(23.761)	(17.264)	(22.866)
PLAT: March Blackouts	2.593	-3.116	-25.173	29.026	40.241
	(15.485)	(8.449)	(38.88)	(28.249)	(37.416)
PARL: Trilogue	-5.461	-8.223	-22.842	-12.405	-4.93
	(15.35)	(8.376)	(38.543)	(28.004)	(37.091)
PARL: EP passes EUCD	9.973	-13.607	-34.195	13.45	-12.67
	(15.47)	(8.442)	(38.844)	(28.223)	(37.381)
PARL: Council approves EUCD	22.746	5.435	4.494	12.983	-22.616
	(15.38)	(8.392)	(38.617)	(28.057)	(37.163)
Weekend	-5.488**	-1.365	11.582**	-0.876	8.571*
	(1.62)	(0.884)	(4.069)	(2.956)	(3.915)
Observations	606				
R2	0.574	0.023	0.114	0.064	0.081
Resid. Std. Error	17.657 (df=588)	9.635 (df=588)	44.336 (df=588)	32.212 (df=588)	42.666 (df=588)
F-Statistic	46.58 (df=17;588)	0.83 (df=17;588)	4.45 (df=17;588)	2.37 (df=17;588)	3.06 (df=17;588)
Log Likelihood	-14009.708				

Note: . p<0.1, * p<0.05, ** p<0.01

Table A9: Vectorautoregression (EUCD – Spanish)

	Endogenous Variables:				
	Framing Tweets	**Framing News**	**Framing Anti-Copyright Coalition**	**Framing Pro-Copyright Coalition**	**Framing MEPs**
Framing $Tweets_{t-1}$	0.42** (0.045)	0.007 (0.009)	0.092 (0.072)	0 (0.047)	0.011 (0.014)
Framing $News_{t-1}$	-0.172 (0.236)	-0.008 (0.103)	0.448* (0.212)	-0.014 (0.148)	-0.074 (0.103)
Framing Anti-Copyright $Coalition_{t-1}$	0.037 (0.027)	0.012** (0.004)	0.147** (0.047)	-0.02 (0.028)	0.001 (0.006)
Framing Pro-Copyright $Coalition_{t-1}$	-0.039 (0.031)	0 (0.005)	0.019 (0.06)	0.144** (0.045)	-0.008 (0.015)
Framing $MEPs_{t-1}$	0.024 (0.075)	0.007 (0.068)	0.201* (0.083)	0.102. (0.06)	0.42 (0.511)
Framing $Tweets_{t-2}$	0.232** (0.043)	-0.018 (0.012)	0.136. (0.076)	0.125* (0.059)	0.006 (0.016)
Framing $News_{t-2}$	0.138 (0.191)	-0.119 (0.1)	0.164 (0.191)	-0.198 (0.336)	0.024 (0.112)
Framing Anti-Copyright $Coalition_{t-2}$	0.027 (0.022)	0.011* (0.004)	0.092* (0.044)	-0.035 (0.029)	0.007 (0.011)
Framing Pro-Copyright $Coalition_{t-2}$	-0.026 (0.031)	-0.003 (0.003)	0.052 (0.054)	0.058 (0.041)	0.023 (0.03)
Framing $MEPs_{t-2}$	-0.014 (0.038)	0.037 (0.079)	0.044 (0.154)	0.152** (0.052)	-0.146 (0.228)
Constant	-13.618** (2.874)	0.321 (0.49)	-26.947** (4.623)	7.938* (3.35)	-0.3 (0.521)
	Exogenous Variables				
PLAT: Wikipedia Blackouts & PARL: EP re-opens Debate	10.399 (14.384)	11.102 (30.72)	-15.3 (37.693)	-5.161 (27.637)	-13.264 (50.106)
PLAT: YouTube Ads	-21.85** (7.968)	-1.071 (1.255)	7.177 (18.236)	7.888 (16.937)	2.477 (1.843)
PLAT: March Blackouts	12.445 (19.22)	1.683 (3.715)	-31.109 (35.805)	25.199 (31.576)	62.866 (131.524)
PARL: Trilogue	3.098 (25.091)	-8.264 (45.448)	22.033 (66.13)	18.035 (23.784)	28.701 (110.991)
PARL: EP passes EUCD	24.986** (5.818)	-21.759 (78.538)	-28.671 (26.726)	20.818 (14.849)	-31.637 (62.413)
PARL: Council approves EUCD	10.98 (18.87)	0.983 (0.749)	3.544 (40.973)	7.834 (7.157)	2.1 (1.887)
Weekend	0.823 (2.427)	0.594 (0.537)	11.094** (4.25)	-0.13 (3.237)	1.523 (1.113)
Observations	606				
R2	0.366	0.093	0.098	0.063	0.21
Resid. Std. Error	24.819 (df=588)	5.874 (df=588)	44.729 (df=588)	32.238 (df=588)	13.597 (df=588)
F-Statistic	20.01 (df=17;588)	3.54 (df=17;588)	3.77 (df=17;588)	2.31 (df=17;588)	9.19 (df=17;588)
Log Likelihood	-13254.352				

