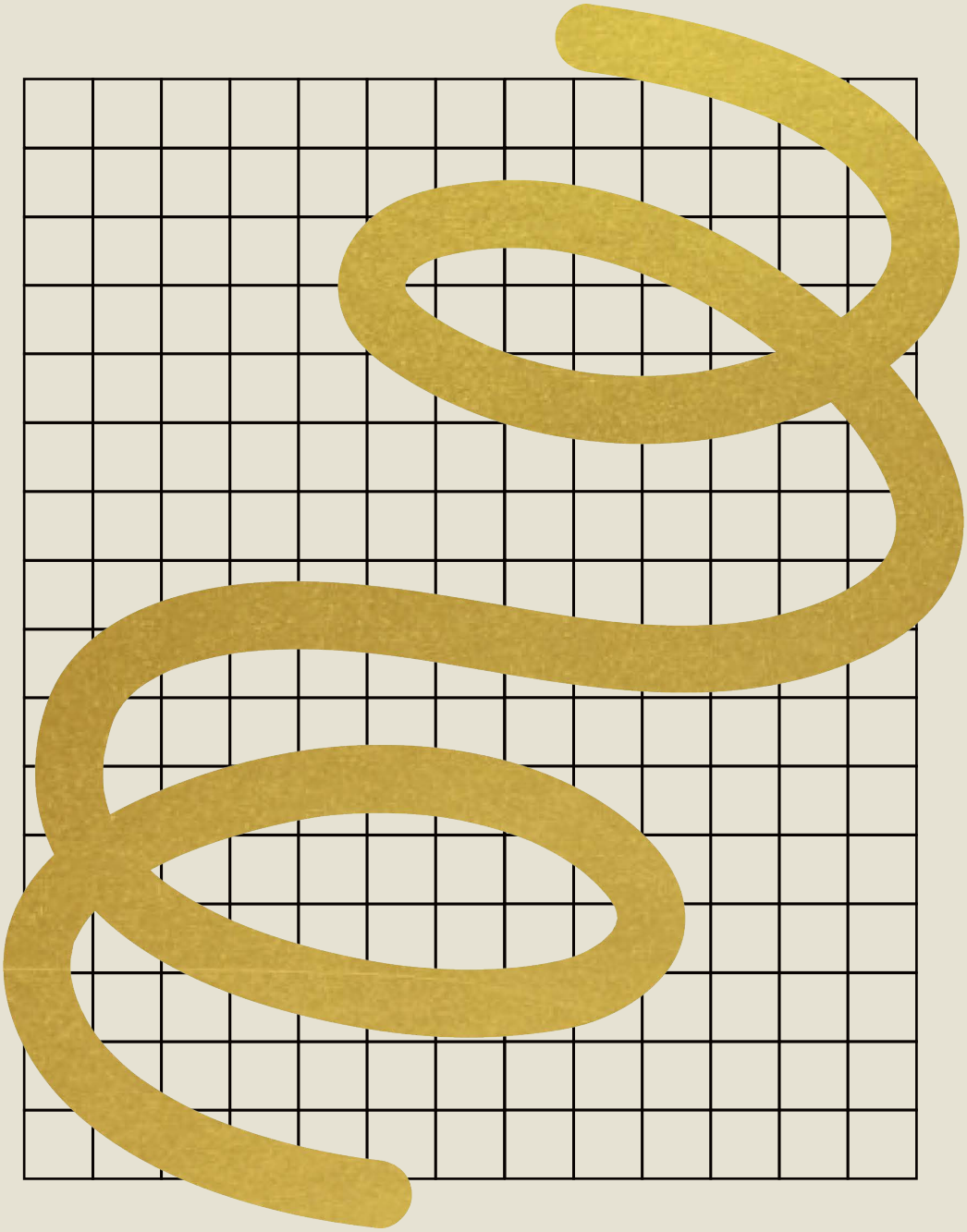
INNOVATION, INSTITUTIONS AND INSTITUTIONAL INNOVATION



STUDIES ON DIFFUSION AND GATEKEEPING

Matthijs Benjamin Punt

INNOVATION, INSTITUTIONS AND INSTITUTIONAL INNOVATION

STUDIES ON DIFFUSION AND GATEKEEPING

Innovation, institutions and institutional innovation - Studies on diffusion and gatekeeping

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ISBN/EAN: 978-94-6423-168-7
Graphic design: Lisa Reith
Layout: Marian Sloot | www.proefschriftmaken.nl
Printing: ProefschriftMaken | www.proefschriftmaken.nl

This work was supported by the Netherlands Organization of Scientific Research (NWO) under the Vici scheme, number 453-14-014.

INNOVATION, INSTITUTIONS AND INSTITUTIONAL INNOVATION

STUDIES ON DIFFUSION AND GATEKEEPING

INNOVATIE, INSTITUTIES EN INSTITUTIONELE INNOVATIE

STUDIES OVER DIFFUSIE EN GATEKEEPING

(met een samenvatting in het Nederlands)

PROEFSCHRIFT

ter verkrijging van de graad van doctor aan de
Universiteit Utrecht op gezag van de
rector magnificus, prof.dr. H.R.B.M. Kummeling,
ingevolge het besluit van het college voor promoties
in het openbaar te verdedigen op

woensdag 21 april 2021 des middags te 4.15 uur

door

Matthijs Benjamin Punt

geboren op 20 november 1990
te Capelle aan den IJssel

Promotor:
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Dr. J. Hoekman

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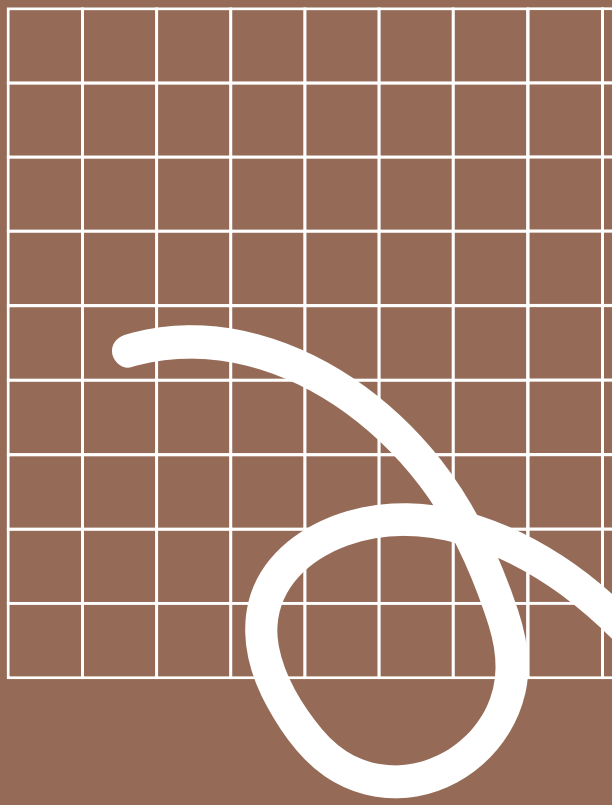
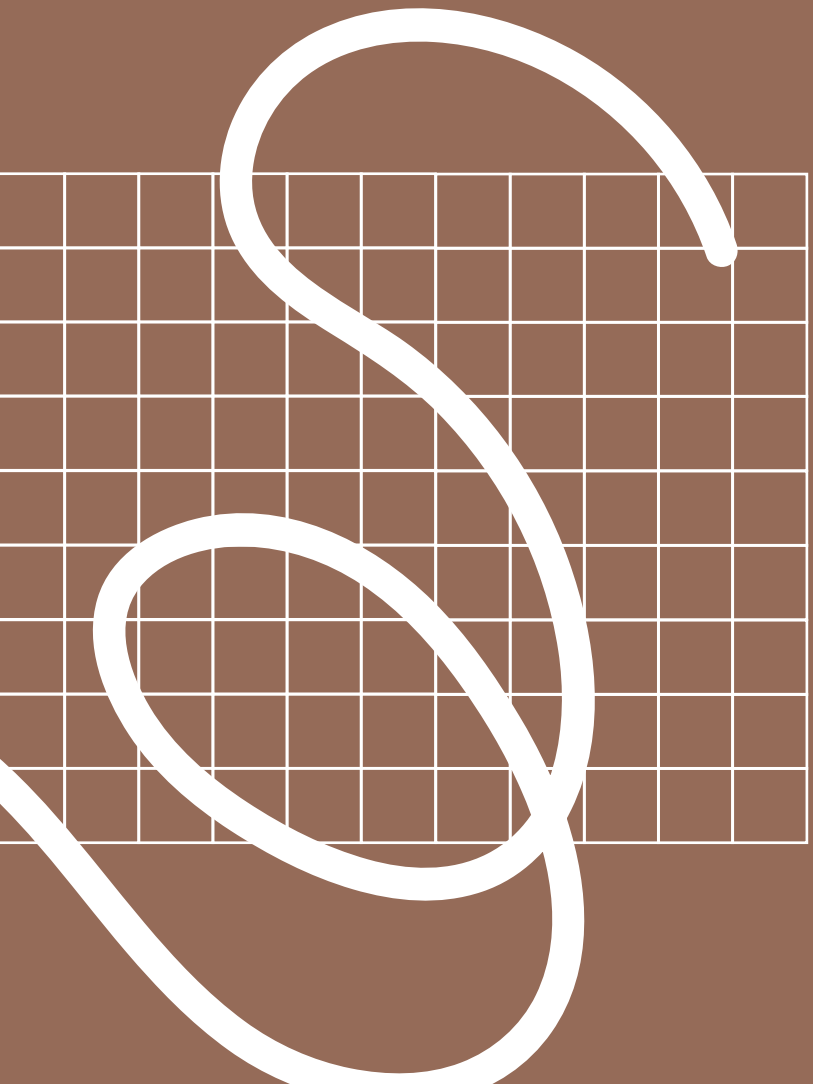
1. INTRODUCTION





1.1 Technological and institutional change in innovation studies

The study of innovation places primary emphasis on studying technological change. In particular, radical innovations have been defined as innovations embodying new technologies that create new markets or disrupt existing ones (Dahlin and Behrens, 2005; Garcia and Calantone, 2003). Most of these studies on radical innovation are based on the Schumpeterian idea that radical technological change can undermine the competitive advantage of incumbent firms by rendering their established technology, and their underlying competencies, irrelevant (Schumpeter, 1934; Tushman and Anderson, 1986). However, innovations also come with institutional change, which is especially the case for radical innovations that usually do not resonate with existing regulations, norms and values (Freeman and Perez, 1988).

Since the 1980's, a growing body of literature has paid attention to the effects of institutions on innovation. With the elaboration of the notion of technological regimes (or paradigms) came a conceptual shift from studying technological change to studying the co-evolution of institutional and technological factors (Constant, 1987; Dosi, 1982; Geels, 2002; Nelson and Winter, 1982; Rip and Kemp, 1998). Technological regimes or paradigms are cognitive structures that relate to "technicians' beliefs about what is feasible or at least worth attempting" (Nelson and Winter, 1982, pp. 258-259). This positions an emerging technology in an institutional environment that is determined by dominant evaluation schemata based on accepted technologies. These paradigms and regimes are treated as selection environments, which determines what technologies are successful and become widespread (Dosi, 1982; Van den Belt and Rip, 1987). As such, Garud and Rappa (1994) have argued that for technology to progress, researchers' individual beliefs about technology and the form and function of technological artefacts should resonate with the institutionalized evaluation routines that shape the direction of technological progress at the macro-level.

While early studies focused on how beliefs of firms and technicians shape the technological regimes, Kaplan and Tripsas (2008) developed a life-cycle model of technological change that focuses on the beliefs and frames of a wider array of actors. They argue that the technological frames – i.e. lenses through which different actors define and interpret a technology – of producers, users and institutional actors interact in shaping the development of collective frames around the meaning of new technologies. While this shifts the exclusive attention away from the producer-side of innovation by taking into account more actors, most studies still depart from the notion of innovation as essentially technological change. Indeed, scholars of radical innovation have concentrated on products or the production process and as such radical innovation tends to be equated

with radical product or process innovation (Chandy and Tellis, 2000; Dewar and Dutton, 1986; McDermott and O'Connor, 2003; Sood and Tellis, 2005). Institutional change in innovation studies is mostly studied in co-evolution with technological change, but not frequently in and of itself. This thesis addresses this gap in the literature by studying innovation that mostly involves institutional change, something I call institutional innovation.

The idea that radical innovations are accompanied by institutional change is not new (Van den Belt and Rip, 1987). However, innovation that is predominantly institutional in nature – and where technology plays no or no pivotal role– is still an underdeveloped topic in the study on innovation. One exception is a line of research on disruptive innovation initiated by Christensen (1997), who widened his theory on disruptive technologies to include disruptive business models as well (Christensen and Raynor, 2003). A growing literature on business model innovations has paid specific attention to these non-technological innovations. However, this literature has mostly looked at how business model innovation leads to changes in performance outcomes, competitive advantages and organizational change processes (Foss and Saebi, 2016). Less attention has been paid to institutions. The literature on disruptive innovation has also been criticized for lumping together technological and non-technological innovations, without separating the idiosyncratic mechanisms behind these different types of innovation (Chesbrough, 2010; Markides, 2006). While some contributions argued that non-technological innovations require different conceptualization compared to technological changes (Markides, 2006). Despite the observation that non-technological innovations are much more sensitive to pressures from the institutional environments in which these innovations arise (Foss and Saebi, 2016), an institutional lens to these non-technological innovations has remained underdeveloped (Wieland et al., 2017).

To incorporate innovations of a predominantly institutional nature in the study of innovation, one can take inspiration from scholarly work on institutions in other disciplines. Indeed, institutional studies are found in a plethora of disciplines and as a result there is a variety of definitions of what institutions are. Most studies started off from the idea that institutions are 'the rules of the game' (Jepperson, 1991; North, 1990), but others have used a more extensive definition that distinguishes between cognitive, normative and regulative structures that provide stability and meaning to the social world (Scott, 1995). North (1990) has made the distinction between formal and informal institutions, where the former are codified and often written laws and regulations enforced by regulatory bodies and the latter are structures and values embodied in traditions, cultural customs and codes of conduct.

From an institutional perspective, disruptive innovation mostly comes from new organizational activities that require change in the institutional setup of the environments in which organizations are active – e.g. norms in organizing in a market, regulatory frameworks or patterns in consumer behavior (Aldrich and Fiol, 1994; DiMaggio and Powell, 1983; Scott, 1995). Organizational practices that diverge from the rules and practices that prevail in a specific field might suffer in terms of legitimacy (Deephouse, 1999). In contrast to the rational behavior of organizations emphasized by classic organization theories, institutional studies view organizations as adaptive and affected by their social and institutional environment (Vermeulen and Raab, 2007). As such, the main challenge for disruptive innovations of an institutional nature is to seek legitimacy for their new activities (Geels and Verhees, 2011; Raffaelli and Glynn, 2015), next to the quest for competitive advantage as stressed in innovation literature (Abernathy and Clark, 1985; Christensen, 1997; Tushman and Anderson, 1986).

Some recent studies have turned towards these legitimization processes in heavily institutionalized contexts, including platform business models such as Airbnb and Uber (Boon, et al., 2019; Pelzer, et al., 2019), renewable energy (Bohnsack et al., 2016; Wirth, 2014), personalized medicine (Moors et al., 2018; Kukk et al., 2016) and innovations in the water sector (Fuenfschilling and Truffer, 2016; Rogers et al., 2015). These studies tend to emphasize that "innovation is not only – and in some cases not even primarily – about technological advance or gauging market demand, but also about actively challenging and creating institutions in a way that an innovation becomes legitimate and accepted" (Pelzer et al., 2019, p. 2). Most of these studies draw on the concept of institutional entrepreneurship in studying co-evolution of innovations and institutions (Hoogstraaten et al., 2020), which is defined as "activities of actors who have an interest in particular institutional arrangements and who leverage resources to create new institutions or transform existing ones" (Maguire et al., 2004, p. 657). These studies thus focus on the agency of actors that actively try to change institutions through legitimizing processes for new organizational activities.

This thesis takes a more structural approach to studying the legitimization processes of what I will call 'institutional innovations'. Hargrave and Van de Ven (2006, p. 866) understand institutional innovation as "institutional change as a difference in form, quality, or state over time in an institution." An institutional innovation can thus be identified as the introduction and diffusion of a new institution or a new set of coherent institutions. Institutional innovation can be regarded as a subset of all innovations in the sense that institutional innovations are both novel and useful; what makes institutional innovations specific is that these innovations should also be considered legitimate and credible by key actors in a field (Hargrave and Van de Ven, 2006; Raffaelli and Glynn, 2015). Gaining legitimacy is far from automatic as institutional innovation, by definition,

go against – and sometimes disrupt – some of the existing institutions and therefore may face strong resistance.

Following these studies, the locus of institutional innovation is found in the establishment of new relationships within or between institutions to create new opportunities for existing or new technologies or practices (Hagel and Brown, 2013). Raffaelli and Glynn (1998) provide Apple's iPod as example, which in "itself was not that revolutionary from a purely technical standpoint, [but] did create a significant reconfiguration of actors in the music industry that coordinated an institutional environment; the result was to converge music, artists, distributors and technology into a new eco-system or field." By conceptualizing innovations as socio-technical configurations (Rip and Kemp, 1998), one could say that institutional innovations introduce no real technological novelties *per se*, but rather introduce new ways of configuring the technological with the social environment. Once these configurations stabilize and gain legitimacy we can speak of an institutional innovation (Raffaelli and Glynn, 2015). By definition institutional innovations go against existing institutional orders and as such they are often contested by incumbents, policymakers or audiences in their field. The conceptualization innovations as socio-technical innovations is also what distinguishes institutional innovation from the broader concept of institutional change, the more general "displacement of one set of institutionalized arrangements by another, or, the modification of prevailing arrangements (Suddaby and Greenwood, 2009, p. 177), and makes it more compatible with more general notions of innovation.

The key question, then, holds: how and why does institutional innovation occur? Raffaelli and Glynn (2015) summarize three types of explanations. The first explanation points at the impact of exogenous factors, such as environmental jolts (Meyer, 1982). For instance, Sine and David (2003) show how environmental crises elucidated structural weaknesses in the US electric power industry, leading to search processes that can result in profound institutional change. However, such explanations are considered too infrequent to serve as a structural explanation for institutional change and they ignore agentic processes that bring about institutional innovations. This leads to a second explanation for institutional innovations, which reasons from institutional entrepreneurship. Institutional entrepreneurs are actors that actively aim to break away from existing institutions to pursue new ventures or institutional arrangements. However, this explanation has been criticized for overestimating the role of "hyper-muscular, heroic entrepreneur" (Raffaelli and Glynn, 2015, p. 408). A third explanation of institutional change focuses more on the institutional innovation itself. An institutional innovation, according to Raffaelli and Glynn (2015), requires legitimacy, "a condition whereby other alternatives are seen as less appropriate, desirable, or viable" (Dacin et al., 2002, p. 47). To acquire legitimacy, stakeholders – including regulators, financers, users, experts etc. – need to be involved

in the process of institutional innovation, in line with the notion that the processes of institutional entrepreneurship are driven by collectives, in a distributed way, rather than by individuals (Garud and Karnøe, 2003). This last explanation allows me to take a structural approach to studying institutional innovation, focusing on field-level dynamics that foster or hinder the introduction or change of institutions.

While traditionally more structuralist scholars of institutional theory have emphasized isomorphism, or the growing interorganizational homogeneity as a result of conformity to institutional pressure (DiMaggio and Powell, 1983; Fligstein, 1985), later research looked at processes of differentiation and fragmentation (Dacin et al., 2002; Fuenfschilling and Truffer, 2016; Greenwood and Hinings, 1996). Interest arose in the conditions that make way for contested practices that deviate from existing institutions (Boxenbaum and Jonsson, 2017). Breaking away from established institutions in a field does not mean that the institutional order itself does not affect institutional innovation. In developing institutional innovations, actors may draw on institutions already present in other fields by transposition of existing institutions from one domain into another domain (Boxenbaum and Battilana, 2005; Powell et al., 2012). They may also mobilize broader institutional logics (community, state, market, etc.) to legitimize new institutions that break away from existing ones (Raffaelli and Glynn, 2015; Fuenfschilling and Truffer, 2016). These structural conditions for institutional innovation are likely to vary by organizational fields also by geographical fields (i.e. city, region or country).

This thesis approaches innovations of an institutional nature from a more structural perspective, by analyzing the interaction between institutional conditions and contested practices. I do so in two ways. First, I analyze the diffusion of institutional innovations across space and time, highlighting the structural heterogeneity in cities and regions (Chapter 2 and Chapter 3). Second, I study how institutional innovations brought about by gatekeepers shape the selection of scientific and cultural outputs (Chapter 4 and Chapter 5).

1.2 The distributed nature of legitimization processes

Innovation is often studied by including those actors that directly contribute to the process of innovation. Studies focused on different kinds of actors – such as individuals, teams, organizations – or sets of actors aggregated into industries, regions and nations (Vermeulen and Raab, 2007). While research in the tradition of the socio-technical regime started to include institutional conditions, these studies were mostly based on cognitions and beliefs by producers as emphasized in the early writings by Dosi (1982) and Nelson and Winter (1982). More recently, some studies have also started to include other actors

in studying the legitimization and institutionalization of innovations, including users (Dewald and Truffer, 2011), regulators (Garud and Karnøe, 2003), intermediaries (Binz et al., 2016a), and the interaction between them (Kaplan and Tripsas, 2008). Moreover, Geels and Verhees (2011) have argued that especially in studying processes of legitimization attention needs to be paid to the wider public as well. The variety of actors could be considered especially important for innovations that are highly institutional in nature, because these innovations have consequences for different groups of involved actors, as these have to respond to new institutional configurations.

Institutional studies specifically emphasize the distributed nature of legitimization processes (Delbridge and Edwards, 2008). This already becomes clear from Suchman's (1995) definition of legitimacy as "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions" (p. 574). This definition embeds the process of legitimization in wider societal belief systems and approaches it as a social process (Johnson et al., 2006). However, not all actors are equally important in this process. Scott (1995) argued that it varies from time to time and place to place what significant others confer legitimacy. As such, the question is whose evaluations are important in determining legitimacy, even though this legitimacy might be challenged by others (Stinchcombe, 1965). That is, the process of legitimation is inherently political and its dynamics are partly driven by differential power positions of actors.

Over time, legitimacy has been dimensionalized into a plurality of types and sources, not all of which are fully compatible with one another (Deephouse and Suchman, 2008). Aldrich and Fiol (1994), for example, made the distinction between cognitive and socio-political legitimacy. Cognitive legitimacy refers to the spread of knowledge about an innovation or new venture, where the highest level of legitimacy is achieved when the innovation or venture is taken for granted. Socio-political legitimacy refers to processes by which relevant stakeholders accept an innovation as appropriate or right, according to existing norms and laws. Scott (1995) subdivided this latter form of legitimacy into regulative and normative legitimacy. Here, normative legitimacy relates to a deeper moral base for legitimacy, where legitimacy depends on moral obligations prevalent in a given place or culture. Regulative legitimacy on the other hand, refers to legal and quasi-legal rules, where legitimacy depends on existing laws and regulations. While Suchman's (1995) conceptualized a similar trichotomy, his proposed pragmatic legitimacy could be added as a fourth pillar to the conceptualizations of Aldrich and Fiol (1994) and Scott (1995). In the context of innovation, pragmatic legitimacy builds on the direct usefulness of an innovation to a group of actors (Pelzer et al., 2019). While later studies have proposed additional types, these four pillars of legitimacy are most dominant in

most research done in institutional theory (Binz et al., 2016a; Greenwood et al., 2002; Johnson et al., 2006).

Because of the multidimensional nature of legitimacy, the role of different actors involved in the legitimization of innovation differs per case. Different legitimating audiences are involved in conferring different forms of legitimacy. For example, for regulative legitimacy innovations mostly depend on policymakers and regulators, while pragmatic legitimacy is mostly conferred by users. However, these different dimensions are often intertwined and their legitimation processes are hard to fully separate in their effects. Deephouse and Suchman (2008) proposed that "instead of further reifying analytic distinctions among the various dimensions of legitimacy, researchers might do well to attend more closely to the workings of various sources of legitimacy" (p. 68). Therefore, this thesis' foremost focus is on different actors as 'carriers' of certain institutions and their legitimacy (Zilber, 2002), rather than only the different pillars of legitimacy. In doing so, I pay specific attention to the role of users as legitimating actors (Chapter 2 and 3) and to the role of intermediaries that serve as links between audiences and producers in mediated markets (Chapter 4 and 5). In highly institutionalized markets, legitimating intermediaries (e.g. consumer watchdogs, professional associations, quality certifiers, critics) are influencing access to privileged categories, markets, definitions or memberships (Lee et al., 2016; Trank and Washington, 2009). This thesis has a specific focus on gatekeepers, a type of intermediary that often has commercial or reputational stakes in the goods or services that make it to the market (Janssen, 1997; Khaire, 2017). These gatekeepers play and important legitimating role, by selecting among available producers and products in their decisions what to grant access to their audiences (Foster et al., 2011). However, because of their commercial and reputational stakes, gatekeepers' default instinct is usually to reduce risk and they are often wary of innovation, especially institutional innovations (Hsu, 2006; Janssen, 1997; Siler et al., 2015).

1.3 Spatial heterogeneity in institutions

Just as institutional innovation can be regarded as a subset of innovation, so can the diffusion process of institutional innovations be approached as a subset of innovation diffusion processes. Diffusion has received ample attention in innovation studies. It is however generally assumed to depend on characteristics of the technology and of users (Rogers, 1962; Utterback, 1994). The dominant perspective starts from users who have to learn the technical and economic characteristics of an innovation in order to adopt (Mansfield, 1961). Here, the diffusion of innovation literature has elaborated two models of diffusion: endogenous and exogenous. Endogenous diffusion relies mostly on processes of social contagion, where those that already adopted an innovation are a source of

information (or active promotion) to those who have not yet adopted (Bikhchandani et al., 1992; Granovetter, 1978; Rogers, 1962). Exogenous diffusion, on the other hand, usually relies on external sources such as mass media or change agents that advertise the innovation to potential adopters (Coleman et al., 1957; Rogers, 1962). As a result, most analyses in innovation studies, and diffusion models in general, treat diffusion as an almost exclusively relational phenomenon.

However, the diffusion of innovations also depends on the institutional environment in which relations are embedded (Strang and Meyer, 1993). Arguably, the institutional environment plays an important role in both endogenous and exogenous diffusion mechanisms. Scholars have argued for instance that when actors are subject to the same institutional conditions diffusion of an innovation will be easier (Rossman, 2014; Strang and Meyer, 1993). This insight is also elaborated in terms of institutional proximity, where actors operating under similar or proximate institutional frameworks may be better able to understand and use a particular technology, as technology contains scripts that partially reflect the wider institutions in which the technology has been developed (Gertler, 2003). Strang and Meyer (1993) further argued that the theorization of institutional frameworks can stimulate the diffusion of innovations that fall within these frameworks (e.g. the theorization of environmental challenges stimulates the diffusion of environmental policy changes or sustainable technologies). In similar vein, Rossman (2014) argued that exogenous diffusion is only possible when an innovation is legitimate and, as a consequence, innovations that lack legitimacy are highly dependent on mechanisms of endogenous diffusion. He argues that the diffusion of an innovation is essentially dependent on the diffusion of the institutions in which it is embedded. For institutional innovations as discussed in this thesis, Rossman's argument is key as at the core of the diffusion of these innovations lies in the transfer of the new or changed institutions.

The focus on transfer of new or changed institutions emphasizes the importance of spatial differences in institutional conditions for innovations to diffuse. Traditionally, spatial diffusion of innovation is discussed in terms of geographical distance (Hagerstrand, 1967; Strang and Soule, 1998). These standard diffusion models often assume spatial homogeneity, which makes them ignorant to the social structure and environment underlying the populations that are being studied (Strang and Tuma, 1993). In institutional theory, the environment of innovations or organizations is conceptualized as an organizational field, defined as "those organizations that, in the aggregate, constitute a recognized area of institutional life: key suppliers, resource and product consumers, regulatory agencies and other organizations that produce similar services or products" (DiMaggio and Powell, 1983, p. 148). In studying these organizational fields, there is a growing emphasis on heterogeneity and complexity, as innovations face different institutional forces and environments (Boxenbaum and Jonsson, 2017;

Greenwood et al., 2011). This complexity is reflected in two important ways. First, institutional environments are complex and fragmented in and of itself, with different actors and domains reflecting different institutions (Deephouse and Suchman, 2008; Scott, 1995). Secondly, spatially separated institutional environments vary with respect to their specific institutional setup and differ in their relevant and authoritative actors (Kostova and Zaheer, 1999). This second point is especially important for spatial diffusion of innovations of an institutional nature, as with different institutional environments come different legitimacy requirements.

Once innovations or organizations are diffusing spatially, they are confronted with "multiple, fragmented, nested, or often conflicting institutional environments" (Kostova et al., 2008, p. 998). Furthermore, prior research has argued that globalization of practices and cultures increasingly exposes innovations to both global and local institutional pressures (Marquis and Battilana, 2009; Pache and Santos, 2010). Applications of institutional theory in international business studies have looked at the institutional frameworks of different locations (usually countries) in order to see to what extent differences in the institutional environment affects diffusion (Ferner et al., 2005; Kostova and Roth, 2002). The most straightforward spatial differences in institutions are on the regulatory level, since laws and regulations are usually created by local or national governments (Kostova and Zaheer, 1999). Cognitive and normative differences on the other hand, might be harder to capture as these are part of 'deep structures' of a locations culture and codes of conduct (Gersick, 1991). Most of these studies show how innovations usually more easily diffuse to locations where there is a fit between the nature of the innovation and the institutional environment (Kostova, 1999). However, some studies found that when an innovation diffuses to an institutional environment where it violates all pillars of legitimacy, the diffusion relies on key adopters in this host institutional environment (Fiss and Zajac, 2004; Sanders and Tuschke, 2007). This shows how, when local institutional settings are generally unfavorable, different legitimating actors can play a key role in the diffusion of an innovation to compensate for the lack of supportive institutions.

1.4 Outline of this thesis

In this thesis, I build on institutional studies to provide insight into the diffusion and evaluation of innovations that are institutional in nature. I speak of institutional studies as this thesis builds on ideas of both institutional theorists and organizational ecologists, which might be proximate outsiders of each other but have remarkably similar ideas on institutions (Haverman and David, 2008). Institutional studies and innovation studies seem very complementary: where innovation studies have a rich tradition in focusing on

the origins of innovations, institutional studies are known for their focus on tracing how innovations become established as taken-for-granted (Lounsbury and Crumley, 2007; Vermeulen and Raab, 2007).

This thesis focuses on innovation that is mostly institutional in nature. While every innovation brings about institutional change to some extent, 'institutional innovations' do so to a greater extent. Institutional innovation, as new configurations between technologies and their social environment, can be seen as both the result of the creation of new institutions and of changes in existing institutions (Hargrave and Van de Ven, 2006; Raffaelli and Glynn, 2015). Another way in which institutional innovations manifest is through transposition of existing institutions from one domain into another domain (Boxenbaum and Battilana, 2005; Powell et al., 2012). However, regardless of the source of the institutional innovation, it is important that the innovation is perceived as legitimate by a certain group of relevant actors (Raffaelli and Glynn, 2015).

My conception of institutional innovation is that they introduce new configurations between existing technologies or practices and their social environments. As the four cases in the thesis will show, institutions are often innovated in order to reach new target groups that are left out in the dominant institutional settings (see for example Battilana and Dorado, 2010). It is important to note that new technologies can play a role in institutional innovation, but that these are never central to the novelty or disruptive nature of these innovations (Laurell and Sandström, 2016; Raffaelli, 2018). This thesis mostly deals with innovations that that mostly rely on the application of already existing technology but do realize institutional change, hence referred to as institutional innovations.

A recent example of an institutional innovation can be found in the rise of the platform economy (Hinings et al., 2018; Mair and Reischauer, 2017). Platform firms can be defined as digital intermediaries that mediate social and economic interactions between producers and consumers (Kenney and Zysman, 2016). Especially service platforms such as Airbnb, Uber and Deliveroo are challenging local business models as well as the prevailing institutions they are embedded in (Mair and Reischauer, 2017; Thelen, 2018; Uzunca et al., 2018). These platform innovations are highly institutional in nature as they change the way services such as hospitality, taxi services and food delivery are organized (via algorithmic matching) and governed (via reviews), while the technological novelty of these services is often limited (Laurell and Sandström, 2016; Pelzer et al., 2019). In **Chapter 2**, I study how platform services, as contested institutional innovations, could diffuse as rapidly around the globe as they did. Empirically I test this on the case of Uber, which connects unlicensed drivers to taxi passengers through an app challenging local taxi regulations in cities. I expect that platforms introduce their services mostly

in locations where local formal institutions are most favorable and their services enjoy the most regulative legitimacy (Scott, 1995). However, I also expect that platforms can benefit from their global pool of users, which are mostly business travelers and tourists, who can function as 'carriers' of Uber's legitimacy (Zilber, 2002). This chapter argues that these travelers endogenously spread Uber's cognitive legitimacy to locations that they visit (Rossman, 2014), giving Uber the opportunity to follow into these locations where travelers function as a 'trusted community' (Li et al., 2019). This chapter uses a time to event model to analyze to what extent the global diffusion of Uber's controversial UberX service is influenced by local regulatory institutions and cognitive legitimacy-spillovers facilitated by their global user base.

In **Chapter 3**, I continue by looking at the spatial diffusion of institutional innovation, in this case the diffusion of the cooperatives in the renewable energy sector in Germany. The innovation in this chapter is mostly the result of the transposition of the cooperative organizational form into a new market (Boxenbaum and Battilana, 2005). As such, I expect that renewable energy cooperatives will be more likely to emerge in German regions where more cooperatives are already present in other industries, referred to as 'institutional relatedness' between industries. Here, citizens that want to found a renewable energy cooperative can build on local institutional arrangements and face less resistance since they can draw on institutions that are already legitimated in the local context to some extent (Content and Frenken, 2016; Powell et al., 2012). This spatial heterogeneity may explain the differential diffusion of the renewable energy cooperatives across German regions. This chapter uses an organizational ecology model in order to analyze to what extent the legitimacy gained by this institutional relatedness exists next to standard density-dependent cognitive legitimization processes found in this literature.

While the first two papers are mostly concerned with users as sources of legitimacy, as the spatial heterogeneity of supportive institutions, the last two papers of this thesis focus on the role of gatekeepers. The focus in these chapters shifts from spatial diffusion processes to the evaluation processes by intermediary actors. **Chapter 4** deals with the important role of journals as gatekeepers (Crane, 1967). The field of scientific publishing has seen important institutional changes in the way of organizing gatekeeping since their origination in the seventeenth century (Ornstein, 1938). I focus on two important institutional changes in the way of organizing academic publishing: non-society ownership and the business model of open-access publishing. These changes mark the gradual transformation of the scientific publishing industry away from the professional institutional logic held by (societies of) scientists towards the market institutional logic held by large commercial publishers where publishing is foremost approached as a (highly) profitable business, as it unfolded before in higher education publishing as well (Thornton and Ocasio, 1999). Especially the second institutional change has sparked

some debate and is often seen as a controversial deviation from the norm in academic publishing (Siler and Frenken, 2020). This chapter builds on the work on field conventions and actors' field positions (Becker, 1982; Jones et al., 2016) arguing that producers that work to some extent on the fringes or periphery of a field are important drivers of novelty, as they are more distant to isomorphic pressures and role expectations coming from the conventions of a field. The chapter makes the case that this might not only hold for producing actors, but also for intermediary actors such as scientific journals. It puts forward a number of expectations that non-society-owned and open access journals are more involved in the publications of novel research. These expectations are then tested in a dataset on the publication of novel research in 725 newly founded biomedical and life sciences journals

The role of gatekeepers remains central in **Chapter 5** which studies categories as a specific type of institution. Categorization imposes coherence on our social worlds by partitioning items into groups and by providing anchors for judgments about value and quality (Hsu & Hannan, 2005; Vergne & Wry, 2014). The aim of this paper is to study to what extent a category changes between periods of emergence and re-emergence of the same market. It studies to what extent gatekeepers play a role in reinventing the meaning of a market category during periods of re-emergence. This chapter builds on literature on market categorization to test the changing influence of different types of category signals (Negro et al., 2015). I study the case of surf music to analyze to what extent producers of surf compilations albums picked up different category signals during the original and revival period of this music genre. I argue that while in the original period gatekeepers mostly targeted an insider audience, the revival period was mostly focused on a broader mass market audience (Griswold, 1986). As such, the music included by these gatekeepers on compilation albums in the early period mostly signaled a restrictive and subcultural understanding of surf music. In the revival period the music included mostly signaled a narrativized understanding of surf music that was more prototypical to broader audiences.

Finally, in **Chapter 6** I summarize these four chapters and draw conclusions based on their results. Furthermore, I outline the contributions to innovations studies and some contributions to institutional theory. I also present some of the limitations of this thesis and suggests some avenues for future research.

While the institutional innovations in these different chapters all seem of a different nature, the commonality here is that all of them introduce a new institution or a new set of coherent institutions. In Chapter 2 I study how Uber introduced new institutions relating to a new way of connecting supply and demand in the taxi market. In Chapter 3 the new institution consists of the cooperative organizational form that is transposed to the market for renewable energy generation. Chapter 4 studies changes in scientific

journal ownership and open access, that come with new ways of gatekeeping and new institutional logics. Finally, Chapter 5 studies a music genre as an institution and changes in the boundaries and categorization of this genre.

Table 1.1 shows an overview of the different chapters of this thesis, including the case and industry being studied, the type of institutional perspective used, the innovation mechanism being studied, and the relevant actors involved. Table 1.2 gives an overview of the contributions of the co-authors to these chapters.

Table 1.1 Overview of Chapters 2-5

	Chapter 2	Chapter 3	Chapter 4	Chapter 5
Case	Uber	Renewable energy cooperatives	Scientific journals	Surf music
Industry	Transportation	Energy	Publishing	Music
Institutional lens	Formal and informal	Institutional relatedness	Conventions	Categories
Mechanism	Diffusion	Local market formation	Novelty generation	Emergence and re-emergence
Actors	Users	Users	Gatekeepers	Gatekeepers

Table 1.2 Overview of co-author contributions

	Chapter 2	Chapter 3	Chapter 4	Chapter 5
Theory	Koen Frenken	Koen Frenken		Alex van Venrooij
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2. YOUR UBER IS ARRIVING NOW

An analysis of platform location decisions through an institutional lens

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Abstract

While previous studies on platform-based companies studied their impact on local economies and communities, our understanding of their location choices remains limited. Given the disruptive nature of platform-based business models, we argue that an institutional lens is particularly relevant in understanding the location choices of platform-based companies. We study the local institutional conditions affecting Uber's decisions where to introduce their controversial platform service UberX that matches unlicensed chauffeurs with passengers through an app. Following previous institutional studies of location choice, we make a distinction between formal and informal institutions. Regarding formal institutions, our main finding holds that Uber preferred to locate in cities with institutions that promote competition and innovation. We further find that Uber leveraged their global pool of users who acted as mobile carriers of informal institutions, providing legitimacy for Uber's controversial taxi service across the world.