Note: . p<0.1, * p<0.05, ** p<0.01

Table A10: Vectorautoregression (EUCD – French)

Endogenous Variables:

	Framing Tweets	Framing News	Framing Anti-Copyright Coalition	Framing Pro-Copyright Coalition	Framing MEPs
	0.32**	0.004	0.094	0.016	0.004
Framing $Tweets_{t-1}$	(0.049)	(0.014)	(0.071)	(0.051)	(0.032)
	0.115	0.05	0.021	-0.408*	0.23.
Framing $News_{t-1}$	(0.092)	(0.07)	(0.237)	(0.168)	(0.134)
Framing Anti-Copyright	0.039	0.005	0.113*	-0.022	0.011
$Coalition_{t-1}$	(0.031)	(0.007)	(0.048)	(0.033)	(0.019)
Framing Pro-Copyright	0.057	-0.003	0.002	0.153**	0.044
$Coalition_{t-1}$	(0.051)	(0.017)	(0.064)	(0.049)	(0.045)
	0.042	0.006	0.054	0.148**	-0.075
Framing $MEPs_{t-1}$	(0.037)	(0.018)	(0.072)	(0.052)	(0.059)
	0.039	-0.021	-0.012	0.002	0.032
Framing $Tweets_{t-2}$	(0.045)	(0.014)	(0.077)	(0.061)	(0.062)
	0.239*	-0.025	0.08	0.071	0.055
Framing $News_{t-2}$	(0.118)	(0.063)	(0.181)	(0.114)	(0.127)
Framing Anti-Copyright	0.016	0	0.062	-0.044	0.014
$Coalition_{t-2}$	(0.035)	(0.008)	(0.047)	(0.032)	(0.019)
Framing Pro-Copyright	-0.06	0.003	0.052	0.045	0.023
$Coalition_{t-2}$	(0.045)	(0.009)	(0.061)	(0.041)	(0.024)
	0.022	0.049.	0.113	-0.038	0.039
Framing $MEPs_{t-2}$	(0.035)	(0.026)	(0.073)	(0.059)	(0.061)
Framing $Tweets_{t-3}$	-0.011	0.007	-0.02	-0.008	0.015
	(0.054)	(0.012)	(0.072)	(0.044)	(0.025)
Framing $News_{t-3}$	0.005	-0.031	0.101	-0.168	-0.098
	(0.107)	(0.032)	(0.161)	(0.128)	(0.142)
Framing Anti-Copyright	-0.024	-0.007	0.094*	0.012	0.016
$Coalition_{t-3}$	(0.028)	(0.007)	(0.045)	(0.032)	(0.026)
Framing Pro-Copyright	0.051	-0.009	0.012	0.068	0.022
$Coalition_{t-3}$	(0.046)	(0.011)	(0.063)	(0.044)	(0.051)
Framing $MEPs_{t-3}$	0.021	0.01	0.055	0.028	0.021
	(0.054)	(0.027)	(0.057)	(0.046)	(0.145)
Framing $Tweets_{t-4}$	0.069	-0.014	-0.001	0.033	-0.059
	(0.056)	(0.016)	(0.068)	(0.046)	(0.06)