This chapter is under review at a journal.

2.1 Introduction

The rise of the platform economy has raised debate about the disruptive impact of online peer-to-peer business models (Kenney and Zysman, 2016). Globally operating platforms that offer location-bound services such as Airbnb (Zervas et al., 2017), Uber (Thelen, 2018) and Deliveroo (Cant, 2019) challenge local businesses as well as the prevailing institutions in which they are embedded (Mair and Reischauer, 2017; Thelen, 2018; Uzunca et al., 2018). In particular, peers transacting via online platforms often do not comply with market regulations and tax obligations (Frenken and Schor, 2017; Martin, 2016). Platforms also raise questions about low pay and lack of social security (Kenney and Zysman, 2016; Kuhn and Maleki, 2017). Previous studies have furthered our understanding of the local impact of platform companies on local businesses and communities. However, our understanding of platform location choices around the globe remains limited (Stallkamp and Schotter, 2019).

Traditionally, location choice research in international business studies explained foreign entry as the result of economic drivers, such as market size, resources availability or lower labor costs (for a review see Kim and Aguilera, 2016). More recently, international business scholars turned to institutional and cultural factors (Dunning and Lundan, 2008; Flores and Aguilera, 2007; Kostova and Zaheer, 1999). The core tenet of the latter studies holds that multinational enterprises (MNE) look for host locations with institutional environments that are similar to their home country and fit with their activities (Kostova and Zaheer, 1999).

An institutional lens is particularly relevant for the study of online platform companies' location decisions. Finding institutional environments that are welcoming to platform services may be difficult, as the activities that peers employ via online platforms often challenge local regulations. Instead, platform companies tend to enter a local market first, and deal with regulatory institutions only at a later stage (Thelen, 2018; Uzunca et al., 2018), a strategy which can be summarized as "don't ask permission, ask forgiveness" (Kenney and Zysman, 2016, p. 67). In their location decisions, platforms thus seem to prioritize market share gain and first-mover advantages, despite potential conflicts with local regulators (Garud et al., 2020). In doing so, their entry strategy depends on creating a 'buzz' among local potential users (Parente et al., 2018).

What, then, are the institutional conditions that affect a platform's decisions to introduce a controversial service in locations around the world? While we expect that platforms take specific formal institutions, including regulations, into account in their location decisions, we argue that they also rely on the local presence of informal institutions, which are embodied in shared codes of conduct, norms and solidarity between the platform and

their global user base. Platform companies examine the latent demand for their service in new markets by looking at the number of people that open their app in particular cities worldwide using GPS (Johnson, 2016; Van Dijck et al., 2018). As such, we argue, platform companies can rely on their network of global users, in particular business travelers and tourists, who act as a 'trusted community' supporting the entry in new local markets.

In this paper we specifically focus on platforms active in markets for location-bound services (e.g. transportation, food delivery, cleaning), rather than services that remain online (e.g. outsourced business services or social media) (Stallkamp and Schotter, 2019). Location-bound services specifically disrupt local businesses and communities. We study the case of Uber and we focus on its controversial service UberX, which connects unlicensed drivers to taxi passengers through an app, thereby challenging local taxi regulations in cities. We analyze location choice factors associated with Uber's decisions to locate in nearly 600 cities worldwide in a time period of less than seven years. Specifically, we test to what extent Uber's location decisions are affected by local formal institutions in the form of regulations and informal institutions carried by their global user base.

The paper makes several contributions. Theoretically, we extend the study of location decisions to 'born globals', in our case platform companies, which rely on the presence of trusted communities that share informal institutions with the MNE. Empirically, we add to the recent wave of studies on the disruptive impact of platform companies on local economies by considering how a platform company chooses these host locations. We do so by examining not only the effect of local regulations on location choices, but also the effect of global users as key legitimizing actors. As such, we respond to recent calls for a better understanding of the internationalization patterns of platform companies (Parente et al., 2018; Stallkamp and Schotter, 2019).

We will proceed as follows. In the next section, we review location choice research on both formal and informal institutions and hypothesize on how institutions affect platform's location decisions. We then present our data and explain the application of a time-to-event model to study Uber's location decisions. We test our hypotheses in the next section and in the last section conclude with a discussion on the relevance of our study for location choice and discuss managerial and policy implications.

2.2 Location choice and institutions

International business research has a long tradition of analyzing the location choices of MNEs. This research is mainly concerned with studying location factors that shape

MNEs' strategies to access new geographic markets and affect their location decision (Jain et al., 2016; Nielsen et al., 2017). Prior research found a multitude of factors that influence an MNE's location choice, which can broadly be divided into two umbrella drivers: economic drivers and institutional-cultural factors (Flores and Aguilera, 2007). While traditionally much emphasis has been put on economic drivers such as market size, market affluence, market growth or resource availability and efficiency-seeking motives (Caves, 1996; Dunning, 1980; Sethi et al., 2003; Vernon, 1966), institutional drivers gained in attention more recently (Dunning and Lundan, 2008; Flores and Aguilera, 2007; Kostova and Zaheer, 1999; and, for a review, see Kim and Aguilera, 2016).

Prior research indicated that MNEs are aware of the importance of the institutional environment for their location decisions (Kedia and Mukherji, 1999). The core tenet in research on these institutional drivers holds that MNEs prefer host locations that are institutionally similar to the home country, reducing uncertainty and the likelihood of failure (Kostova and Zaheer, 1999). When entering foreign locations MNEs are subjected to new regulations, local norms and customers' requirements, and need to gain local legitimacy (Flores and Aguilera, 2007). Legitimacy is more easily acquired when formal and informal institutions are similar to the host environment. We first discuss formal institutions that are codified laws and regulations enforced by regulatory bodies, and subsequently informal institutions that are embodied in traditions, cultural customs, and codes of conduct (North, 1990).

2.2.1 Formal institutions

Platform companies that enable informal economic activity among peers generally create friction with formal institutions such as existing laws and regulations at local levels. However, even if formal institutions are generally unfavorable for platform companies, one can still expect that in attempts to seek for institutional similarity, these companies will try to limit the friction between their activities and local regulations to the extent that such institutions can provide at least some legitimate support for a platform's service (Kostova and Zaheer, 1999). In reviewing prior literature on the importance of local formal institutions, we hypothesize about platforms' attempts to seek institutional similarity and limit friction by distinguishing between three sets of institutions: 1) economic institutions; 2) political institutions; and 3) labor market institutions.

An MNE's location choice may be affected by a range of economic institutions, where economic institutions are taken to refer to "the various dimensions of institutions that ensure the smooth operation of a market economy" (Du et al., 2012, p. 210). Generally, prior studies conclude that MNEs exhibit an aversion towards locations with weaker economic institutions (Ascani et al., 2016; Du et al., 2008). Economic institutions impacting MNE's location decisions include barriers to start a business, barriers of entry,

taxation policies, competition policy and trade liberalization (Bevan et al., 2004; Djankov et al., 2006; Pajunen, 2008; Spar, 2001). Also, it is known from prior studies that in most countries governments control foreign entry in their service industries more severely than in their manufacturing industries (Li and Guisinger, 1992; Miozzo and Yamin, 2012). This may be especially important for the entry decisions of platform companies, as platforms, by nature, operate in winner-take-all markets due to positive network externalities, causing severe disruption of incumbents operating traditional business models (Kenney and Zysman, 2016; Thelen, 2018; Zervas et al., 2017).

The extent to which countries allow foreign entry and support innovation differs quite a lot (Herrera and Nieto, 2008; Spar, 2001). Specifically, prior research indicated that both cities and countries greatly differ in the ways they regulate platform companies (Aguilera et al., 2019; Thelen, 2018; Uzunca et al., 2018). The studies by Thelen (2018) on Germany, Sweden and the United States and Uzunca et al. (2018) on Egypt, The Netherlands and the United Kingdom both showed that, while governments regulated UberX quite differently, they all acknowledge the innovative and user-friendly nature of the service. In general, one can argue that countries with more innovation-friendly institutions, encouraging investment in technology and innovative entry, are more attractive to platform companies than countries that lack such institutions (Interian, 2016). One can therefore expect that platforms prefer to enter in locations with economic institutions promoting competition and innovation, leading to the following hypothesis:

> **Hypothesis 1:** Platform companies are more likely to introduce their services in locations with strong economic institutions.

Regarding political institutions, as with economic institutions, prior literature has argued that locations with weaker political institutions or higher political risk are less attractive for MNEs to enter (García-Canal and Guillén, 2008; Quer et al., 2012). The general argument holds that political instability and ineffective governments will negatively affect economic performance, especially for newcomers who are less acquainted and networked than firms already present. One of the most studied aspect is local corruption, which is usually argued to negatively influence an MNE's decision to invest locally (Du et al., 2008; Grosse and Trevino, 2005; Habib and Zurawicki, 2002; Wei, 2000). Other studies look at the quality of the host's legal system, showing that MNEs tend to avoid countries without transparent legal systems (Campos and Kinoshita, 2003; Globerman and Shapiro, 2003). Other studied factors of political stability and government effectiveness include red tape, regime type and nepotism (Flores and Aguilera, 2007; Globerman and Shapiro, 2003; Mudambi and Navarra, 2002). While prior research on the effects of political instability and effective governments on companies active in platform economy is very limited, some research suggests that, similarly to location choices by traditional firms, locations

with higher political instability seem less supportive of platform activities (Cohen, 2018; Tham, 2016). This leads us to the following hypothesis:

> **Hypothesis 2:** Platform companies are more likely to introduce their services in locations with strong political institutions.

In studying the relationship between labor market characteristics and an MNE's location choice, most early literature focused on the impact of labor costs (Culem, 1988). Later studies also looked at more subtle characteristics of national labor markets. In general, these studies find that MNEs prefer to enter countries where labor market regulations are flexible, and, more specifically, where difficulty of dismissals is lower, the length of notice periods is lower, the required severance payments are lower, labor unions are weaker, and employment contract protection is weaker (Görg, 2005; Gross, and Ryan, 2008; Lee, 2003). MNEs active in service sectors seem to be more sensitive to labor market regulations compared to manufacturing MNEs, as service sectors are generally more labor-intensive (Javorcik and Spatarneanu, 2005).

As platform-based companies are based in service sectors, and, moreover, classify their workers as independent contractors, we expect that especially platform MNEs prefer locations with flexible labor market institutions. For platforms, the relation with platform workers is not without controversies. While they tend to treat them as independent contractors, they nevertheless, and similar to an employer, actively monitor their workers on speed and quality of service, and sometimes even ban them from the platform if quality is judged too low (Cornelissen and Cholakova, 2019; Kenney and Zysman, 2016). This new type of labor relations has met fierce critiques from labor unions, while legal experts suggest that classifying platform workers as independent contractors may be inconsistent with labor law in most countries (Aloisi, 2015; De Stefano, 2015; Fabo et al., 2017). By now, platform companies such as Uber and Deliveroo experienced several strikes by their workers as well as legal cases against them in multiple countries (Bernal, 2018; Taylor, 2018). When considering location choice in the platform economy, one can expect that a platform expects the least friction in locations with loose labor market regulations and weak union power. This brings us to the following hypothesis:

> **Hypothesis 3:** Platform companies are more likely to introduce their services in locations with weak labor market institutions.

2.2.2 Informal institutions

Informal institutions can facilitate or hinder economic activities in a location by increasing or reducing transaction costs (North, 1990). These institutions play important roles in coordinating local economic activity through mechanisms such as reputation, trust and

familiarity (Seyoum, 2011). Countries' informal institutions include patterns and norms of behavior and socially sanctioned codes of conduct embedded in national cultures (Peng, 2000). Traditionally, location choice studies used the cultural distance between an MNE's home country and potential host countries to indicate the dissimilarity of informal institutions, finding that cultural distance indeed negatively affects location choices (Kogut and Singh, 1988; Quer et al., 2012). This means that MNEs favor locations where their activities fit well with the local informal institutions, or, at least, where the distance to these informal institutions is smaller. Studies also built on the idea that certain aspects of local informal institutional environments will make them more or less open to the activities and behavioral norms of foreign MNEs (Li et al., 2019). For instance, MNEs exhibit a general preference for certain types of informal institutions, such as high levels of trust (Seyoum, 2011), risk-taking attitudes (Contractor et al., 2014) or associative activity (Zhao and Kim, 2011).

More recent location choice studies have started to study mechanisms through which MNEs can moderate or overcome cultural distances. One of those mechanisms is provided by the presence of 'trusted communities' (Li et al., 2019) who can facilitate economic exchange via shared informal institutions (Hernandez, 2014). For instance, the presence of co-ethnic facilitates economic exchange driven by shared codes of conduct, norms and solidarity between the MNE and local co-ethnic communities (Portes and Sensenbrenner, 1993). Prior research also looked at the role played by both home country diaspora in the host location (Esperanca and Gulamhussen, 2001; Hernandez, 2014) and of agglomeration of same-country MNEs (Tan and Meyer, 2011).

We build on the literature of 'customer following' of trusted communities, by extending it to platform companies, which are often 'born globals' and rely on a global customer base (Nambisan et al., 2019). Platform companies organize digital market places rather than producing a direct service for customers themselves (Acquier et al., 2017; Kenney and Zysman, 2016). As intermediaries, platforms create value by connecting local customers with local producers online, thereby escaping most of the problems of cultural adjustment. This means that once platform companies think that there is local demand for their services, they can start connecting these customers to potential local producers, without a need to have personal contact with users of their app. Instead, platforms are to a large degree dependent on their brand familiarity and attractiveness to local customers (Stallkamp and Schotter, 2019) and need to create a local buzz when they enter a new local market in order to achieve widespread user adoption (Parente, 2018). The interactive relation with local customers primarily relies on informal institutions, such as social values and shared understandings.

A previous study on Chinese platform companies showed that home-country customer following had limited success outside of providing services to co-ethnic community in host locations (Jia et al., 2018). We argue, however, that rapidly diffusing platform companies are able to engage in a more dynamic process of customer following, by focusing on customers that are not yet present in a market but are mobile between geographically separated fields. For example, platforms such as Uber, Airbnb, Mobike and BlaBlaCar have become a global brand and explicitly target internationally travelling audiences (Cardona, 2018; Dredge and Gyimóthy, 2015). Different platform companies indicated that they examine the latent demand for their service in new markets by looking at the number of people that open their app in particular cities worldwide using GPS (Johnson, 2016; Van Dijck, 2018). This allows platforms to estimate with quite some precision the potential 'trusted community' for their service before they enter a new location.

As such, we argue that platforms benefit from shared informal institutions with their mobile customers acting as a 'trusted community' in the host locations that they visit. Indeed, when platforms start operating in a new location, its first customers are often those customers who are already familiar with its services (Campbell, 2015; Knight, 2016). Besides being part of the trusted community themselves, these users are also likely to increase legitimacy through processes of endogenous diffusion promoting the new platform services to a broader population. Here, we follow studies on the adoption of innovation, which argued that new-to-the-world innovations are typically best legitimated by direct observations of peer behavior and word-of-mouth (Rossman, 2014). In this sense, global audiences are the mobile carriers of informal institutions transferring new consumer behavior from cities where the platforms are already present to cities where their services are newly introduced. Our last hypothesis reads:

> **Hypothesis 4:** Platform companies are more likely to introduce their services in locations with more exposure to visiting customers who already experienced their services in other locations.

2.3 Data and methods

2.3.1 Sampling and dependent variable

Since the Uber-app was launched in San Francisco in July 2010, Uber has been introducing its services worldwide and mostly at the city-level. We therefore take cities as the unit of analysis with the introduction of UberX in a city at a particular moment in time as our main dependent variable. In order to construct the dependent variable, we used

Geonames[1] gazetteer data to compile a list of all cities worldwide with a population equal to or above 100,000 inhabitants, resulting in a comprehensive collection of 4,262 cities worldwide. A minimum in population was set because including smaller cities would disproportionally increase the size of the dataset relative to the number of entries. For 4,190 (98.3 percent) of all cities we were able to collect information on all independent and control variables. These cities comprise our final sample.

We used Uber's cities webpage[2] to create our binary and time-specific introduction variable. In order to gather the dates of city introductions, we used the Internet Archive Waybackmachine[3]. This service enabled us to visit archived versions of Uber's cities webpage in order to see on what date a new city appears on these pages. The Internet Archive states that their archived pages do not represent all historical updates of the web, but are based on periodic web crawls done by web traffic companies since 1996. However, with 452 crawls in a period of 72 months (January 2011- February 2017), the crawls are done 6.2 times a month, which makes a good proxy for the introduction dates of Uber's services. To further refine the date of introduction we searched Uber's blog and newsroom[4] pages to find the blog posts containing the announcement and exact date of each city introduction. The first web crawls for Uber's website go back to 4 January 2011, which is more than a year before the first date of observation in this study, when the company had its first UberX introduction on 3 July 2012. The day of this first introduction of UberX is also the first date of follow-up. All searches were finalized on 28 February 2017 and this date was considered the last follow-up date for UberX entry. Thus, cities were either followed-up until moment of UberX entry or the last follow-up date, after which they were censored. For 574 cities we found an UberX introduction, comprising 13.5 percent of the cities in our dataset.

2.3.2 Formal institutional variables

In order to test the hypotheses on formal institutional variables, we will focus on three sets of variables in the regulatory domain: economic institutions, political institutions and labor market institutions. The data is taken from the Institutional Profiles Database (IPD) 2012 (Bertho, 2013), which contains 130 indicators on institutional characteristics for 143 countries and has been used in international business literature before (Arezki et al., 2015; Bénassy-Quéré et al., 2007; Lavigne and Nicet-Chenaf, 2016). These institutional characteristics are measured on the country level through composite indicators built

1 www.geonames.org is an open gazetteer database including geographical data such as place names in various languages, elevation, population, lat/long coordinates and more. This data was collected in November 2018 and was manually cleaned to exclude duplicates, correct spelling mistakes, etc.
2 www.uber.com/cities
3 http://web.archive.org/ is an archive that saves historical web data. Their archived pages are web crawls done by web traffic companies since 1996.
4 blog.uber.com and later newsroom.uber.com

from perception data measured on a continuous scale from 0 to 4. The data was not available for 38 cities, which all are located in low income countries without any UberX introductions. These cities were excluded from the analysis.

In order to measure economic institutions, we used indicators for market regulations such as “competition regulation”; “barriers to market entry”; and “public support for innovation’. Here, strong economic institutions are indicated by higher scores on competition regulation and public support for innovation and lower scores for barriers to market entry. In order to capture political stability, we include the IPD indicators “functioning of the justice system”; “level of corruption” and “influence economic stakeholders”. Strong political institutions are thus indicated by higher scores on the functioning of the justice system and lower scores for the level of corruption and influence of economic stakeholders. Finally, to capture the local labor regulations, we included the indicators “trade union freedoms”; “compliance with employment law (formal sector)”; and “employment contract protection”. Here, strong labor market institutions are indicated by higher scores on all three indicators. Out of all the indicators of the IPD database, we decided to use these nine indicators to operationalize the three regimes of formal institutions for several reasons. First, most of these IPD indicators have previously been used to explain location choice activities (Bénassy-Quéré et al., 2007). Second, and related to this, many of the indicators fall outside of the scope of this research, because they are unrelated to location choice, Uber or platform companies or the three regulatory regimes of interest (e.g. most indicators on the capital market). Furthermore, some other indicators of the IPD dataset are formulated too general (e.g. ‘functioning of political institutions’; or ‘autonomy of organizations’). Lastly, some indicators that could have been interesting to include in our analysis, correlate too strong with others that we have included now (e.g. ‘barriers to entry’ correlated strongly with ‘ease of starting a business’; ‘trade union freedoms’ correlated strongly with ‘independence and pluralism of trade unions).

Our nine indicators on a scale from 0 to 4 are all measured at one moment in time, which is justified as these generic regulatory institutions of interest are not expected to change substantially during the short period of our time frame, as macro-institutional change is gradual and incremental (Mahoney and Thelen, 2010; North, 1990). For a more detailed description of the IPD data, we refer to the data description published in Bertho (2013).

2.3.3 Informal institutions

In order to measure the extent to Uber could follow its existing customers, we measure to what extent cities are exposed to UberX in other cities through networks of traveling customers. We used three networks between cities based on three different datasets.

First, we make use of air traffic between cities, which constitutes a general network of travel. The assumption here is that the better cities are connected to other through air traffic, the more Uber customers will travel between these cities. We use data provided by openflights.org on air routes between cities to calculate this air traffic connectivity between cities, which provides us with 67,663 air routes between 3,209 airports around the world. As such, we are able to calculate the number of air routes between each pair of cities and construct a network of incoming air routes between cities.

Our second network is based on global business connectivity. In the case of Uber, an important global audience can be specifically found in the business community (Alemi et al., 2018). Indeed, business travelers were among Uber's earliest customers and Uber targeted this audience in their global expansion strategy (Lashinsky, 2017). In order to measure business connectivity between cities we make use of data of the Globalization and World Cities (GaWC) Research Network (Taylor, 2001; Taylor et al., 2014; Taylor and Derudder, 2016). This world city network is constructed based on the premise that links between cities follow from connections between a single firm's offices in different cities (Taylor et al., 2014). Our idea here is that the better cities are connected through business firms in the world city network, the more business travelers are expected to move between these cities. Two cities in this network are thus connected when they both have an office of the same multinational firm. This connection is weighted by the type of office that is present in both of the cities (which are coded between 1 and 5). By combining the single firm networks of 175 multinational firms in 'advanced producer services' in 2016[5] we construct a (weighted) network of shared offices between cities.

Our third network is based on a dataset on co-patenting. We used co-patenting to capture a more industry-based business collaboration between cities, because co-patenting indicates a joint output stemming from collaborative R&D activities (Belderbos et al., 2014). When two cities are better connected by co-patenting, there is more collaboration between R&D intensive organizations in these two cities, and accordingly more travelers moving between these cities. In order to obtain co-patenting patterns between cities, we used the OECD-REGPAT database, which contains all patent applications to the European Patent Office and Patent Corporation Treaty between 1978 and 2017. These patent applications are allocated to the city-level based on the inventor addresses. Because we analyze co-patenting, we only selected the patents that are co-developed by inventors from different cities and leave out patents developed by only one inventor or inventors from the same city. As a result, our network of inter-city co-patenting consists

5 The 75 largest financial services firms and 25 largest firms each in accounting, advertising, law, and management consulting of 2016. Firms were selected by using trade information that ranked these firms by size (e.g., on turnover) (Taylor et al., 2014).

of 136,197 patents that list at least two addresses from different cities between 2009 and 2017. For each year in our time frame (2012–2017) we take the moving sum of number of collaborations between cities within the last four years starting three years before the focal year in order to capture that working towards a patent application requires preparation and publications in the years before the application (Belderbos et al., 2014). We then constructed a network of connectivity between cities through co-patents for the period between 2012 and 2017.

In order to capture to what extent cities are exposed to UberX through these networks we compute for each city *i* the sum of all connections with cities where UberX is already active at time *t*, as given by:

$$uberX\ exposure\ through\ intercity\ network_{it} = \sum_{j=1}^{4,190} (C_{i\leftrightarrow j} \cdot U_{jt})\ (\text{where } i \neq j)$$

where $C_{i\leftrightarrow i}$ is the intercity connectivity of city *i* with the jth city in our dataset and U_{jt} is a binary variable indicating whether UberX is active in the jth city at time *t*. Applying this formula to our three individual networks provides us with three time-dependent UberX exposure variables that change over time when UberX starts to get introduced in more cities globally. In order to make these independent variables more comparable, we normalized the variables across the three networks on a scale from 0 to 10.

Our three different networks provide us with a rich picture of a cities' exposure to incoming travelers. The GaWC network and the patent network mostly capture business travelers, where the former has a focus on advanced producer services and the latter a focus on R&D intensive industries. As such, we capture one of Uber's core audiences (Alemi et al., 2018). Our air traffic network focuses more on incoming travelers in general, including business and tourist flights. As such, we also capture incoming tourists, another one of Uber's core audiences (Connolly, 2020).

2.3.4 Control variables

We include a number of control variables in our models. First, we include national GDP per capita and city population in order to control for the attractiveness of local markets. GDP per capita is included as country proxy in US dollars that we retrieve from World Bank (2019a) data. The population of the cities in our database is provided in the gazetteer data of Geonames. Besides these control variables for the general attraction of cities for foreign entry, we used some variables that might affect this attractiveness for Uber specifically. First, we included the local level of unemployment in percentages (World Bank, 2019b), because higher unemployment rates provide Uber with more opportunities to find local drivers. Second, we used the perceived quality of the local public transport (Bertho, 2013), since the attractiveness of entering a city for Uber might decrease with higher

Table 2.1 Descriptive statistics for time-independent and time-dependent variables

Variable	Mean	SD	Min.	Max.
Time-independent variables				
UberX introduction	0.14		0	1
Population (in millions)	0.46	0	0	22.32
GDP per capita (in ten thousands)	1.65	1.79	0	10.29
Unemployment (in percentages)	6.75	5.02	0.28	27.47
Quality of public transport	2.15	1.23	0	4
Capital city	0.03		0	1
Barriers to market entry	2.61	0.89	0	4
Public support for innovation	2.11	1.08	0	4
Competition regulation	2.2	0.89	0	4
Functioning of the justice system	2.19	0.77	0	4
Level of corruption	2.52	1.24	0	4
Influence economic stakeholders	2.27	0.55	0	4
Compliance with employment law	2.98	0.78	1	4
Trade unions freedom	2.63	1.06	0	4
Employment contract protection	2.39	0.66	0	4
Time-dependent variables				
GaWC network exposure	0.08	0.38	0	10
Patent network exposure	0.02	0.18	0	10
Air traffic network exposure	0.05	0.26	0	10
Geographical proximity to UberX	0.31	0.86	0	12

quality of alternative modes of mobility. We also included a dummy variable for capital cities as these cities are sometimes considered more attractive in location decisions due to better access to national government officials (Belderbos et al., 2017). Furthermore, in order to distinguish between exposure to UberX and overall connectivity of a city we also include the total connectivity for each city in our three networks. These three total connectivity measures are computed in similar fashion as the exposure networks that serve as our independent variables, but ignoring whether cities already have UberX or not, thus including all cities in these networks. We add this measure for overall global connectivity to control for the attractiveness of global cities for the location choice of MNEs (Belderbos et al., 2017).

As a final control variable we take into account the geographical proximity of prior UberX entry. This variable is introduced to control for the possibility that Uber has prior experience proximate to a given location (Jain et al., 2016; Nielsen et al., 2017). We calculated for each moment in time the number of cities with UberX in a radius of 100 kilometers (great circle distance) from the focal city. Rather than taking the national scale, we choose this smaller scale since our geographical proximity variable is expected

to measure the likelihood that Uber has overcome local cultural adjustment problems and that local audiences directly interacted with UberX services in geographical proximate cities. Table 2.1 and Table 2.2 show the descriptive statistics for our time-independent variables only and correlations for all independent and control variables respectively.

2.3.5 Time to event analysis

In order to test our hypotheses we use time-to-event analysis and build an Extended Cox model. This model is suitable for studying the impact of time-varying covariates on the risk of a specific event occurring, in this case the local introduction of UberX within a city. The main reason for using a Cox model is that the model explicitly accounts for the right-censored nature of our data, i.e. cities that did not experience an UberX introduction in the studied time frame, but might experience such an introduction at a later stage. We use an extended Cox model because we include time-varying variables in our analysis which results in a violation of the proportional hazard assumption of a regular Cox model. In order to estimate covariates associated with the risk of introduction, extended Cox models use exponential hazard functions that represent the risk that if at time *t* a city has not seen an UberX introduction, this city will be subjected to an UberX introduction in the next instant. This means that the data is formatted in such a way that each city contributes a line for each time interval, allowing the time-dependent variables to change (Kleinbaum and Klein, 2012; Therneau et al., 2017). To measure the influence of covariates, the model uses the following equation:

$$h(t, \boldsymbol{X}(t)) = h_0(t) \exp\ [\sum_{i=1}^{p1} \beta_i X_i + \sum_{j=1}^{p2} \delta_j X_j(t)]$$

where $h_0(t)$ is the baseline hazard function, X_i denotes the ith time-independent variables and $X_j(t)$ denotes the jth time-dependent variables (Kleinbaum and Klein, 2012). All predictors at time *t* are denoted by bold $\boldsymbol{X}(t)$. The baseline hazard function estimates the risk for observations with 0 on all (time-dependent and -independent) covariates and is thus only dependent on time. Time here is measured in days. We use four time-dependent variables, which are the three UberX exposure networks and the geographical proximity of prior foreign entry. The other variables are added as time-independent variables, where for most of these we assume that they will not significantly change over a period of 72 months. We use the package *survival* in R to estimate the models (Therneau, 2018).

2.4 Results

In total 574 cities experienced an UberX introduction during our time-frame, which corresponds to 13.5 percent of the 4,190 cities included in our dataset. The table in appendix A2.1 separates this global diffusion by continent and country. The overall pattern

Table 2.2 Correlations of independent and control variables

	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
(1)	Population	1																					
(2)	GDP per capita	-0.08	1																				
(3)	Unemployment	-0.05	0.14	1																			
(4)	Quality of public transport	-0.02	0.52	-0.03	1																		
(5)	Capital city	0.28	-0.02	0.04	-0.05	1																	
(6)	Geographical proximity to UberX	-0.04	0.26	0.05	0.1	-0.05	1																
(7)	Barriers to market entry	0.08	-0.6	-0.16	-0.11	-0.06	-0.25	1															
(8)	Public support for innovation	-0.01	0.64	0.08	0.61	-0.09	0.16	-0.21	1														
(9)	Competition regulation	-0.07	0.53	0.03	0.45	-0.06	0.26	-0.44	0.41	1													
(10)	Functioning of the justice system	-0.09	0.74	0.18	0.51	0.01	0.18	-0.54	0.48	0.59	1												
(11)	Level of corruption	0.06	-0.82	-0.08	-0.53	0	-0.26	0.57	-0.63	-0.48	-0.73	1											
(12)	Influence economic stakeholders	0.02	0.06	-0.2	-0.06	-0.02	0.02	-0.05	-0.03	0.03	0	0.07	1										
(13)	Compliance with employment law	-0.1	0.4	0.16	0.07	0.01	0.16	-0.44	0.17	0.4	0.46	-0.15	0.12	1									
(14)	Trade unions freedom	-0.1	0.39	0.29	-0.06	0.03	0.11	-0.52	-0.07	0.21	0.51	-0.27	0.2	0.47	1								
(15)	Employment contract protection	-0.02	0.13	0.26	0.17	-0.02	-0.05	0.05	0.19	0.17	0.25	0.04	-0.21	0.29	0.24	1							
(16)	GaWC network exposure	0.41	0.08	0.02	0.04	0.49	-0.02	-0.08	0.04	0.04	0.09	-0.08	-0.01	0.03	0.06	0.04	1						
(17)	Patent network exposure	0.09	0.14	0	0.08	0.03	0.06	-0.09	0.07	0.09	0.1	-0.12	-0.02	0.05	0.05	0.02	0.17	1					
(18)	Air traffic network exposure	0.32	0.13	0.05	0.07	0.28	-0.03	-0.08	0.09	0.05	0.07	-0.12	0.01	0.05	0.02	0	0.59	0.16	1				
(19)	GaWC total connectivity	0.55	0.1	0.03	0.06	0.55	-0.05	-0.11	0.05	0.06	0.1	-0.11	-0.01	0.04	0.07	0.02	0.76	0.17	0.51	1			
(20)	Patent total connectivity	0.22	0.15	-0.02	0.12	0.08	0.01	-0.04	0.12	0.05	0.12	-0.13	0.03	0.03	0.05	0.05	0.29	0.5	0.32	0.3	1		
(21)	Air traffic total connectivity	0.56	0.11	0.03	0.07	0.34	-0.05	-0.06	0.09	0.04	0.06	-0.1	-0.01	0.02	0	0.01	0.51	0.15	0.7	0.74	0.33	1	
(22)	Prior Uber Black (in 100 days)	0.13	0.09	0	0.01	0.13	-0.01	-0.05	0.02	0.05	0.04	-0.06	0.01	0.02	0.03	0	0.24	0.09	0.24	0.34	0.06	0.32	1
(23)	Total exposure dummy	0.38	0.25	0.04	0.16	0.34	0.01	-0.19	0.17	0.16	0.17	-0.23	0	0.09	0.05	0.01	0.5	0.19	0.45	0.54	0.17	0.46	0.12

of diffusion can be summarized as a process that started in North-America, continued in Europe, South-Africa, Asia and Oceania, and ended in South-America.

2.4.1 Hypothesis testing

Table 2.3 presents the exponential regression coefficients (hazard ratios) of our Extended Cox models of the formal institutional variables. Following Blossfeld et al. (2007), we interpret the effect of the covariates in the extended Cox model as the percentage change in the hazard rate, given that all other variables remain unchanged. To do this, we can use the following equation:

$$\Delta\hat{r} = (\exp(\hat{a}_i) - 1) \times 100\%$$

where $\hat{a}_i$ is the coefficient for X_i (or $X_i(t)$) and $\Delta\hat{r}$ is the percentage change in the hazard rate resulting from a one-unit change in X_i (or $X_i(t)$).

Model 1 only includes our control variables, and shows the expected results for variables measuring host market attractiveness. Both population and GDP per capita show a positive and significant effect on the likelihood of experiencing an UberX introduction. Furthermore, the variables indicating a city's attractiveness for the UberX service specifically show the expected signs, with Uber entering being more likely in locations where the quality of public transport is relatively low and the level of unemployment is relatively high. This first model also shows that capital cities have an increased likelihood of experiencing an UberX introduction. Lastly, prior UberX activities in proximate cities seems to have a negative effect, indicating a more geographically diffuse strategy for Uber to penetrate markets worldwide. Models 2 to 5 introduce the regulatory institutional variables that we use to test hypotheses 1 to 3. We introduce three blocks of variables representing economic institutions, political institutions and labor market institutions. As model 2 shows, all of the variables capturing economic institutions promoting innovation and competition are significant and with the expected direction. It shows that Uber prefers to enter locations where barriers of market entry are low, innovation is encouraged, and competition is safeguarded. These effects prove to be robust from model 2 onwards. The competition variable shows the strongest effect, with an increase of the hazard rate between 55 and 120.2 percent with one-unit change for this variable (on a scale from 0 to 4) throughout our models. In all, the effects for economic institutions variables support hypothesis 1.

The results regarding local political institutions are mixed. In model 3, all three variables show a significant effect, but not all have the expected directions. While the variables for corruption shows the expected direction (i.e. less corruption increases the risk of UberX introduction), the hazard ratio of 0.794 (and 0.371 in model 5) for functioning of the justice system runs counter to hypothesis 2. This shows that the better the functioning

Table 2.3 Extended Cox model introducing regulatory institutional variables for predicting local UberX introduction

Variable	Model 1		Model 2		Model 3		Model 4		Model 5	
Population (in millions)	1.363**	(0.015)	1.380***	(0.014)	1.359***	(0.015)	1.400***	(0.016)	1.404***	(0.015)
GDP per capita (in ten thousands)	1.620***	(0.019)	1.221***	(0.034)	1.246***	(0.037)	1.429***	(0.027)	1.156**	(0.055)
Unemployment	1.029***	(0.008)	1.019*	(0.009)	1.036***	(0.008)	1.035**	(0.010)	1.026*	(0.012)
Quality of public transport	0.784***	(0.036)	0.683***	(0.042)	0.772***	(0.044)	0.949	(0.045)	0.886*	(0.045)
Capital city	1.872***	(0.143)	2.771***	(0.144)	2.293***	(0.144)	2.180***	(0.147)	3.587***	(0.154)
Geographical proximity to UberX	0.926*	(0.040)	0.824***	(0.046)	0.846***	(0.044)	0.808***	(0.046)	0.752***	(0.049)
Regulatory institutional variables										
Economic institutions:										
Barriers to market entry			0.601***	(0.056)					0.809*	(0.092)
Public support for innovation			1.391**	(0.062)					1.273**	(0.078)
Efficiency competition regulation			1.550***	(0.066)					2.202***	(0.094)
Political institutions:										
Functioning of the justice system					0.794**	(0.086)			0.371***	(0.127)
Level of corruption					0.528***	(0.068)			0.748**	(0.095)
Influence economic stakeholders					1.404***	(0.085)			1.213	(0.117)
Labor market institutions:										
Compliance with employment law							2.375***	(0.080)	2.059***	(0.090)
Trade unions freedom							0.917	(0.122)	1.382*	(0.162)
Employment contract protection							0.505***	(0.072)	0.763*	(0.116)
Model improvement (X2)	869.59***		206.77***		107.51***		389.35***		546.09***	
Compared to	Null model		Model 1		Model 1		Model 1		Model 1	
n	4,190		4,190		4,190		4,190		4,190	
Events	574		574		574		574		574	

Standard errors in parentheses, reported effects are hazard ratios (exponent of the coefficient)
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

of the justice system, the less likely Uber is to enter with their UberX service. The hazard ratio of 1.404 for influence economic stakeholders also runs counter to hypothesis 2, as it means that the more influence economic stakeholders have (and thus the weaker the political institutions are), the more likely Uber is to introduce their UberX service. However, from model 5 onwards the influence of economic stakeholders shows no significant effect. Taken together, we cannot confirm hypothesis 2, as only one out of three variables shows the anticipated effect.

Our variables for labor market institutions are added in model 4. Again, this set of formal institutions shows a mixed picture. Employment contract protection shows the expected negative effect, meaning that the higher employment contract protection the less likely it is that UberX is introduced. Model 5 tells us that the hazard rate of UberX introduction decreases with 23.7 percent with a one-unit increase in the employment contract protection variable (on a scale from 0 to 4). However, the variable indicating the compliance with labor laws shows an unexpected positive relationship with the likelihood of UberX entering. The hazard rate of UberX entry more than doubles for every one-unit change in this variable (on a scale from 0 to 4). Uber seems to introduce their UberX service in locations that have an increased compliance with local employment laws. Trade unions freedom also shows an unexpected positive effect, but this turns out not to be significant in later models. Taken together, we can only partially confirm hypothesis 3.

Models 6 to 9 in Table 2.4 include our variables measuring exposure to visiting customers who already experienced their services as a test of hypothesis 4. In each of the models 6 to 8 we introduce one of the exposure measures separately, with all of them showing significant positive effects. When we include all of the exposure measures in model 9, all maintain their positive and significant effect. The GaWC network exposure variable shows the strongest effect. A one-unit increase in the GaWC network exposure variable (on a scale from 0 to 10) increases the hazard rate of UberX introduction with 51.9 percent. Our patent network and air traffic exposure variables show an increase in the hazard rate of 19.9 and 20.8 percent respectively. Taken together, the observed effects for network exposure confirm hypothesis 4. Finally, in model 10 we control for the total connectivity of our three networks, in addition to the specific exposure to UberX measured by our network exposure variables. We thus test whether location decisions are based on the exposure to UberX, or a city's overall global connectivity (Belderbos et al., 2017). The GaWC total connectivity variable in this model shows that cities are indeed more attractive to Uber when they are globally connected, and the inclusion of overall connectivity does not go at the expense of the effects of our network exposure variables.