Framing $News_{t-4}$	0.129	0.048	0.04	0.237*	-0.134
	(0.097)	(0.063)	(0.204)	(0.116)	(0.165)
Framing Anti-Copyright	0.029	-0.008	0.058	0.039	0.016
$Coalition_{t-4}$	(0.029)	(0.009)	(0.048)	(0.03)	(0.018)
Framing Pro-Copyright	0.005	-0.007	0.023	-0.058	-0.05
$Coalition_{t-4}$	(0.047)	(0.011)	(0.062)	(0.06)	(0.033)
Framing $MEPs_{t-4}$	-0.039	0.035	-0.034	0.011	-0.009
	(0.042)	(0.027)	(0.082)	(0.046)	(0.049)
Framing $Tweets_{t-5}$	0.051	0.005	0.022	-0.014	0.063
	(0.043)	(0.012)	(0.067)	(0.048)	(0.042)
Framing $News_{t-5}$	-0.031	0.002	-0.166	0.008	-0.237
	(0.101)	(0.049)	(0.229)	(0.133)	(0.147)
Framing Anti-Copyright	0.019	0.006	0.09*	0.006	0.007
$Coalition_{t-5}$	(0.034)	(0.007)	(0.044)	(0.034)	(0.018)
Framing Pro-Copyright	-0.021	-0.018	-0.121.	0.07	0.017
$Coalition_{t-5}$	(0.042)	(0.022)	(0.066)	(0.048)	(0.046)
Framing $MEPs_{t-5}$	0.061.	0.02	0.033	0.048	-0.082
	(0.036)	(0.016)	(0.072)	(0.07)	(0.053)
Framing $Tweets_{t-6}$	0.001	-0.009	0.018	0.016	0.023
	(0.051)	(0.011)	(0.059)	(0.06)	(0.021)
Framing $News_{t-6}$	0.088	0.032	-0.044	-0.135	-0.22
	(0.113)	(0.063)	(0.16)	(0.158)	(0.242)
Framing Anti-Copyright	-0.019	-0.013	-0.068	-0.001	-0.038
$Coalition_{t-6}$	(0.03)	(0.008)	(0.046)	(0.034)	(0.027)
Framing Pro-Copyright	0.073	0.002	0.016	0.045	0.06
$Coalition_{t-6}$	(0.048)	(0.011)	(0.063)	(0.04)	(0.043)
Framing $MEPs_{t-6}$	0.023	0.027	0.083	-0.088	-0.077
	(0.037)	(0.022)	(0.063)	(0.053)	(0.087)
Framing $Tweets_{t-7}$	0.129**	0.003	0.038	-0.024	0
	(0.044)	(0.015)	(0.083)	(0.048)	(0.032)
Framing $News_{t-7}$	0.01	0.078*	-0.108	0.086	0.269
	(0.099)	(0.04)	(0.182)	(0.104)	(0.184)
Framing Anti-Copyright	-0.059.	0.005	0.08.	0.002	-0.006
$Coalition_{t-7}$	(0.033)	(0.008)	(0.043)	(0.041)	(0.017)
Framing Pro-Copyright	0.061	-0.006	0.052	-0.025	0.024
$Coalition_{t-7}$	(0.047)	(0.009)	(0.067)	(0.04)	(0.035)

Framing MEPs$_{t-7}$	-0.024	0.026	0.091.	-0.002	0.025
	(0.047)	(0.036)	(0.051)	(0.04)	(0.071)
Framing Tweets$_{t-8}$	0.011	-0.001	-0.063	0.046	-0.007
	(0.048)	(0.01)	(0.071)	(0.052)	(0.023)
Framing News$_{t-8}$	0.148	0.096.	-0.24	-0.001	-0.02
	(0.133)	(0.058)	(0.217)	(0.116)	(0.107)
Framing Anti-Copyright Coalition$_{t-8}$	0.045	-0.004	0.089.	-0.03	0.007
	(0.031)	(0.009)	(0.049)	(0.029)	(0.018)
Framing Pro-Copyright Coalition$_{t-8}$	-0.03	0.014	-0.031	0.049	-0.011
	(0.04)	(0.01)	(0.067)	(0.056)	(0.031)
Framing MEPs$_{t-8}$	-0.06	-0.037	0.091	0.032	0.018
	(0.053)	(0.027)	(0.084)	(0.049)	(0.091)
Framing Tweets$_{t-9}$	0.152**	0.01	-0.019	0.003	0.028
	(0.054)	(0.011)	(0.06)	(0.05)	(0.026)
Framing News$_{t-9}$	0.116	0.118*	0.027	0.055	0.096
	(0.16)	(0.053)	(0.174)	(0.118)	(0.105)
Framing Anti-Copyright Coalition$_{t-9}$	-0.033	0.01	0.032	-0.018	-0.014
	(0.027)	(0.008)	(0.046)	(0.033)	(0.022)
Framing Pro-Copyright Coalition$_{t-9}$	-0.018	0.013	0.041	0.023	-0.015
	(0.037)	(0.016)	(0.063)	(0.055)	(0.039)
Framing MEPs$_{t-9}$	-0.008	-0.064*	-0.045	0.035	0.032
	(0.034)	(0.032)	(0.062)	(0.045)	(0.062)
Constant	-3.108	0.42	-21.629**	2.793	-2.719
	(3.684)	(1.055)	(5.158)	(4.011)	(1.934)
Exogenous Variables					
PLAT: Wikipedia Blackouts & PARL: EP re-opens Debate	45.743	32.088*	-4.358	3.422	-31.515.
	(34.682)	(13.188)	(24.392)	(17.522)	(17.408)
PLAT: YouTube Ads	-35.477.	-1.688	-0.331	-3.706	-6.624
	(18.585)	(3.73)	(21.652)	(15.587)	(12.399)
PLAT: March Blackouts	-12.022	-5.139	7.829	21.812	114.519**
	(21.988)	(22.797)	(23.615)	(24.797)	(30.521)
PARL: Trilogue	-21.108.	7.317	-28.975	-6.234	22.711
	(11.973)	(15.839)	(44.86)	(51.597)	(61.843)
PARL: EP passes EUCD	-22.327	-2.672	-25.631	1.713	30.598
	(17.749)	(58.001)	(54.838)	(26.103)	(21.917)
PARL: Council approves EUCD	10.571.	-35.928	2.286	-2.779	33.7**
	(5.927)	(34.626)	(37.966)	(20.59)	(5.522)
Weekend	-6.787*	0.347	11.35*	0.302	4.891*
	(3.211)	(0.95)	(4.588)	(3.748)	(2.001)
Observations	599				
R2	0.323	0.184	0.158	0.112	0.155
Resid. Std. Error	29.778 (df=546)	9.318 (df=546)	44.629 (df=546)	32.326 (df=546)	24.414 (df=546)
F-Statistic	5.01 (df=52;546)	2.36 (df=52;546)	1.96 (df=52;546)	1.33 (df=52;546)	1.92 (df=52;546)
Log Likelihood	-13737.849				