Table 2.4 Extended Cox model introducing network exposure variables for predicting local UberX introduction

Variable	Model 6		Model 7		Model 8		Model 9		Model 10	
Population (in millions)	1.301***	(0.020)	1.397***	(0.015)	1.367***	(0.017)	1.303***	(0.020)	1.064*	(0.028)
GDP per capita (in ten thousands)	1.180**	(0.056)	1.141*	(0.057)	1.115	(0.056)	1.159**	(0.058)	1.143*	(0.056)
Unemployment	1.038**	(0.012)	1.027*	(0.012)	1.028*	(0.012)	1.036**	(0.011)	1.024*	(0.012)
Quality of public transport	0.846***	(0.051)	0.875**	(0.051)	0.861**	(0.051)	0.843***	(0.052)	0.839***	(0.052)
Capital city	1.310	(0.204)	3.445***	(0.155)	2.531***	(0.162)	1.307	(0.206)	0.669*	(0.198)
Geographical proximity to UberX	0.786***	(0.047)	0.751***	(0.047)	0.767***	(0.049)	0.790***	(0.047)	0.809***	(0.047)
Regulatory institutional variables										
Economic institutions:										
Barriers to market entry	0.751**	(0.094)	0.799**	(0.092)	0.747**	(0.092)	0.729***	(0.094)	0.787**	(0.091)
Public support for innovation	1.218**	(0.079)	1.267**	(0.078)	1.210**	(0.078)	1.203*	(0.079)	1.366***	(0.079)
Efficiency competition regulation	2.422***	(0.099)	2.235***	(0.095)	2.268***	(0.096)	2.413***	(0.099)	2.215***	(0.095)
Political institutions:										
Functioning of the justice system	0.352***	(0.127)	0.375***	(0.128)	0.390***	(0.128)	0.356***	(0.127)	0.277***	(0.129)
Level of corruption	0.824*	(0.099)	0.756**	(0.096)	0.767***	(0.097)	0.813*	(0.099)	0.751**	(0.098)
Influence economic stakeholders	1.072	(0.120)	1.209	(0.117)	1.116	(0.118)	1.071	(0.121)	1.201	(0.123)
Labor market institutions:										
Compliance with employment law	1.992***	(0.091)	2.047***	(0.090)	2.026***	(0.090)	2.003***	(0.091)	1.982***	(0.093)
Trade unions freedom	1.150	(0.164)	1.364*	(0.163)	1.264	(0.163)	1.145	(0.164)	1.146	(0.162)
Employment contract protection	0.670***	(0.116)	0.748**	(0.113)	0.766*	(0.114)	0.696**	(0.116)	0.863	(0.119)
Exposure measures										
GaWC network	1.650***	(0.043)					1.519***	(0.057)	1.206**	(0.070)
Patent network			1.271***	(0.067)			1.199*	(0.093)	1.395***	(0.100)
Air traffic network					1.433***	(0.033)	1.218***	(0.057)	1.159*	(0.071)
GaWC total connectivity									1.870***	(0.067)
Patent total connectivity									0.626***	(0.103)
Air traffic total connectivity									1.15	(0.100)
Model improvement (X2)	116.04***		7.711*		70.99***		126.25***		199.69**	
Compared to	Model 5		Model 5		Model 5		Model 5		Model 9	
n	4,190		4,190		4,190		4,190		4,190	
Events	574		574		574		574		574	

Standard errors in parentheses, reported effects are hazard ratios (exponent of the coefficient)
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

2.4.2 Robustness checks

We test the robustness of our findings in Table 2.5. A second service that Uber introduced globally is Uber Black, which only employs licensed drivers with luxurious cars and thus faced much less friction with formal regulatory institutions. More specifically, the Uber Black service better resembles incumbent taxi business and therefore has met less local resistance compared to their controversial UberX service (Rienstra et al., 2015). Of the 574 cities that experienced an UberX introduction, 20 percent experienced a prior Uber Black introduction. Model R1 in Table 2.5 includes a variable that measures the amount of days that Uber Black is already present in a city. The result shows that cities become more attractive to introduce UberX when Uber already introduced its Uber Black service in that same city. This could be interpreted as Uber using its legal Uber Black service to prepare a city and its local audiences, for an UberX introduction. The UberX service can as such profit from a local legitimacy transfer from a prior Uber Black introduction (Dobrev et al., 2006). The effects of all our independent variables remain robust after adding this variable to our model.

In model R2 we include country dummies for countries with at least 5 cities in the dataset, in order to control for any unobserved country differences. This means that we have to exclude the country-level institutional variables. The likelihood-ratio test shows that this model is an improvement compared to model R1, meaning that a model containing country dummies captures additional heterogeneity compared to a model that contains the country-specific institutional variables. After adding these dummies, all of our network exposure variables remain almost unchanged in both significance and effect sizes.

One may argue that the entry of UberX in cities where Uber Black is already active, is not a true UberX entry as Uber has already established a brand name and user base on the ground. Hence, in model R3 and R4, we re-run the analysis of R1 and R2 only for cities that have not seen a prior Uber Black introduction. This limits our analysis to 4,079 cities with 464 UberX introductions.

While our network exposure variables also prove to be robust in this analysis, there are some changes in the effects of our formal institutions in R3 compared to R1. The influence of economic stakeholders and the employment contract protection show significant effects again, as was also the case in the earlier models in Table 2.3.

2.4.3 Conditional logit model

We also use an alternative estimation strategy using a conditional logit model. This model estimates the conditional probability that a city is selected from a set of alternative cities with similar attributes, and is regularly used to model MNE's location choices (Belderbos

Table 2.5 Extended Cox model including robustness checks predicting local UberX introduction

Variable	Model R1		Model R2		Model R3		Model R4	
Population (in millions)	1.080**	(0.029)	1.042	(0.032)	1.175***	(0.031)	1.480***	(0.056)
GDP per capita (in ten thousands)	1.105*	(0.055)			1.083	(0.066)		
Unemployment	1.026*	(0.012)			1.028	(0.013)		
Quality of public transport	0.850**	(0.052)			0.913*	(0.054)		
Capital city	0.817	(0.202)	0.910	(0.205)	0.387***	(0.251)	0.240***	(0.299)
Geographical proximity to UberX	0.800***	(0.048)	0.758***	(0.049)	0.832***	(0.046)	0.803**	(0.054)
Formal institutional variables								
Economic institutions:								
Barriers to market entry	0.781**	(0.092)			0.851*	(0.101)		
Public support for innovation	1.428***	(0.080)			1.170*	(0.088)		
Efficiency competition regulation	2.141***	(0.096)			2.219***	(0.105)		
Political institutions:								
Functioning of the justice system	0.268***	(0.130)			0.367***	(0.144)		
Level of corruption	0.730*	(0.099)			0.684**	(0.138)		
Influence economic stakeholders	1.213	(0.122)			1.608***	(0.106)		
Labor market institutions:								
Compliance with employment law	2.057***	(0.093)			2.467***	(0.105)		
Trade unions freedom	1.181	(0.163)			1.068	(0.178)		
Employment contract protection	0.865	(0.118)			0.771*	(0.129)		
Informal exposure measures								
GaWC network	1.201*	(0.078)	1.764***	(0.089)	1.165*	(0.087)	1.740***	(0.102)
Patent network	1.349**	(0.105)	1.340***	(0.142)	1.567***	(0.107)	1.590**	(0.143)
Air traffic network	1.134*	(0.074)	1.134*	(0.074)	1.230**	(0.078)	1.178**	(0.079)
GaWC total connectivity	1.702***	(0.073)	1.678***	(0.081)	2.230***	(0.101)	2.701***	(0.103)
Patent total connectivity	0.670***	(0.107)	0.807	(0.257)	0.463***	(0.174)	0.399***	(0.174)
Air traffic total connectivity	1.114	(0.105)	1.231*	(0.118)	1.056	(0.170)	1.058	(0.171)
Prior Uber Black (in 100 days)	1.255***	(0.046)	1.233***	(0.048)				
Country dummy	NO		YES		NO		YES	
Uber Black cities excluded	NO		NO		YES		YES	
Model improvement (X2)	22.25***		278.75***		1295.69***		309.66***	
Compared to	Model R1		Model R2		Null model		Model R4	
n	4,190		4,190		4,079		4,079	
Events	574		574		464		464	

Standard errors in parentheses, reported effects are hazard ratios (exponent of the coefficient).
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

et al., 2011; Li et al., 2019; Tan and Meyer, 2011). By constructing choice sets of a selected city and alternative non-selected cities that share the same attributes, part of the variance in these models is conditioned out of the model (Li et al., 2019). The variance in this model is then limited to attributes within the choice set that vary between cities. For each UberX introduction (n = 574) possible alternative choices are defined by a choice set that includes the five most proximate cities where UberX is not introduced at that point in time. As such, we constructed a sample of 3,444 cities (574 × 6), in which cities can be included multiple times as long as they have not had an UberX introduction and are among the five most proximate cities to the city where UberX is introduced. We estimate this conditional logit using the *survival* package in R and parameters are estimated using the maximum likelihood method (Therneau, 2018). Table 2.6 presents the two conditional logit models including our robustness checks. We find that using a conditional logit model, instead of an Extended Cox model, provides us with very similar results and does not change any of the conclusions regarding our hypotheses.

2.4.4 Post hoc analysis

Our results yield some significant results that run counter some of our hypotheses.f While hypothesis 1 and 4 are confirmed, we could only partially confirm hypothesis 2 regarding political institutions and hypothesis 3 regarding labor market institutions. For the political institutions, only the corruption variable shows the expected effect and for the labor market institutions, only the employment contract protection variable shows the expected effect. Thus, while the economic institutions seem to have a straightforward effect on Uber's location decision, the associations with political institutions and labor market institutions might be more complex. We ran two post hoc analysis to explore the effects of the latter two sets of institutions.

Our first post hoc analysis tests whether location choice is affected by institutions in a curvilinear fashion. For the political institutions one could expect that Uber might sometimes favor political institutions that are weaker in enforcing sectoral regulations and more sensitive to the lobby of the platform, when asking for adjusted pro-platform regulations (Uzunca et al., 2018). However, in locations where political institutions are weakest, the problems with local governments might outweigh the possible leeway in sectoral regulations. Similarly, for the labor market institutions platforms might prefer cities where labor market institutions are more lenient, but also avoid locations where labor market institutions are weakest. Model P1 in Table 2.7 includes our political and labor market institutions as dummy variables. We split the original variables on the tertiles of the number of observations and created three equally sized groups: weak (1st tertile), moderate (as reference) and strong institutions (3rd tertile).

Table 2.6 Conditional logit model including robustness checks predicting local UberX introduction

Variable	Model R5		Model R6	
Population (in millions)	0.380***	(0.098)	0.459***	(0.119)
GDP per capita (in ten thousands)	-0.221**	(0.078)	0.067	(0.235)
Unemployment	-0.008	(0.018)	0.174	(0.474)
Quality of public transport	-0.236**	(0.079)		
Capital city	-1.153**	(0.363)		
Geographical proximity to UberX	-0.051	(0.048)	-0.054	(0.049)
Formal institutional variables:				
Economic institutions				
Barriers to market entry	-0.323**	(0.118)		
Public support for innovation	0.176*	(0.102)		
Efficiency competition regulation	0.565***	(0.143)		
Political institutions:				
Functioning of the justice system	-0.295*	(0.168)		
Level of corruption	-0.231*	(0.134)		
Influence economic stakeholders	0.319	(0.197)		
Labor market institutions:				
Compliance with employment law	0.340**	(0.129)		
Trade unions freedom	0.120	(0.228)		
Employment contract protection	-0.099	(0.175)		
Informal exposure measures:				
GaWC network	0.788***	(0.158)	1.461***	(0.189)
Patent network	0.226*	(0.134)	0.467*	(0.259)
Air traffic network	0.315*	(0.138)	0.243*	(0.131)
GaWC total connectivity	0.457***	(0.131)	0.265*	(0.133)
Patent total connectivity	-0.433*	(0.231)	-0.212*	(0.121)
Air traffic total connectivity	0.238	(0.228)	0.417	(0.245)
Prior Uber Black (in 100 days)	0.269*	(0.128)	0.409*	(0.170)
Intercept	-4.699***	(0.881)	-2.224*	(1.210)
Country dummy	NO		YES	
n	3,444		3,444	
Events	574		574	

Standard errors in parentheses. Choice set based on geographic proximity.
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

As can be seen in Table 2.7, most other variables in model P1 remain unchanged compared to earlier models. Considering the political institutions, the tertile dummies show some evidence of curvilinear effects. Labor market institutions show signs of a curvilinear relation, of which the freedom of trade unions turns out to be significant. This effect shows that Uber tends to avoid locations where freedom of trade unions is either relatively strong or relatively weak. Furthermore, the significant negative effect for the third tertile of the employment contract protection variable indicates that Uber mostly avoids locations where employment contract protection is the strongest. While these two show some support for hypothesis 3, the strong positive effect for locations with the strongest compliance with employment law remains and goes counter to the formulated hypothesis.

Our second post hoc analysis tests whether there are interaction effects between the informal institutions and the political and labor market institutions. In general, scholars studying 'institutional voids' argued that when formal institutions are weak, this void can be filled by informal institutions (Khanna and Papelu, 1997; Mair et al., 2012). In our context, this could mean that in locations that lack formal institutions that support market activity, MNEs may rely more on informal institutions developed in local networks and communities (Li et al., 2019; Puffer et al., 2009). Platforms are sometimes said to seize opportunities in countries that are politically instable, since their decentralized crow-based rating systems solves problems with information asymmetry that are characteristic of markets that lack effective governmental support (Ozimek, 2014; Uzunca et al., 2018). Because platforms take on important roles in governing their own markets – e.g. monitoring and sanctioning rule compliance through their rating systems – they can have a strong self-regulating role, diminishing the importance of governmental stability and regulations for entry decisions (Frenken et al., 2020). Indeed, prior research has pointed out that formal institutional voids can also offer opportunities for firms that devise novel ways to bypass these voids (Doh et al., 2017; Jean and Tan, 2019). However, all of this fully depends on how these novel ways of organizing are accepted by customers in these potential locations.

To test whether there are any interactions between our informal institutions and our political or labor market institutions, we first constructed one composite variable capturing a city's exposure to Uber's user base. Because our three network exposure measures are all on a scale from 0 to 10, we sum the three values for each city to obtain a single network exposure measure ranging from 0 to 30. When this measure is entered in model 10 (Table 2.4) instead of the three separate network exposure variables this gives a hazard ratio of 1.238 ($p<0.001$), similar to our three separate network measures. Subsequently, we create four groups of cities, allocating cities that have any exposure into tertiles and using cities without any network exposure as reference category. We

Table 2.7 Extended Cox model including curvilinear effects predicting local UberX introduction

Variable		Model P1	
Population (in millions)		1.091**	(0.028)
GDP per capita (in ten thousands)		1.028	(0.054)
Unemployment		1.035**	(0.011)
Quality of public transport		0.771***	(0.059)
Capital city		0.720	(0.205)
Geographical proximity to UberX		0.814***	(0.047)
Formal institutional variables			
Economic institutions:			
Barriers to market entry		0.743**	(0.100)
Public support for innovation		1.590***	(0.077)
Efficiency competition regulation		1.656***	(0.088)
Political institutions:			
Functioning of the justice system	1st tertile	1.453*	(0.226)
	3rd tertile	1.021	(0.233)
Level of corruption	1st tertile	0.978	(0.179)
	3rd tertile	1.133	(0.179)
Influence economic stakeholders	1st tertile	0.828	(0.168)
	3rd tertile	1.265	(0.147)
Labor market institutions:			
Compliance with employment law	1st tertile	1.065	(0.204)
	3rd tertile	2.245***	(0.147)
Trade unions freedom	1st tertile	0.660*	(0.191)
	3rd tertile	0.455***	(0.161)
Employment contract protection	1st tertile	0.877	(0.154)
	3rd tertile	0.636**	(0.165)
Informal exposure measures:			
GaWC network		1.169*	(0.072)
Patent network		1.381**	(0.105)
Air traffic network		1.149*	(0.082)
GaWC total connectivity		1.625***	(0.073)
Patent total connectivity		0.658***	(0.111)
Air traffic total connectivity		1.182	(0.107)
Prior Uber Black (in 100 days)		1.255***	(0.047)
n		4,190	
Events		574	

Standard errors in parentheses, reported effects are hazard ratios (exponent of the coefficient). *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

then interact general exposure with the political and labor market institutions, to analyze whether the effect of political and labor market institutions depends on levels of exposure.

Figure 2.1 presents the hazard ratios for the political institutions by UberX exposure group, when they are added to model 10. As can be seen in the top panel, the main effect for the functioning in the justice system turns positive (1.319), meaning that for cities without network exposure to UberX, the justice system has a positive effect on location decision. However, the interaction terms for the last two tertiles are significant and increasingly negative (0.707 and 0.477 respectively), meaning that the higher the network exposure to UberX the less important a strong justice system is for Uber's location decision. When we look at the middle panel, we find a similar pattern for corruption. Whereas the main effect is negative and significant (0.584), meaning that in cities where there is no network exposure corruption has a negative effect on location decision, the interaction terms are all significant and positive which indicates that the higher the network exposure in a city the less important the negative effect of corruption is for location decision. The bottom panel shows that for the influence of economic stakeholders there are no clear and significant main and interaction effects.

The interaction effects show us that the effects of the functioning of the justice system and corruption are not a as straightforward as we might expect. We know that platforms are mostly driven by market shares and first mover advantages despite possible issues with local regulators or governments (Parente et al., 2018) and a way to overcome the problems with these issues might rely more heavily on informal institutions present at the guest location.

Figure 2.2 presents the hazard ratios for the labor market institutions by traveler exposure group, when added to model 10. Our three variables on labor market institutions barely show any significant effects. As such, we must conclude that there is no interaction effect between labor market institutions and our informal institutions.

2.5 Conclusion and discussion

2.5.1 Conclusion

In this paper we use an institutional lens to further our understanding of the location choices of globally active platform companies. As platform companies generally meet institutional resistance in the host location they enter (Mair and Reischauer, 2017; Thelen, 2018; Uzunca et al., 2018), we study institutional factors that are associated with the location decisions of these companies. Empirically, we focus on the location choices of Uber to introduce their controversial online platform service UberX. We find evidence for

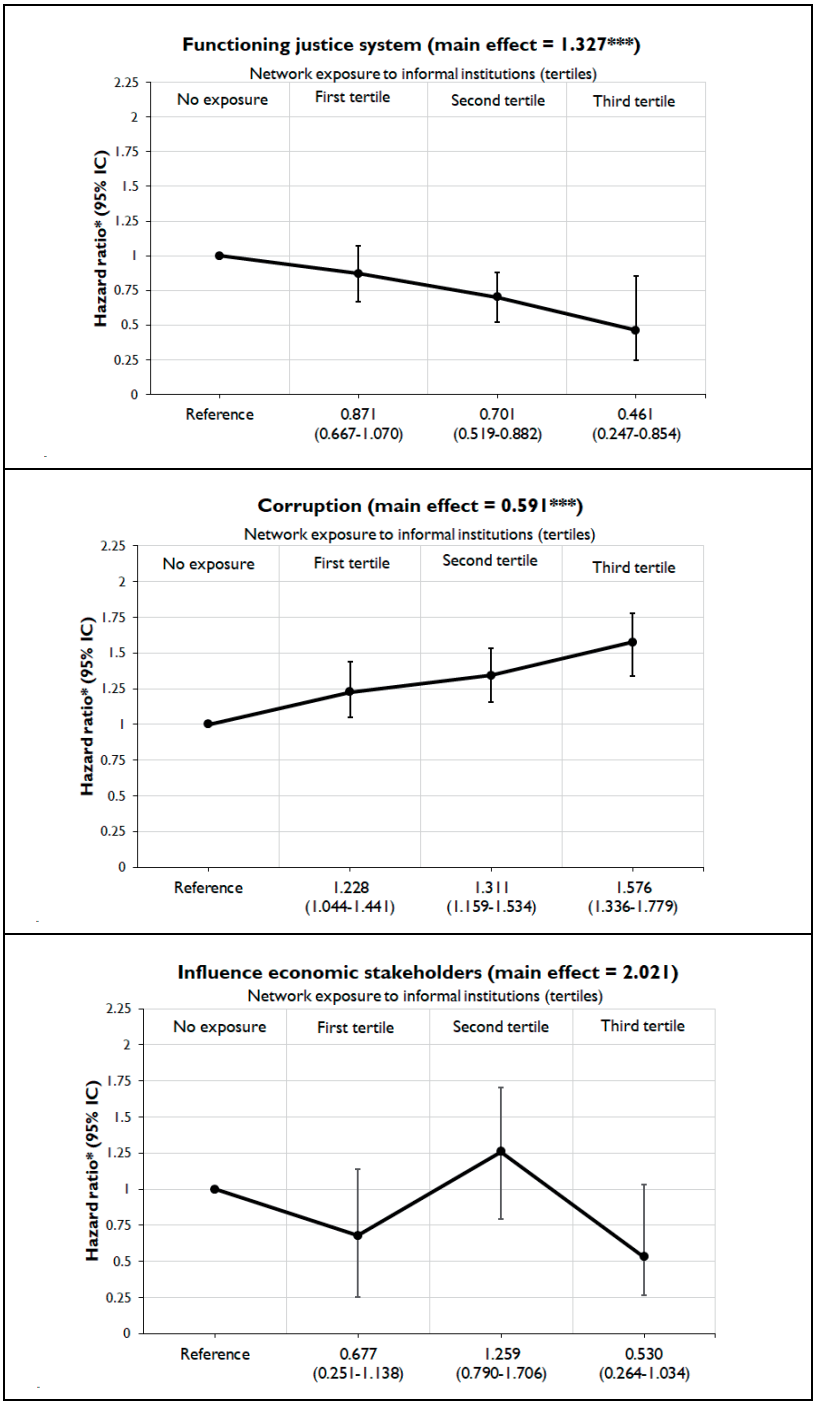


Figure 2.1 Adjusted hazard ratios for interaction effects between political institutions and total exposure to informal institutions. Hazard ratios adjusted for variables from model 10.

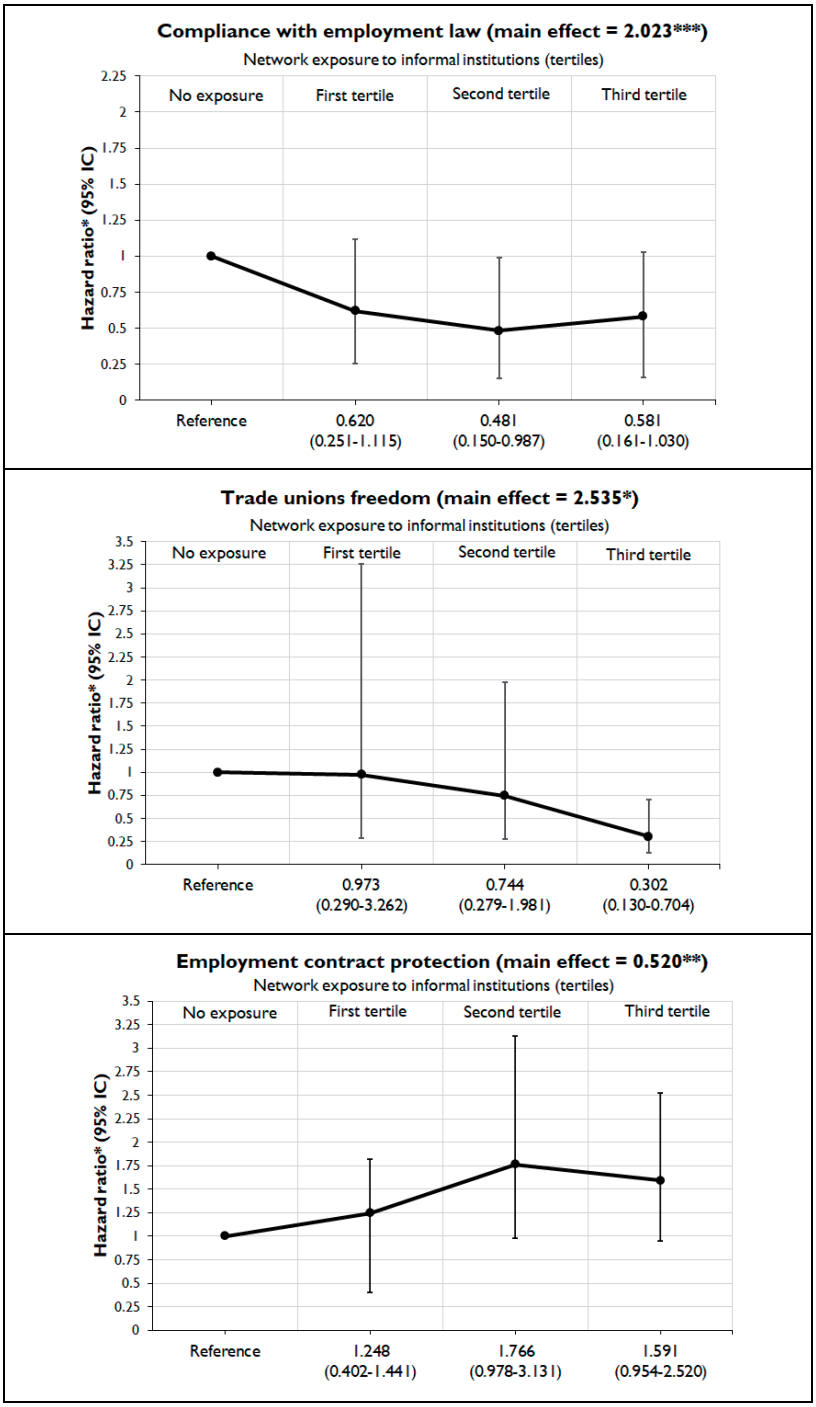


Figure 2.2 Adjusted hazard ratios for interaction effects between labor market institutions and total exposure to informal institutions. Hazard ratios adjusted for variables from model 10.

the importance of economic institutions by showing that Uber is attracted to locations where competition and innovation is stimulated by formal institutions. We also find that Uber follows their global mobile user base that functions as 'trusted community' in the locations they visit. We argue that these travelers are already familiar with the platform's service and, as such, share particular codes of conduct and norms with the platform company and facilitate economic exchange in potential locations around the world. Our findings contribute to enhancing our understanding of institutional complexities that MNEs face by being present in multiple geographic fields (Kostova and Zaheer, 1999) and they provide a new view on the role of informal institutions in this process.

Regarding political institutions, our findings have been rather mixed. We find that Uber tends to favor locations where the justice system functions less effectively and where there is little corruption. A possible explanation for Uber's tendency to enter locations with weaker justice systems might be because less effective legal structures might provide some leeway in sectoral regulations, to which platforms usually do not comply. We also find evidence that this becomes less important when these locations become more exposed to informal institutions carried by Uber's global users. However, we also find unexpected results for compliance with employment laws. While this finding is not in line with our hypothesis, it does resonate with local labor controversies sparked by Uber's entry, which revolve around the question whether Uber's rightfully treats their drivers as independent contractors or whether it should treat them as employees of the platform (Cornelissen and Cholakova, 2019). That Uber nevertheless preferred locations with high compliance to employment laws, may indicate that the company underestimated the backlash by employment law enforcement that would eventually unfold (Garud et al., 2020), as it initially met little resistance from labor lawyers and unions in countries where it entered early such as Egypt, Germany, The Netherlands, Sweden and the United Kingdom (Thelen, 2018; Uzunca et al., 2018; Pelzer et al., 2019). Alternatively, our finding may indicate that Uber may actually have anticipated possible frictions with employment law, and strategically leverage the resulting public debates to its advantage as a source of free publicity, as media research suggested (Ulloa et al., 2016).

2.5.2 Discussion

While prior studies have acknowledged the global character of platform companies, most research has only focused on the impact of platform companies on local economies (Acquier et al., 2017; Frenken and Schor, 2017; Martin, 2016; Parente et al., 2018). As a result, little is known about the internationalization strategies of these platform companies and their location choices in the process of international expansion. While it has been argued that platform MNEs mostly rely on creating a local buzz among customers and enter local markets before turning to regulatory institutions (Parente et al., 2018; Thelen, 2018), there have been little empirical evidence on these location

decisions. Our findings show that in their location choices platform companies rely on both formal institutions at the national level and informal institutions carried by mobile users at the global level. We thereby answer to calls for a better understanding of the internationalization patterns of platform companies, which are often born globals (Parente et al., 2018; Stallkamp and Schotter, 2019). We also align with recent studies that have emphasized platforms' dependency on both online and offline communities of both users and producers (Reischauer and Mair, 2018; Vaskelainen and Piscicelli, 2018).

Previous studies on MNEs already argued that local communities can play important roles as 'trusted communities' by providing informal institutional contexts which facilitate economic exchange through shared social norms and codes of conduct. However, these studies have often focused on the presence of ethnic groups and same-country MNEs (Li et al., 2019; Portes and Sensebrenner, 1993; Tan and Meyer, 2011). We study a more dynamic form of customer following and extend the notion of 'trusted communities' to global traveling of existing customers of an MNE. While this practice is specifically applicable to platform business models, as they can follow their existing customers through their GPS-based mobile applications, previous studies on multinational bank expansion have also emphasized the importance of non-corporate customer following (Esperanca and Gulamhussen, 2001; Gulamhussen et al., 2016). However, while these studies acknowledge the potential relationship between travelers and foreign expansion, their analysis is usually restricted to immigrants and non-citizen permanent residents, which is probably due to the difficulty to collect non-corporate customer data (Chou and Shen, 2014). In our study, we looked at traveling existing customers and how they influence local informal institutional contexts. This is of course only one aspect that influences local informal institutions and future research could possibly study how these trusted communities are related to other forms of informal institutions (e.g. media, platform complementors).

Our paper also adds to the understanding of legitimizing businesses that are controversial from the day of founding. While the diffusion of the legitimate received plenty academic attention in management studies, Colyvas and Jonsson (2011) argue that "many activities diffuse widely but are not regarded as legitimate [and] [s]cant research tackled the spread and depth of these types of behaviors" (p. 30). Managers should understand that illegitimate innovations are depending on endogenous processes of legitimization like audience firsthand observations and word-of-mouth and the role of vanguard audiences.

For policymakers, our study suggests that it is difficult to steer local legitimization processes, which are heavily influenced by globally mobile actors. From a public policy point of view, then, it may be important for cities to seek common grounds with other cities that are affected by platforms, not only to exchange information and experience,

but possibly also to engage in joint negotiations with a global platform. In this way, public interests shared by cities around the world can be safeguarded more effectively. At the same time, a process of institutional isomorphism may emerge resulting in joint regulations and standardization that may also bring benefits for platforms and their users.

2.5.3 Limitations and future research

It is important to highlight some limitations of our study. A first limitation is our sole focus on entry, without considering exit. Following Jain et al. (2016), we treat location choice an MNE's *a priori* evaluation which indicates a belief of the firm that it can deploy its resources successfully in a host location. A follow-up study to examine where Uber failed to continue to operate would supplement our analysis[6].

Second, we relied on the IPD 2012 data to measure economic, political and labor market regulations at the national level, next to our customer following variable measured at the local level. Indeed, economic, political and labor market institutions are predominantly codified at the level of nation states (Hall and Soskice, 2001). Yet, in addition to the prevailing national regulations, some platform companies may also face local regulations. Yet, in addition to the prevailing national laws and regulations, platform companies may also face sub-national regulations in some countries. For example, in the United States, Tzur (2019) showed how cities differed in their taxi regulations, and regulatory responses, regarding Uber. What is more, state-level regulations also played a role. Hence, future empirical studies on platform companies may invest in collecting local institutional variables to supplement the national variables.

A final limitation concerns the generalization of our results to other platform-based companies. While the goal of this research is mostly to say something about business with a platform business model, and more specifically a location-bound platform business model, the scope of our findings could be extended to other industries. Traditionally, location choice research has often studied the location strategies of multinational banks, an industry that is also characterized by global customers and argued to be able to follow tourists through their expense patterns abroad (Esperanca and Gulamhussen, 2001). As such, future research could test to what extent these global customers can function as trusted communities in other industries.

While most platforms suffer from regulatory challenges, it should also be reminded that some platforms facilitate practices that are legal and may build upon existing practices

6 Note here that data on exits are much harder to collect as Uber does not announce the dates at which their services end in a particular city.

(e.g., hitchhiking, car sharing, second-hand markets) (Martin, 2016; Frenken and Schor, 2017). An interesting final question holds to what extent the location patterns from less controversial companies active in the platform economy differ from the patterns observed in this paper. In this context, following Vergne (2012), one can further investigate to what extent the presence of particular controversial platform companies creates a stigma for other platform-based business or whether such companies can nevertheless destigmatize themselves by emphasizing benefits to relevant audiences and distinctness from controversial services (Hampel and Tracey, 2017).

3. IMPORTING THE COOPERATIVE FORM

Institutional relatedness and the emergence of renewable energy cooperatives in German districts

Matthijs B. Punt, Thomas Bauwens, Koen Frenken and Lars Holstenkamp

Abstract

This paper analyses the evolution of renewable energy cooperatives in Germany looking at all such cooperatives founded in German districts between 2006 and 2016. We investigate the effects of 'institutional relatedness', arguing that renewable energy cooperatives can leverage both the knowledge and the legitimacy gained by cooperatives active in other industries in the same district. Using an organizational ecology approach, we find that the local presence of cooperatives in other industries indeed supported the founding of renewable energy cooperatives.

This chapter will be published as:

Punt, Bauwens, Frenken and Holstenkamp (2021) Institutional relatedness and the emergence of renewable energy cooperatives in German districts. *Regionals Studies*, in press. doi: 10.1080/00343404.2021.1890708.

3.1 Introduction

Geography of innovation tends to focus on spatial differences in new technology development by firms (Carlino and Kerr, 2015; Feldman and Kogler, 2010). The analysis of the diffusion of innovations – if analyzed at all – is often reduced to spatial proxies of market size, thus neglecting the process of market formation across cities and regions. In market formation processes, users often play a pivotal role (Geels, 2004; Grabher et al., 2008; Malerba, 2002). This is especially relevant in the context of grand challenges faced by regions: to address challenges such as climate change and biodiversity loss does not so much require innovative activities by local firms, but rather the large-scale adoption of sustainable technologies and practices by local users (Coenen et al., 2015; Truffer and Coenen, 2012). In order to adopt and embed new technologies in their local contexts, users may develop new organizational arrangements and actively lobby for favorable regulations (Garud and Karnøe, 2003).

We analyze the emergence of renewable energy (RE) cooperatives using data on all renewable energy cooperatives entering in German districts between 2006 and 2016. The rise of RE cooperatives is a prominent example of the strong involvement of users – mainly citizens and farmers – in market formation, driven by environmental and political concerns regarding energy provision (Bauwens et al., 2016; Dewald and Truffer, 2011; Yildiz et al., 2015). Furthermore, RE cooperatives have been key actors in regional transitions to low-carbon energy supply, stimulating investments in renewable energy production at the community level and contributing to the social acceptance of renewable energy technologies due to their democratic and participatory features (Bauwens, 2016; Bauwens and Devine-Wright, 2018; Jobert et al., 2007). Their local embeddedness is of crucial importance because they often do not, or cannot, expand beyond local levels (Hufen and Koppenjan, 2015).

To understand local differences in the founding rates of RE cooperatives, we look at the supportive effects of 'institutional relatedness' within the district (Carvalho and Vale, 2018). We argue that cooperatives in the renewable energy domain can leverage both the knowledge and the legitimacy gained by cooperatives in other industries active in the same district. We also look specifically at the role of cooperative banks in the same district in financially supporting the founding of new RE cooperatives (Ingram and Simons, 2000). To investigate legitimacy spillovers due to institutional relatedness, we make use of an ecological framework in which we analyze to what extent the cooperative activities in other industries in a district affects the founding of RE cooperatives, while controlling for other factors including climate conditions, election results, and national subsidy schemes.

Our paper contributes to current studies of regional development in three ways. First, adding to existing studies (Dewald and Truffer, 2012), we provide new insights in the remarkable growth in renewable energy use in Germany by analyzing the regional conditions that support the founding of RE cooperatives. Second, we show how one can use an ecological framework to investigate legitimacy spillovers stemming from institutional relatedness, while also controlling for supportive structures at the national level, further extending the regional applications of organizational ecology (Bigelow et al., 1997; Cattani et al., 2003; De Vaan et al., 2019; Wezel, 2005). Third, we enrich economic geography by showcasing the role of user cooperatives as agents of change and the role of institutions in this process. In doing so, we go beyond the firm-focus in economic geography by bringing back users into the analysis (Grabher et al., 2008) and take up the calls to better integrate institutional and evolutionary theorizing into a single framework (Binz et al., 2016b; Coenen et al., 2017; Hassink et al., 2014).

We structure the paper as follows. We start with a section on theory on market formation for new technologies. The next section provides some background information on RE cooperatives in Germany. We then present the data and methods and continue with a discussion of the empirical results. We end with further reflections on the empirical study and the theoretical contributions to the field of economic geography.

3.2 Theoretical framework

3.2.1 Market formation and institutional relatedness

New technologies usually have difficulties to compete with established technologies as markets are initially lacking (Hekkert et al., 2007). While market formation is considered of key importance to the innovation process of emerging technologies, its driving forces are usually argued to be exogeneous. For renewable energy technology, for example, the conditions for market formation are mostly explained with reference to favorable regulation and governmental support (Wüstenhagen and Bilharz, 2006). While such conditions play a pivotal role in the market formation of new technologies, it leaves one with the subsequent question why such favorable conditions emerged in some places rather than others (Dewald and Truffer, 2011; Moors et al., 2018). As Bergek et al. (2008) argued, closer attention should be paid to the identification of relevant actors, strategies and activities that hinder or facilitate market formation.

Some recent studies stressed the role of end-users in market formation (Dewald and Truffer, 2011, 2012; Meelen et al., 2019; Randelli and Rocchi, 2017). For our study, the papers by Dewald and Truffer are particularly relevant as they focused on the role of users in photovoltaic (PV) market formation in Germany specifically. Their main conclusion

holds that the considerable regional differences in the deployment of PV markets cannot be attributed to geophysical conditions or incentive structures alone. They emphasize the important role of solar initiatives, as "formalized networks comprising highly motivated (predominantly) private individuals, aiming at the support of renewable energies" (Dewald and Truffer, 2012, p. 409), setting up their own energy cooperatives to deploy PV and actively lobbying at local government for favorable regulation and support.

In the realm of renewable energy more generally, citizen and farmer cooperatives have been pivotal in the development of solar energy, wind energy and bio-energy, leading to a proliferation of the cooperative form in in many countries (Bauwens et al., 2016; Boone and Özcan, 2014; Hewitt et al., 2019; Wierling et al., 2018). New markets segments emerged through user initiatives organized in cooperatives, which started adopting renewable energy technologies, and as such are central to the market formation. The nature of innovation, here, is primarily institutional and does not lie so much in the renewable energy technology, but much more in the cooperative organizational form that users developed to align interests, pool resources and exchange user experiences. What is more, cooperatives are often founded on an ideological basis different from commercial corporations active in the same industry (Schneiberg et al., 2008).