Note: . p<0.1, * p<0.05, ** p<0.01

Table A11: Vectorautoregression (EUCD – Italian)

	Endogenous Variables:				
	Framing Tweets	**Framing News**	**Framing Anti-Copyright Coalition**	**Framing Pro-Copyright Coalition**	**Framing MEPs**
Framing Tweets$_{t-1}$	0.264**	0.004	0.052	0.031	0.004
	(0.063)	(0.004)	(0.062)	(0.035)	(0.019)
Framing News$_{t-1}$	0.561**	-0.025	-0.104	-0.146	-0.083
	(0.181)	(0.024)	(0.195)	(0.12)	(0.143)
Framing Anti-Copyright Coalition$_{t-1}$	0.005	0	0.135**	-0.019	0.026.
	(0.032)	(0.005)	(0.048)	(0.03)	(0.013)

Framing Pro-Copyright Coalition$_{t-1}$	0.04	0.002	0.037	0.147**	0.007
	(0.049)	(0.007)	(0.06)	(0.044)	(0.026)
Framing MEPs$_{t-1}$	0.006	-0.031	0.004	-0.032	0.074
	(0.054)	(0.053)	(0.068)	(0.037)	(0.143)
Framing Tweets$_{t-2}$	0.073	0.005	0.043	0.058	0.014
	(0.051)	(0.007)	(0.066)	(0.041)	(0.021)
Framing News$_{t-2}$	0.204	-0.002	-0.108	-0.083	0.131
	(0.145)	(0.021)	(0.231)	(0.281)	(0.116)
Framing Anti-Copyright Coalition$_{t-2}$	-0.037	-0.005	0.077.	-0.037	-0.021
	(0.033)	(0.005)	(0.045)	(0.03)	(0.016)
Framing Pro-Copyright Coalition$_{t-2}$	0.047	0.014.	0.064	0.065.	0.026
	(0.044)	(0.008)	(0.056)	(0.039)	(0.021)
Framing MEPs$_{t-2}$	0.037	0.001	-0.02	0.01	-0.037
	(0.059)	(0.014)	(0.074)	(0.061)	(0.068)
Framing Tweets$_{t-3}$	0.067	-0.015	0.015	-0.01	0.004
	(0.052)	(0.011)	(0.067)	(0.055)	(0.028)
Framing News$_{t-3}$	-0.141	-0.002	-0.322	-0.131	0.206
	(0.197)	(0.046)	(0.329)	(0.192)	(0.186)
Framing Anti-Copyright Coalition$_{t-3}$	0.025	0	0.115**	0.018	0.039*
	(0.04)	(0.003)	(0.044)	(0.031)	(0.016)
Framing Pro-Copyright Coalition$_{t-3}$	0.079.	0.001	0.001	0.063	0
	(0.046)	(0.013)	(0.059)	(0.041)	(0.017)
Framing MEPs$_{t-3}$	-0.031	-0.003	0.045	-0.062	0.08
	(0.055)	(0.016)	(0.087)	(0.091)	(0.098)
Framing Tweets$_{t-4}$	0.135*	0.011.	0	-0.008	0.004
	(0.055)	(0.006)	(0.057)	(0.049)	(0.017)
Framing News$_{t-4}$	0.184.	0.069	0.197	-0.043	0.268
	(0.107)	(0.07)	(0.31)	(0.178)	(0.289)
Framing Anti-Copyright Coalition$_{t-4}$	0.012	0.008	0.083.	0.053.	0.023
	(0.034)	(0.007)	(0.047)	(0.029)	(0.015)
Framing Pro-Copyright Coalition$_{t-4}$	-0.008	-0.004	0.029	-0.031	0.036
	(0.044)	(0.005)	(0.059)	(0.056)	(0.03)
Framing MEPs$_{t-4}$	0.028	-0.076.	0.043	-0.104.	0.164
	(0.059)	(0.039)	(0.11)	(0.058)	(0.151)
Constant	-10.051*	0.969	-27.71**	6.713*	2.298.
	(3.879)	(0.613)	(4.215)	(3.356)	(1.262)
Exogenous Variables					
PLAT: Wikipedia Blackouts & PARL: EP re-opens Debate	-10.951	9.361	-7.846	1.037	-79.18
	(9.437)	(10.429)	(15.993)	(37.126)	(68.342)
PLAT: YouTube Ads	-43.391*	1.09	-8.163	2.646	14.044
	(18.105)	(2.157)	(17.478)	(13.869)	(19.643)
PLAT: March Blackouts	-48.21.	1.074	-20.36	28.48	-82.254
	(25.004)	(18.383)	(15.299)	(60.5)	(55.178)
PARL: Trilogue	2.774	9.14	-24.802	-15.91	-37.174
	(21.813)	(28.631)	(44.869)	(47.872)	(53.367)
PARL: EP passes EUCD	5.715	1.823	-10.528	21.199	11.767
	(10.269)	(11.789)	(14.115)	(43.225)	(32.72)
PARL: Council approves EUCD	17.922	1.803	11.767	14.834.	25.797
	(34.52)	(8.39)	(50.463)	(7.866)	(24.622)
Weekend	-8.959**	-0.198	11.832**	-0.008	-0.522
	(3.426)	(0.541)	(4.388)	(3.273)	(1.667)
Observations	604				
R2	0.204	0.099	0.106	0.063	0.164
Resid. Std. Error	34.313 (df=576)	6.527 (df=576)	44.96 (df=576)	32.521 (df=576)	20.077 (df=576)
F-Statistic	5.47 (df=27;576)	2.34 (df=27;576)	2.53 (df=27;576)	1.43 (df=27;576)	4.19 (df=27;576)
Log Likelihood	-13686.458				

Note: . p<0.1, * p<0.05, ** p<0.01

Table A12: Vectorautoregression (EUCD – Dutch)