As such, one can ask the question what regional conditions facilitate users in market formation. Following previous studies on market formation, we focus especially on the regional institutional conditions (Dewald and Truffer, 2012; Moors et al., 2018). The founding of a cooperative requires resources that are primarily locally drawn. Cooperatives need organizational knowledge and investment capital to be able to found their venture. However, given that their ways of organizing are new to the industry, they also depend on local legitimacy for the cooperative organizational model (Huybrechts and Mertens, 2014; Staber, 1989). In this paper, we argue that – as an organizational innovation – cooperatives can be expected to benefit from the local presence of cooperatives in other industries. Such legitimacy spillovers can be understood as stemming from 'institutional relatedness' (Carvalho and Vale, 2018).

The institutional relatedness perspective as introduced by Carvalho and Vale (2018) in regional studies, builds on the earlier notion of institutional relatedness in management studies, where it has been defined as "the degree of informal embeddedness with the dominant institutions in the environment that confer resources and legitimacy (to organizations)" (Peng et al., 2005, p. 623). In regional contexts, the core tenet of institutional relatedness holds that organizations can leverage institutional capabilities present in other industries but in the same region, such as how to acquire licenses, how to finance technology, how to set up new organizations, how to engage with policymakers, *et cetera*. Actors need all these capabilities to engage in a bricolage-type of development

process involving not only learning by trial-and-error but also strategic collaboration among multiple actors to align technological, financial and political resources to support and legitimize new activities in a region (Binz et al., 2016b; Carvalho and Vale, 2018; Garud and Karnøe, 2003).

In more general terms, the deployment of new technologies is facilitated by the mobilization of existing institutions to organize and legitimize a new practice, a process that has been called 'transposition' (Boxenbaum and Battilana, 2005; Powell et al., 2012). In this view of institutional relatedness, regions are more likely to adopt new organizational forms that are institutionally related to forms already present in the regions. In such regional contexts, actors can build, with modifications, on local institutional arrangements and practices. They may also face less local resistance as they draw on institutions that are considered legitimate in the local context (Content and Frenken, 2016; Padgett and Powell, 2012)

Following prior research on organizational forms, we distinguish cognitive and sociopolitical legitimacy (Aldrich and Fiol, 1994). Cognitive legitimacy refers to the spread of knowledge about an organizational form, where the highest level is achieved when a form is both well understood and taken for granted. This cognitive legitimacy is often argued to increase with a growth in the number of organizations in an industry, rendering an organizational form to become more familiar and less contested, and eventually mainstream (Hannan and Carroll, 1992; Staber, 1989). Thus, we can expect that the level of cognitive legitimacy rises with the number of RE cooperatives active within a particular region.

Sociopolitical legitimacy refers to processes by which important stakeholders accept an organizational form as appropriate according to local norms and laws (Aldrich and Fiol, 1994).

Because the founding of a cooperative is heavily rooted in ideological motives of local individuals (Boone and Özcan, 2014; Schneiberg et al., 2008), we expect that they benefit from sociopolitical legitimacy of the organizational form. More specifically, the thesis we advance here holds that we expect RE cooperative foundings to benefit from the presence of local cooperatives active in other industries by building on the sociopolitical legitimacy that the cooperative organizational form has in those districts. This is based on the idea that organizations with similar ideologies and institutions can benefit from each other even if their core activity is unrelated (Barnett and Carroll, 1987; Greve and Rao, 2012). Besides direct support between these institutionally related organizations, regions with increased number of cooperatives in other industries will also have increased legitimacy

with local governments, as prior cooperatives likely lobbied for regulatory and financial public support structures.

We further expect that founding a RE cooperative benefits from the presence of local cooperative banks. One the one hand, RE cooperatives are likely to benefit from the cognitive legitimacy carried by these cooperative banks, as they are very familiar with the organizational form. Furthermore, the cooperative form will also have more sociopolitical legitimacy in regions where more cooperative banks are located, as both are primarily oriented towards the interests of local communities. Thus, cooperative banks are likely to support cooperative foundings more directly than other banks, by acting as investor and advisor (Ingram and Simons, 2000). Indeed, Volz (2012) showed that in quite some cases, especially in the early phase of the solar cooperative boom, local cooperative banks initiated these RE cooperatives and have supported their management, creating a direct supportive link between the two.

To disentangle the different sources of legitimacy spillovers and the different spatial levels at which such spillovers may occur, we adopt an organizational ecology approach (Bigelow et al., 1997; Hannan et al., 1995; Wenting and Frenken, 2011). Our study fits into a small set of studies investigating the foundings of cooperative organizations in different industries (Boone and Özcan, 2014; Ingram and Simons, 2000; Lomi, 1995; Staber, 1989). Most prior studies in organizational ecology have argued that cognitive legitimacy spillovers mostly take place at broader geographical levels, while a more localized increase in the number of organizations will mostly have competitive impacts (Baum and Singh, 1994; Hannan et al., 1995). However, later findings suggest that both cognitive legitimation and competition effects are more prominent on the local scale (Greve, 2002; Lomi, 1995). While these studies focus on cognitive legitimacy, Wezel (2005) has argued that "founding a new venture also requires the mobilization of various resources (e.g. human and physical capital, goodwill and normative support), [which] are unevenly distributed in space because subpopulations are characterized by different degrees of socio-political legitimation" (p. 732). As such, the spatial distribution of recourses of sociopolitical legitimacy are usually more complex and organization-dependent (Baum and Oliver, 1995). This is why we also look at institutionally related industries – *viz.* the presence of cooperatives in other industries residing in the same region – thus distinguishing between legitimacy spillovers within the same industry and between related industries. We also look along the spatial dimensions, distinguishing between legitimacy spillovers among RE cooperatives within the region, between neighboring regions, and at the national level.

3.2.2 Renewable energy cooperatives

The tradition of cooperative organizations in the energy sector goes back to the late 19th century when people in rural areas in various countries (such as Germany, Denmark, Italy, and the United States) set up 'electricity cooperatives' as a vehicle to invest jointly in infrastructure for rural electrification. Such investments not only concerned local distribution networks but also local energy production facilities ensuring a local supply of energy (Mori, 2014). Centralization and concentration tendencies in national energy sectors after World War II led to a decline of the number of cooperatives in national energy sectors. In Germany, for example, the number of electricity cooperatives dropped from approximately 6,000 in the 1930s to about 40 in the 1990s (Holstenkamp, 2015). By the turn of the millennium, political decisions regarding deregulation, privatization, and new legislation fostering renewable energy led to a revival of cooperatives in the energy sector, with Germany being again one of the pioneering countries together with Denmark (Bauwens et al., 2016; Yildiz et al., 2015).

Common characteristics of RE cooperatives include (Bauwens, 2016, 2019; Huybrechts and Mertens, 2014): collective ownership by the majority of private individuals through the organizational and legal form of cooperative; an exclusive focus on activities in the renewable energy sector; a broad scope including all fields of activity along the energy industry value chain (i.e., energy generation, energy distribution, energy trading, energy services); a common objective that the cooperative members share (e.g. supply with energy from renewable resources); and democratic voting mechanisms within the general assembly that assign a vote to a member irrespective of his share in the cooperative ("one member, one vote principle"). Furthermore, the use of the concept in practice is not only limited to private individuals but can also involve local utility companies and other stakeholders (Tarhan, 2015; Yildiz et al., 2015).

Most research on the determinants of the deployment of RE cooperatives has been qualitative so far (Bauwens et al., 2016; Kooij et al., 2018; Mignon and Rüdinger, 2016; Oteman et al., 2014). These studies pointed to two types of explanatory factors for the emergence of such initiatives: the regulatory environment and cultural factors. Regarding the influence of the regulatory environment, financial instruments and planning policies stand as the two main aspects (Bauwens et al., 2016). In particular, financial support instruments, such as Feed-In Tariffs, created low-risk investment conditions triggering a lot of investment, which proved more effective than other instruments such as premiums or tenders (Couture and Gagnon, 2010).

Regarding the influence of cultural factors, previous studies have pointed to the importance of environmental movements. In Germany, specifically, the origin of RE cooperatives is often linked with the presence of a strong culture of local energy activism

and, in particular, the anti-nuclear movement (Beveridge and Kern, 2013). Furthermore, the extent to which a society is familiar with the cooperative model is said to have played a role. In countries where the cooperative movement has a historical and well-established tradition, people know about this legal structure and are aware of its benefits (and weaknesses). Hence, they are more likely to choose this juridical form when defining a RE project. Conversely, in countries where the general public and other actors are less familiar with this model, this low awareness may potentially constitute a 'cognitive barrier' (Huybrechts and Mertens, 2014). The supportive effect of familiarity with the cooperative model for the development of RE cooperatives is an example of a legitimacy spillover from institutionally related industries where cooperatives are already present.

3.3 Data and methods

3.3.1 Data

The sample for our study is taken from a database from Leuphana University's Department of Finance and Financial Institutions set up together with Jakob Müller (Degenhart et al. 2017; Kahla et al. 2017). From this database on German community energy companies, we obtain data on 1,095 companies that were founded as registered cooperatives (eG), which, to the best of our knowledge, covers all energy cooperatives registered until the end of 2016. For 1,077 of these cooperatives, both the date of registration and the location are available, meaning that 18 cooperatives are excluded from our analysis. The vast majority of these cooperatives generates electricity from renewable sources and/or owns and operates heating grids fired by biomass. Therefore, we call them 'renewable energy cooperatives'. This dataset enables us to construct entry, exit and density variables for the German market for RE cooperatives. Following Staber (1989), we take the date of registration as a cooperative as founding date.

Figure 3.1 shows the entries, exits and total number of RE cooperatives in Germany for the most recent period of 2006-2016, showing the rapid diffusion of RE cooperatives. To understand the sudden rise of RE cooperatives, three successive events are of importance. In 1998, the German government liberalized electricity markets. In 2000, it introduced feed-in tariffs with the Renewable Energy Sources Act (also known by the German abbreviation EEG). And, in January 2006, the Cooperative Societies Act was amended reducing administrative burdens and decision-making costs, especially for smaller cooperatives. It is only after January 2006 that we witness a steep increase in the number of RE cooperatives. This rapid growth slowed down again a few years later, which relates to lower feed-in tariffs for renewable energy following the amendments to the Renewable Energy Sources Act in January 2012 and August 2014.

Our analysis focuses on quarterly data during the eleven-year period between January 2006 and December 2016, which coincides with the rapid diffusion of RE cooperatives following an S-shaped curve consistent with the organizational ecology model (Figure 3.1). During this period, 993 cooperatives were founded, with 557 in solar technology, 152 in bioenergy, 78 in wind energy and 22 in other types of energy (for 184 cooperatives the specific energy type is unknown).

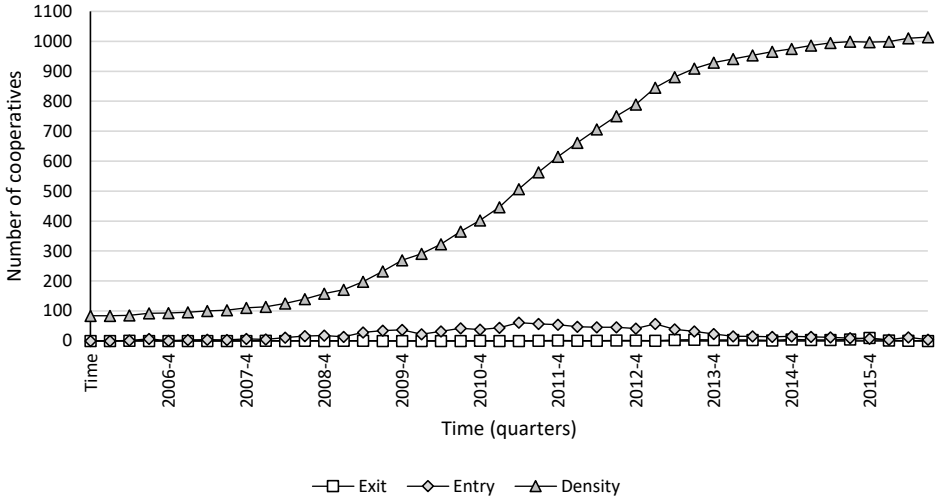


Figure 3.1 Renewable Energy Cooperatives Population in Germany, 2006-2016

Figure 3.2 shows the local diffusion of RE cooperatives in Germany over time at the level of Germany's NUTS3 districts (*Kreise*). We have taken the snapshots at the first quarter in 2006 and last quarter in 2016, and two dates in between corresponding with the dates of the major amendments to the Renewable Energy Sources Act at the national level. The figure shows a higher concentration of RE cooperatives in Southern Germany, while Eastern German districts seem to have lower numbers of RE cooperative foundings, consistent with earlier research by Dewald and Truffer (2012).

3.3.2 Model

Organizational ecology studies the forces that shape populations of organizations over the long run (Hannan and Carroll, 1992; Hannan and Freeman, 1989). Organizational foundings within a specific market are understood as dependent on processes of legitimization and competition. The levels of legitimacy and competition are density dependent, meaning they are dependent on the number of organizations already present in the population. When a market is established, the founding of new organizations is positively dependent on density, because each existing organization provides legitimacy to the new market. However, when a market saturates founding will negatively depend

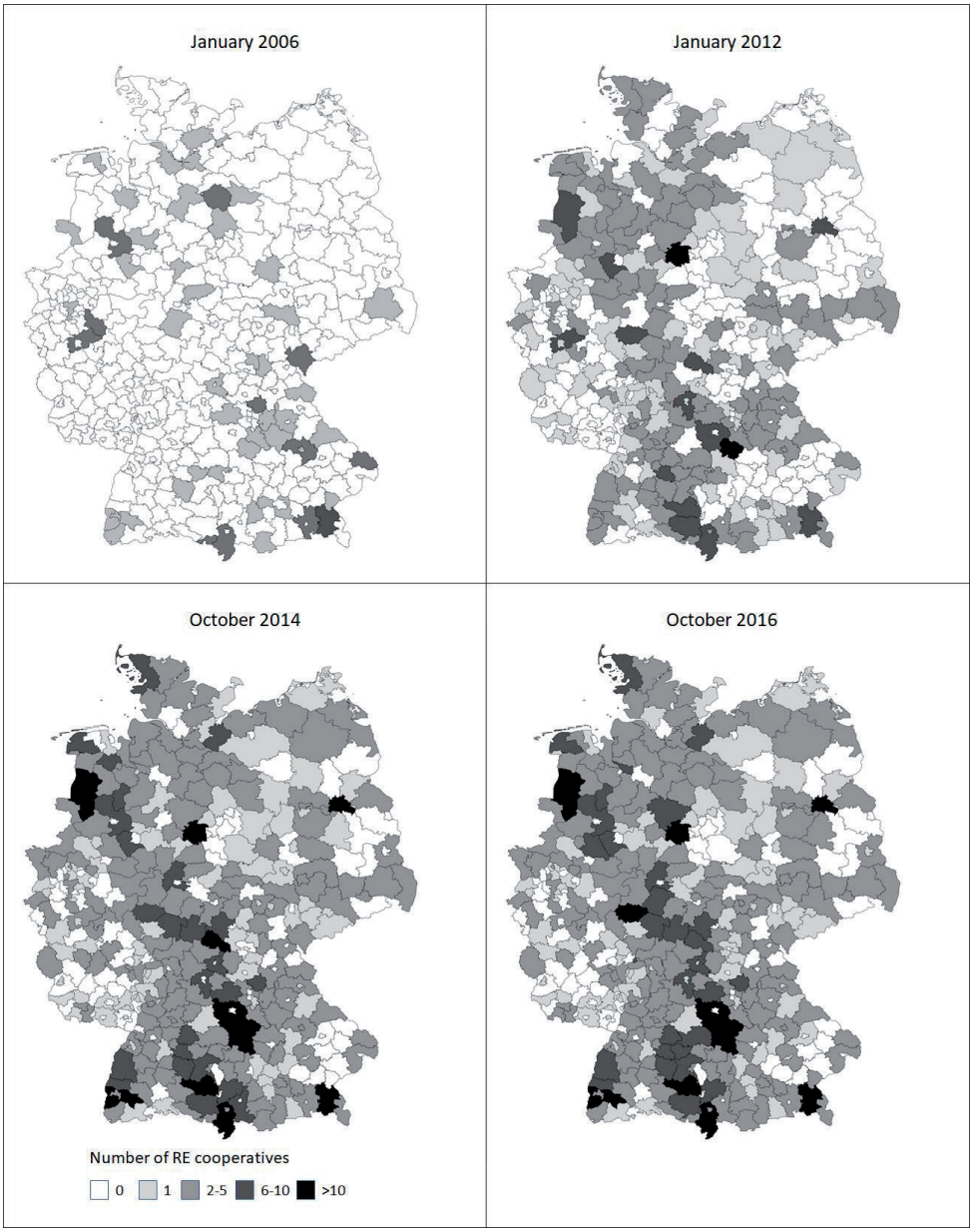


Figure 3.2 Spatial distribution of Renewable Energy Cooperatives in Germany, 2006-2016

on the density in this market because of increasing competition for resources. The two opposing effects are captured in an ecological model by a positive linear effect of legitimation and a negative quadratic effect of competition. Jointly, these effects lead to an S-shaped curve. The founding rate is expressed as (Bigelow et al., 1997):

$$\lambda(t) = \exp(\beta_0 + \beta_1 N_t + \beta_2 N_t^2),$$

where λ(t) stands for the founding rate measured in some time interval (here: quarters) and N_t represents the population density at time t (here: the number of RE cooperatives already present). In the ecological model, β_1 is expected to be positive indicative of the legitimation effect and β_2 is expected to be negative indicative of the competition effect.

Rather than analyzing the German population of cooperatives in its entirety, we take as the dependent variable the quarterly founding rate of RE cooperatives in each German district. In our analysis, we will look at the quarterly founding rate of all RE cooperatives as well as at the quarterly founding rate of solar energy, wind energy and bio-energy cooperatives, separately. As we count entries for 44 quarters and for 401 German districts, we have a total of 17,644 observations or 'spells'.

In order to analyze at what spatial level the processes of legitimization and competition take place, we extend the ecological model with density terms specified for the district and national level. In our study, we use Germany's 401 *Kreise* (NUTS3 level) to measure density at the district level, while density at the national level is measured by total national density (Bigelow et al., 1997; Wenting and Frenken, 2011). To account for spatial spillovers, we also include the densities of neighboring districts to control for legitimation and competition effects of cooperatives present in neighboring districts. This brings us to the baseline ecological model:

$$\lambda(t) = \exp\left(\beta_0 + \beta_1 n_{it} + \beta_2 n_{it}^2 + \beta_3 N_{it} + \beta_4 N_{it}^2 + \beta_5 \breve{n}_{it} + \beta_6 \breve{n}_{it}^2\right),$$

for each district *i*, where n_{it} represents the density of district *i* in quarter *t*, N_{it} the density at the national level in quarter *t*, and $\breve{n}_{it}$ the sum of the densities of districts neighboring to district *i* in quarter *t*. Note that to compute national density in quarter *t*, we take the national density minus the density of district *i* and the densities in the districts neighboring district *i*.

The model is further extended with institutional relatedness variables. We capture legitimacy spillovers from cooperatives in other industries using two variables of institutional relatedness. First, we measure the number of cooperative banks that are present in a district. This density variable is based on data from the *National Association of German Cooperative Banks* (Bundesverband der Deutschen Volksbanken und Raiffeisenbanken – BVR). We use the list of cooperative banks active in Germany that

the BVR publishes yearly and used the number of banks that are present in a district at the beginning of that year.