	Endogenous Variables:				
	Framing Tweets	**Framing News**	**Framing Anti-Copyright Coalition**	**Framing Pro-Copyright Coalition**	**Framing MEPs**
Framing $Tweets_{t-1}$	0.348**	-0.003	0.055	0.024	0.026.
	(0.056)	(0.003)	(0.039)	(0.026)	(0.016)
Framing $News_{t-1}$	-0.029	-0.055	-0.152	-0.174	-0.138
	(0.242)	(0.127)	(0.263)	(0.349)	(0.163)
Framing Anti-Copyright $Coalition_{t-1}$	-0.026	0.003	0.134**	-0.014	-0.007
	(0.042)	(0.002)	(0.047)	(0.029)	(0.015)
Framing Pro-Copyright $Coalition_{t-1}$	0.062	0	0.036	0.149**	-0.007
	(0.072)	(0.004)	(0.06)	(0.045)	(0.019)
Framing $MEPs_{t-1}$	0.074	0.048	0.07	0.095*	0.043
	(0.104)	(0.031)	(0.067)	(0.037)	(0.075)
Framing $Tweets_{t-2}$	-0.016	-0.001	0.08*	-0.051.	-0.017
	(0.048)	(0.005)	(0.041)	(0.029)	(0.013)
Framing $News_{t-2}$	0.302	0.032	-0.142	-0.003	-0.184.
	(0.469)	(0.151)	(0.425)	(0.301)	(0.108)
Framing Anti-Copyright $Coalition_{t-2}$	0.017	-0.002	0.079.	-0.027	0.026
	(0.044)	(0.004)	(0.044)	(0.029)	(0.016)
Framing Pro-Copyright $Coalition_{t-2}$	-0.083	0	0.064	0.064	0.025
	(0.071)	(0.003)	(0.054)	(0.039)	(0.029)
Framing $MEPs_{t-2}$	-0.044	0.018	0.155	0.034	0.16
	(0.11)	(0.02)	(0.094)	(0.107)	(0.11)
Framing $Tweets_{t-3}$	0.083.	0.003	-0.019	-0.012	0.006
	(0.05)	(0.004)	(0.039)	(0.025)	(0.01)
Framing $News_{t-3}$	0.456	-0.041	0.296	0.666.	-0.127*
	(0.355)	(0.05)	(0.532)	(0.344)	(0.063)
Framing Anti-Copyright $Coalition_{t-3}$	0.081.	0.004	0.125**	0.018	0.019
	(0.046)	(0.004)	(0.043)	(0.03)	(0.02)
Framing Pro-Copyright $Coalition_{t-3}$	-0.026	0	0.011	0.065.	0.015
	(0.059)	(0.005)	(0.056)	(0.039)	(0.025)
Framing $MEPs_{t-3}$	0.194.	-0.001	0.048	0.065	0.051
	(0.116)	(0.019)	(0.092)	(0.081)	(0.061)
Constant	-19.404**	-0.21.	-28.468**	1.884	-0.845
	(4.642)	(0.125)	(3.864)	(3.225)	(1.207)
	Exogenous Variables				
PLAT: Wikipedia Blackouts & PARL: EP re-opens Debate	21.16	-5.139	-12.088	-12.63	-5.198
	(17.89)	(18.685)	(35.733)	(27.119)	(32.755)
PLAT: YouTube Ads	1.25	2.284	-1.873	-1.42	4.341
	(44.233)	(2.298)	(17.438)	(18.271)	(3.174)
PLAT: March Blackouts	27.491.	-1.339	-24.766	26.747	28.766
	(14.911)	(6.246)	(20.232)	(44.558)	(21.441)
PARL: Trilogue	-12.13	-18.275	-22.14	-17.345	-30.418
	(19.821)	(63.017)	(56.09)	(32.538)	(31.165)
PARL: EP passes EUCD	36.154	-2.723	-38.907	8.354	-31.702*
	(54.174)	(6.555)	(27.628)	(14.287)	(12.658)
PARL: Council approves EUCD	4.91	-18.946	9.79	11.891.	4.223
	(17.074)	(63.859)	(57.847)	(6.6)	(6.484)
Weekend	-0.522	0.722**	10.972*	0.341	3.294*
	(4.304)	(0.274)	(4.283)	(3.346)	(1.411)
Observations	605				
R2	0.162	0.136	0.11	0.064	0.071
Resid. Std. Error	47.401 (df=582)	4.251 (df=582)	44.624 (df=582)	32.37 (df=582)	17.99 (df=582)
F-Statistic	5.11 (df=22;582)	4.15 (df=22;582)	3.28 (df=22;582)	1.82 (df=22;582)	2.01 (df=22;582)
Log Likelihood	-13583.731				

Note: . p<0.1, * p<0.05, ** p<0.01

Table A13: Vectorautoregression (EUCD – Polish)

Endogenous Variables:

	Framing Tweets	Framing News	Framing Anti-Copyright Coalition	Framing Pro-Copyright Coalition	Framing MEPs
Framing $Tweets_{t-1}$	0.129*	0.001	0.025	-0.01	0.007
	(0.054)	(0.005)	(0.044)	(0.026)	(0.014)
Framing $News_{t-1}$	0.039	-0.11	0.137	0.018	0.038
	(0.135)	(0.094)	(0.187)	(0.136)	(0.147)
Framing Anti-Copyright $Coalition_{t-1}$	0.108**	0.008	0.152**	-0.012	0.034*
	(0.041)	(0.008)	(0.048)	(0.03)	(0.016)
Framing Pro-Copyright $Coalition_{t-1}$	0.075	0.002	0.044	0.157**	0.037
	(0.067)	(0.008)	(0.06)	(0.045)	(0.026)
Framing $MEPs_{t-1}$	-0.03	-0.023	0.011	0.055	0.032
	(0.114)	(0.025)	(0.079)	(0.071)	(0.061)
Framing $Tweets_{t-2}$	0.04	-0.001	0.045	-0.02	0.005
	(0.046)	(0.005)	(0.04)	(0.034)	(0.019)
Framing $News_{t-2}$	-0.319	0.043	0.171	-0.198	0.175
	(0.23)	(0.064)	(0.202)	(0.125)	(0.122)
Framing Anti-Copyright $Coalition_{t-2}$	0.063	-0.004	0.085.	-0.033	0.012
	(0.041)	(0.005)	(0.045)	(0.029)	(0.014)
Framing Pro-Copyright $Coalition_{t-2}$	0.067	0.01	0.066	0.058	-0.024
	(0.085)	(0.011)	(0.056)	(0.04)	(0.024)
Framing $MEPs_{t-2}$	0.029	-0.032	-0.062	-0.042	0.082
	(0.059)	(0.027)	(0.075)	(0.053)	(0.068)
Framing $Tweets_{t-3}$	0.116*	-0.013*	0.028	0.021	0.021
	(0.048)	(0.007)	(0.04)	(0.03)	(0.015)
Framing $News_{t-3}$	-0.121	-0.037	-0.437*	0.001	0.087
	(0.21)	(0.048)	(0.207)	(0.11)	(0.135)
Framing Anti-Copyright $Coalition_{t-3}$	0.043	-0.005	0.119**	0.023	-0.01
	(0.046)	(0.008)	(0.043)	(0.031)	(0.012)
Framing Pro-Copyright $Coalition_{t-3}$	-0.095.	0.008	0.003	0.07.	0.01
	(0.057)	(0.007)	(0.057)	(0.039)	(0.023)
Framing $MEPs_{t-3}$	-0.088	0.015	0.032	0.142.	-0.07
	(0.093)	(0.023)	(0.085)	(0.084)	(0.057)
Constant	-4.552	0.618	-30.77**	2.553	1.416
	(3.752)	(0.456)	(3.728)	(2.997)	(1.489)
Exogenous Variables					
PLAT: Wikipedia Blackouts & PARL: EP re-opens Debate	16.319	-19.25	-8.937	-5.813	-35.538
	(10.686)	(54.476)	(30.791)	(29.38)	(132.681)
PLAT: YouTube Ads	-32.327	5.858	-5.316	1.596	-0.629
	(28.148)	(6.713)	(16.556)	(15.749)	(2.405)
PLAT: March Blackouts	-40.014	-10.707	-26.227	31.229	81.408
	(62.281)	(36.386)	(16.451)	(39.818)	(81.372)
PARL: Trilogue	17.142	-4.622	-26.418	-12.401	32.181
	(34.938)	(7.716)	(41.756)	(47.746)	(47.7)
PARL: EP passes EUCD	25.993	-9.81.	-23.48.	5.437	-11.414
	(29.85)	(5.717)	(14.114)	(18.761)	(20.162)
PARL: Council approves EUCD	58.843**	58.275	21.238	14.411	11.081
	(19.189)	(51.289)	(25.311)	(15.88)	(55.959)
Weekend	-4.018	-0.569	10.782*	0.737	1.234
	(3.781)	(0.621)	(4.39)	(3.372)	(1.285)
Observations	605				
R2	0.1	0.147	0.101	0.058	0.1
Resid. Std. Error	44.191 (df=582)	7.723 (df=582)	44.856 (df=582)	32.469 (df=582)	18.178 (df=582)
F-Statistic	2.94 (df=22;582)	4.55 (df=22;582)	2.97 (df=22;582)	1.64 (df=22;582)	2.93 (df=22;582)
Log Likelihood	-13908.955				

Note: . p<0.1, * p<0.05, ** p<0.01

Table A14: Vectorautoregression (EUCD – Portuguese)

Endogenous Variables:					
	Framing Tweets	Framing News	Framing Anti-Copyright Coalition	Framing Pro-Copyright Coalition	Framing MEPs
Framing $Tweets_{t-1}$	0.294**	-0.005	0.117**	-0.002	0.023
	(0.041)	(0.006)	(0.044)	(0.032)	(0.023)

	0.148	-0.017	-0.256	-0.471.	-0.123
Framing $News_{t-1}$	(0.302)	(0.042)	(0.331)	(0.239)	(0.17)
Framing Anti-Copyright $Coalition_{t-1}$	0.032	0.011*	0.124**	-0.022	0.018
	(0.038)	(0.005)	(0.042)	(0.03)	(0.021)
Framing Pro-Copyright $Coalition_{t-1}$	0.117*	-0.015*	0.05	0.142**	-0.04
	(0.053)	(0.007)	(0.058)	(0.042)	(0.03)
	-0.013	0.002	0.057	-0.025	0.088*
Framing $MEPs_{t-1}$	(0.075)	(0.01)	(0.082)	(0.059)	(0.042)
	0.053	0.001	-0.011	0.074*	-0.007
Framing $Tweets_{t-2}$	(0.043)	(0.006)	(0.047)	(0.034)	(0.024)
	0.5.	-0.009	0.147	-0.605*	-0.175
Framing $News_{t-2}$	(0.302)	(0.042)	(0.331)	(0.239)	(0.17)
Framing Anti-Copyright $Coalition_{t-2}$	0.036	-0.002	0.066	-0.031	0.025
	(0.038)	(0.005)	(0.042)	(0.03)	(0.022)
Framing Pro-Copyright $Coalition_{t-2}$	0.041	0.003	0.046	0.071.	0.024
	(0.054)	(0.007)	(0.059)	(0.043)	(0.03)
	-0.073	-0.012	0.118	0.023	0.013
Framing $MEPs_{t-2}$	(0.075)	(0.01)	(0.082)	(0.059)	(0.042)
Framing $Tweets_{t-3}$	0.039	0.001	0.021	0.016	0.02
	(0.043)	(0.006)	(0.047)	(0.034)	(0.024)
Framing $News_{t-3}$	0.156	-0.009	-0.25	0.224	-0.18
	(0.303)	(0.042)	(0.332)	(0.24)	(0.17)
Framing Anti-Copyright $Coalition_{t-3}$	0.016	0.006	0.096*	0.02	-0.015
	(0.038)	(0.005)	(0.042)	(0.03)	(0.022)
Framing Pro-Copyright $Coalition_{t-3}$	0.021	0.002	-0.002	0.054	0.024
	(0.053)	(0.007)	(0.058)	(0.042)	(0.03)
Framing $MEPs_{t-3}$	0.023	0.004	0.056	-0.048	0.01
	(0.075)	(0.011)	(0.083)	(0.06)	(0.042)
Framing $Tweets_{t-4}$	0.18**	-0.007	-0.02	-0.043	0.01
	(0.041)	(0.006)	(0.045)	(0.032)	(0.023)
Framing $News_{t-4}$	-0.159	0.016	-0.644.	0.151	-0.015
	(0.304)	(0.042)	(0.333)	(0.241)	(0.171)
Framing Anti-Copyright $Coalition_{t-4}$	0.116**	-0.009.	0.081.	0.041	0.016
	(0.038)	(0.005)	(0.042)	(0.03)	(0.021)
Framing Pro-Copyright $Coalition_{t-4}$	-0.004	-0.004	0.023	-0.03	-0.031
	(0.053)	(0.007)	(0.058)	(0.042)	(0.03)
Framing $MEPs_{t-4}$	-0.033	0.002	0.062	-0.031	0.076.
	(0.074)	(0.01)	(0.081)	(0.059)	(0.042)
	-10.359**	0.221	-27.714**	6.338*	0.318
Constant	(3.73)	(0.52)	(4.088)	(2.956)	(2.099)
Exogenous Variables					
PLAT: Wikipedia Blackouts & PARL: EP re-opens Debate	4.051	0.511	-13.41	-1.823	-1.472
	(35.735)	(4.983)	(39.164)	(28.322)	(20.107)
	-60.792**	4.181	7.086	1.42	-34.731**
PLAT: YouTube Ads	(22.293)	(3.109)	(24.432)	(17.669)	(12.543)
	-14.396	0.827	-3.127	29.546	9.794
PLAT: March Blackouts	(36.522)	(5.093)	(40.027)	(28.947)	(20.55)
	-7.548	-12.196*	-20.355	-16.097	-64.806**
PARL: Trilogue	(35.816)	(4.995)	(39.252)	(28.387)	(20.152)
	-4.805	10.564*	-7.256	19.985	-73.334**
PARL: EP passes EUCD	(36.174)	(5.045)	(39.645)	(28.671)	(20.354)
PARL: Council approves EUCD	20.245	7.371	22.85	18.039	11.139
	(35.845)	(4.999)	(39.284)	(28.41)	(20.169)
	4.648	-0.39	12.998**	-0.815	3.637.
Weekend	(3.758)	(0.524)	(4.118)	(2.978)	(2.114)
Observations	604				
R2	0.262	0.051	0.125	0.084	0.111
Resid. Std. Error	40.58 (df=576)	5.659 (df=576)	44.474 (df=576)	32.163 (df=576)	22.833 (df=576)
F-Statistic	7.57 (df=27;576)	1.16 (df=27;576)	3.05 (df=27;576)	1.94 (df=27;576)	2.66 (df=27;576)
Log Likelihood	-13755.602				

Note: . p<0.1, * p<0.05, ** p<0.01

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