Second, we seek to capture legitimacy effects of the cooperative organizational form in its temporal context (Ingram and Simons, 2000; Staber, 1989). In order to do so, we count the number of organizations with a cooperative legal form that are founded in a district in the last two years other than RE cooperatives. We use a founding measure instead of a density measure here because population dynamics (i.e. foundings and dissolvements) are generally believed to be more transitory than density-dependent measures (Delacroix et al., 1989; Hannan and Freeman, 1987), and as such capture better the temporality of acceptance and sociopolitical legitimacy of the cooperative organizational form and its corresponding ideology. Put differently, by counting the foundings over the past years, we capture local 'momentum'. We choose a period of two years as we expect the process of founding a RE cooperative to take at most two years (see also, Boone and Özcan 2014). Using the Amadeus dataset of Bureau van Dijk (2019), we observe a total of 1,833 cooperatives that are founded in Germany between 2004 and 2016 in all domain but excluding RE.

Finally, we include several control variables. First, we control for population density, GDP per capita and land area at the district level provided by Eurostat (2019a). National energy prices are included as a control variable to see to what extent foundings of RE cooperatives are driven by financial incentives, also taken from Eurostat (2019b) (as electricity prices for household consumers including all taxes and levies). Furthermore, we control for geophysical differences across districts using *Deutscher Wetterdienst* (DWD) data on solar irradiance and wind speed. We also include a time-varying control variable on the share of votes for the green party per district, during federal state election that are held (approximately) every four years, as a proxy for 'green attitudes' of the inhabitants of districts (Horbach and Rammer, 2018). Additionally, we use a dummy variable for districts in former Eastern Germany. As Bauwens et al. (2016, p. 142) noted: "energy cooperatives are less developed in the Eastern part of Germany, owing to the socialist era's possibly negative legacy as well as to a financially worse-off population".

Finally, we included a dummy variable for periods in between the main national policy changes discussed above. We used the two amendments of the Renewable Energy Sources Act in January 2012 and August 2014 to create three different policy periods: January 2006 – December 2011, January 2012 – September 2014, and October 2014 – December 2016.

3.3.3 Regression

Organizational ecology models usually have dependent variables containing many zeros. Table 3.1 shows that in the distribution of our dependent variable 95 percent of the spells has no foundings of RE cooperatives. Furthermore, this table shows that within the spells that do have at least one founding, 90 percent had only one founding in that district during that quarter. Because the cases with more than one founding are limited, and considering the large number of zeros in our model, we transform our data into binary data, as the main variation lies between zero and one founding (Barron and Hannan, 1991). We then use logistic regression to model the foundings of RE cooperatives. We estimate our regressions with the software package R, clustering observations by district and quarter to control for intra-district or intra-quarter correlation. Parameters are estimated using the maximum likelihood method.

Table 3.1 Distribution of the foundings of RE cooperatives over our observations

Number of foundings	Frequency	Percentage of spells	Percentage of spells with foundings
0	16758	94.98	-
1	801	4.54	90.41
2	69	0.391	7.79
3	12	0.068	1.35
4	2	0.0113	0.226
5	2	0.0113	0.226
Total spells	17644		
Total spells with foundings	886		

3.4 Results

Table 3.2 presents the descriptive statistics and correlations for our variables. The correlations between most variables are low to moderate, except where we would expect them to be high, as with the squared terms. Understandably, the policy period dummies correlate highly with national density. Therefore, we decided to include the policy period dummies only in a last model as robustness check.

The results of our analysis are shown in Table 3.3. Model 1 only includes our control variables. Population density and GDP per capita show no significant effects. The effect for land area is positive and significant, indicating that the cooperatives are more likely to be founded in larger districts. Together with the negative significant effect of population density in later models, this suggests that RE cooperatives are founded where there is more land available. The energy price at the national level has a positive and significant effect, suggesting that when energy gets more expensive, people are more likely to found

Table 3.2 Descriptive statistics and correlations

	Variable	Mean	SD	Correlation																		
				(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(1)	RE cooperative founding	0.05	0.22	1.00																		
(2)	Local density	1.26	2.17	0.14	1.00																	
(3)	(Local density^2)/100	0.06	0.25	0.12	0.85	1.00																
(4)	National density	517.20	377.94	0.03	0.41	0.22	1.00															
(5)	(National density^2)/100	4103.70	4296.77	0.00	0.40	0.22	0.98	1.00														
(6)	Neighboring density	4.39	5.76	0.04	0.30	0.14	0.53	0.51	1.00													
(7)	(Neighboring density^2)/100	0.52	1.42	0.02	0.22	0.10	0.34	0.34	0.88	1.00												
(8)	Local cooperatives foundations	0.73	1.45	0.28	0.45	0.42	0.14	0.11	0.10	0.05	1.00											
(9)	Local cooperative banks density	2.82	2.39	0.09	0.21	0.14	-0.07	-0.07	0.07	0.07	0.19	1.00										
(10)	Population density (in thousands/km2)	0.52	0.68	-0.03	-0.07	0.00	0.00	0.00	0.00	-0.03	0.23	-0.15	1.00									
(11)	GDP per capita (in ten thousand euros)	3.14	1.39	-0.01	0.03	0.02	0.19	0.19	0.08	0.03	0.10	0.02	0.52	1.00								
(12)	Region area (in km^2)	886.20	725.36	0.07	0.18	0.11	0.00	0.00	0.04	0.05	0.08	0.20	-0.53	-0.41	1.00							
(13)	National energy price (cents/kwh)	18.73	0.39	0.02	0.03	0.01	0.08	0.07	0.06	0.03	0.02	-0.04	-0.03	-0.01	0.02	1.00						
(14)	Solar irradiance (mw)	1.12	0.07	-0.01	-0.06	-0.02	-0.09	-0.10	-0.08	-0.06	-0.01	0.01	0.14	0.15	-0.27	0.02	1.00					
(15)	Windspeed (bft)	2.12	0.57	0.00	-0.02	-0.03	0.00	0.00	-0.03	-0.05	0.01	-0.14	0.05	-0.13	0.15	0.06	-0.14	1.00				
(16)	Former East-Germany region (dummy)	0.17		-0.01	-0.06	-0.02	0.00	0.00	-0.06	-0.04	0.04	-0.22	-0.08	-0.22	0.43	-0.02	-0.11	0.30	1.00			
(17)	Votes for Green Party (percentage points)	9.95	5.82	0.05	0.20	0.11	0.19	0.17	0.21	0.12	0.20	0.19	0.36	0.38	-0.27	-0.03	0.15	-0.12	-0.21	1.00		
(18)	Policy period 2006-2012	0.55		-0.03	-0.39	-0.21	-0.93	-0.91	-0.48	-0.31	-0.14	0.07	-0.00	-0.17	-0.00	0.12	-0.00	-0.07	0.00	-0.18	1.00	
(19)	Policy period 2012-2014	0.23		0.10	0.16	0.07	0.37	0.27	0.20	0.10	0.15	-0.03	0.00	0.06	0.00	-0.14	0.00	0.036	0.00	0.11	-0.59	1.00
(20)	Policy period post-2014	0.23		-0.06	0.30	0.18	0.73	0.81	0.37	0.27	0.01	-0.04	0.01	0.15	0.00	0.01	0.01	0.04	0.00	0.10	-0.59	-0.29

Table 3.3 Logistic regression models of renewable energy cooperative founding

Variable	Model 1		Model 2		Model 3		Model 4		Model 5	
Population density	0.022	(0.091)	0.040	(0.082)	-0.719 ***	(0.112)	-0.719 ***	(0.113)	-0.573 ***	(0.164)
GDP per capita	-0.029	(0.039)	-0.022	(0.040)	0.045	(0.040)	0.044	(0.040)	0.104	(0.071)
Region area	0.001 ***	(0.0001)	0.0004 ***	(0.0001)	0.0002 *	(0.0001)	0.0002 *	(0.0001)		
National energy price	0.136 **	(0.047)	0.123 *	(0.062)	0.101	(0.064)	0.102	(0.064)	3.065 ***	(0.443)
Solar irradiance	-0.021	(0.529)	-0.949 *	(0.486)	-0.894	(0.527)	-1.042	(0.542)	-1.201	(0.807)
Windspeed	0.048	(0.070)	0.053	(0.072)	0.154 *	(0.075)	0.152 *	(0.075)	0.184	(0.101)
Former East-Germany region	-0.644 ***	(0.134)	-0.441 ***	(0.130)	-0.454 **	(0.142)	-0.454 **	(0.142)		
Votes for Green Party	0.046 ***	(0.006)	0.023 ***	(0.007)	0.015 *	(0.007)	0.015 *	(0.007)	0.011	(0.012)
Local density			0.187 ***	(0.031)	-0.033	(0.040)	-0.031	(0.040)	-0.613 ***	(0.059)
(Local density^2)/100			-0.141	(0.204)	0.121	(0.284)	0.113	(0.283)	0.243	(0.333)
National density			0.010 ***	(0.001)	0.008 ***	(0.001)	0.009 ***	(0.001)	0.011 ***	(0.001)
(National density^2)/100			-0.001 ***	(0.0004)	-0.001 ***	(0.0004)	-0.001 ***	(0.0001)	-0.0001 ***	(0.0001)
Neighboring density			0.004	(0.015)	0.024	(0.015)	0.023	(0.015)	0.029	(0.021)
(Neighboring density^2)/100			-0.028	(0.060)	-0.054	(0.054)	-0.051	(0.053)	-0.072	(0.073)
Local cooperatives foundations					0.439 ***	(0.032)	0.439 ***	(0.033)	0.575 ***	(0.042)
Local cooperative banks density					0.044 **	(0.017)	0.044 **	(0.017)	0.150 ***	(0.028)
Policy period 2012-2014							-0.239	(0.160)	-0.153	(0.155)
Policy period post-2014							-0.207	(0.294)	-0.109	(0.283)
Intercept	-6.456 ***	(1.023)	-6.828 ***	(-1.235)	-6.431 ***	(-1.290)	-6.377 ***	(1.286)	-62.863 ***	(8.375)
District dummy	NO		NO		NO		NO		YES	
Log-likelihood	-3418.15 ***		-3104.26 ***		-2903.362 ***		-2902.032		-2556.099 ***	
n (spells)	17,644		17,644		17,644		17,644		17,644	

N= 17,644; ***p ≤ 0.001, **p ≤ 0.01 *p ≤ 0.05
Standard errors in parentheses are robust standard errors clustered by quarter and NUTS3 region.

an energy cooperative. However, this effect does not seem to be robust in later models. Furthermore, the geophysical variables seem to have no significant effect on the founding of RE cooperatives in general. However, in later models wind speed does have a significant positive effect on the founding of cooperatives. Our dummy variable for Eastern German districts, as expected, shows a negative significant effect showing that cooperatives are less likely to be founded in these districts, in line with Bauwens et al. (2016). Finally, the share of votes going to the green party, as a proxy for green attitudes, has the expected positive effect on the likelihood of a RE cooperative being founded in that district, also in line with the qualitative analysis of Dewald and Truffer (2012).

In model 2 we include the density variables at the level of the district, neighboring districts and the country as a whole. At the local level, only the legitimation effect is significant. The squared term of local density is insignificant, which suggests that the RE cooperatives do not compete with each other at the local level. The effects of density in neighboring districts are insignificant, indicating that legitimacy spillover and competition effects between neighboring districts are absent. Finally, for national density, we find the expected positive effect of the linear term and the negative effect of the quadratic term, in line with the S-shaped diffusion curve in Figure 3.1 showing an overall saturation in the population growth of RE cooperatives in Germany.

In model 3, we introduce the two institutional relatedness variables. The number of cooperatives founded during the past two years shows a positive and significant effect. This shows that the past founding of cooperatives in any local industry in a district render the foundings of RE cooperatives in this district more likely. Model 3 also shows a positive and significant effect for the presence of cooperative banks on the founding of RE cooperatives in a district. When we compare these two effects, the founding of any cooperative (0.44) seems considerably stronger than the effect of the presence of a cooperative bank (0.04). This suggests that the legitimacy spillover from institutional relatedness comes primarily from the recent foundings of cooperatives in any local industry, rather than from the presence of cooperative banks. Importantly, comparing model 3 with model 2, the effect of local density of RE cooperatives turns insignificant. This indicates that legitimacy spillovers do not stem from the local presence of other RE cooperatives, but from institutional relatedness to recent foundings of cooperatives in other industries.

As a robustness check, model 4 adds the dummy variables for policy periods. The policy period variables do not have any significant effect while effect sizes and significance levels of the other variables remain largely unaffected. The results found in model 3 therefore seem to be robust. Finally, model 5 adds a district dummy to control for unobserved differences between districts that have fixed effects over time. Hence, this

model does not include time-invariant variables on the district level (i.e. region area and Former East-Germany region dummy). Our main variables on institutional relatedness show to be robust in this model and even increase in effect size compared to model 4. Local density shows a negative effect, which only emphasizes that legitimacy spillovers do not stem from the presence of other RE cooperatives and seems to suggest that they might even compete at the local level.

Next, in Table 3.4, we report on the regression analysis for solar energy, wind energy and bio-energy cooperatives separately. Model 6 includes the control variables and the density variables at the local and national level, while model 7 introduces our variables on institutional relatedness. As we focus in each regression on one particular type of RE cooperative, we can now also include the local density effects of the other two types of RE cooperatives, as to test for legitimacy and competition effects between renewable energy options. At the national level, the densities of the different types of RE cooperatives all showed a correlation higher than 0.9 and are therefore excluded from the analysis.

The results in Table 3.4 show that the effects of the control variables are similar to the results in Table 3.3 for all RE cooperatives. What is striking, though, is that energy price and green party votes only seem to affect the founding of solar energy cooperatives. As such, the effects of these variables found in our general model seem mostly driven by the foundings of solar energy cooperatives. An unexpected finding is that the geophysical variables in our analysis show the opposite effect of what we would expect. Local solar irradiance shows a negative effect on the founding of solar energy cooperatives and the wind speed shows a negative effect on the founding of wind energy cooperatives. This may indicate that renewable energy production in such regions is dominated by for-profit firms looking for the best geophysical conditions for large-scale production. The result further speaks to the conclusion drawn by Dewald and Truffer (2012) that the concentration of solar energy cooperatives in Southern Germany should not be attributed to geophysical conditions, but to local citizen and farmer movements.

When turning to our main variables of interest in Table 3.4, and focusing on the full model reported in Model 6, we observe similar effects as before. Only at the national level, the legitimation and competition effects are consistently significant and with the expected signs. Furthermore, as in the full model reported in Model 7, we find that past foundings of cooperatives in other industries has strong positive and significant effects for all our three types of energy.

However, the variable on the presence of cooperative banks is only significant for solar energy cooperative foundings. The latter result seems to suggest cooperative banks preferentially invest in solar energy projects, possibly because the small size of these

Table 3.4 Logistic regression models of renewable energy cooperative founding separated by renewable energy type

	Model 6			Model 7		
Variable	**Solar**	**Wind**	**Bio**	**Solar PV**	**Wind**	**Bio**
Population density	0.071	0.312	0.073	-0.555 ***	-0.257	-1.020 ***
	(0.106)	(0.288)	(0.197)	(0.142)	(0.286)	(0.286)
GDP per capita	-0.022	-0.258 *	-0.094	0.007	-0.205	0.057
	(0.054)	(0.125)	(0.098)	(0.058)	(0.121)	(0.083)
Region area	0.0004 ***	0.001 **	0.0004 ***	0.0001	0.001 **	0.000 *
	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0003)	(0.0001)
National energy price	0.154 *	-0.117	-0.059	0.155 *	-0.185	-0.095
	(0.073)	(0.060)	(0.051)	(0.072)	(0.064)	(0.053)
Solar irradiance	-1.758 **			-2.200 **		
	(0.616)			(0.675)		
Windspeed		-0.701 **			-0.640 **	
		(0.245)			(0.239)	
Former East-Germany region	-0.896 ***	-1.119 *	-0.256	-0.855 ***	-1.240 *	-0.475
	(0.194)	(0.556)	(0.271)	(0.211)	(0.557)	(0.321)
Votes for Green Party	0.034 ***	0.016	0.004	0.029 **	0.008	0.012
	(0.008)	(0.019)	(0.004)	(0.009)	(0.021)	(0.017)
Focal RE local density	0.255 ***	0.631	0.646 **	-0.108	0.327	0.334
	(0.071)	(0.374)	(0.228)	(0.084)	(0.428)	(0.249)
(Focal RE local density^2)/100	-1.827	-3.605	-5.591	0.207	0.684	-4.629
	(0.937)	(4.483)	(5.588)	(1.220)	(5.167)	(6.65)
Other RE local density	0.052	0.272 *	0.429 ***	-0.112	0.129	0.146
	(0.056)	(0.123)	(0.115)	(0.076)	(0.144)	(0.127)
(Other RE local density^2)/100	0.181	-2.671	-2.889 *	-0.280	-3.356 *	-1.847
	(0.527)	(1.385)	(1.308)	(0.891)	(1.329)	(1.465)
Focal RE national density	0.016 ***	0.208 ***	0.056 ***	0.015 ***	0.195 ***	0.043 ***
	(0.001)	(0.045)	(0.011)	(0.001)	(0.046)	(0.011)
(Focal RE national density^2)/100	-0.003 ***	-0.198 ***	-0.035 ***	-0.003 ***	-0.183 ***	-0.028 ***
	(0.0002)	(0.040)	(0.007)	(0.0002)	(0.041)	(-0.028)
Local cooperatives foundations				0.372 ***	0.323 ***	0.352 ***
				(0.036)	(0.061)	(0.047)
Local cooperative banks density				0.086 ***	0.011	-0.054
				(0.021)	(0.053)	(0.04)
Policy period 2012-2014	-0.147	-0.944	0.324	-0.094	-0.683	0.355
	(0.181)	(0.738)	(0.395)	(0.196)	(0.746)	(0.416)
Policy period post 2014	-0.823 *	-17.000 ***	-0.917	-0.537	-16.603 ***	-0.683
	(0.374)	(0.740)	(0.884)	(0.392)	(0.750)	(0.912)
Intercept	-6.321 ***	-4.991 ***	-5.740 ***	-5.740 ***	-3.661 ***	-4.569 ***
	(1.472)	(0.881)	(0.876)	(1.473)	(1.032)	(0.911)
Log-likelihood	-2029.4 ***	-388 ***	-722.5 ***	-1945.2 ***	-376.9 ***	-691.2 ***
n (spells)	17,644	17,644	17,644	17,644	17,644	17,644

N= 17,644; ***p ≤ 0.001, **p ≤ 0.01, *p ≤ 0.05
Standard errors in parentheses are robust standard errors clustered by quarter and NUTS3 region.

projects entails lower risks. Cooperative banks, then, could use the community solar cooperative model to offer a low-risk investment to their customers.

Finally, in appendix A3.1 we test whether these findings are robust by including a district dummy. This table shows that our main variables on institutional relatedness do not change sign and significance compared to model 7 in Table 3.4.

3.5 Conclusion and discussion

Our study analyzed the evolution of RE cooperatives in Germany looking at all foundings between 2006 and 2016 at the district level. We were particularly interested in the effects of 'institutional relatedness' as we expected that RE cooperatives can leverage both the knowledge and the legitimacy gained by cooperatives in other industries active in the same district. Using an organizational ecology approach, we found indeed that recent foundings of cooperatives in other local industries supported the founding of RE cooperatives in that district. We further found a positive effect of the presence of cooperative banks, more specifically, on the foundings of solar energy cooperatives.

Our results further showed that the national stock of existing RE cooperatives had a legitimizing effect on new foundings. The positive effect of national density aligns with prior studies distinguishing a local and a global level (Bigelow et al., 1997; Hannan et al., 1995). More generally, we understand the national process fostering legitimacy as the increased cognitive taken-for-grantedness of RE cooperatives (Hannan and Carroll, 1992; Pólos et al., 2002). When the number RE cooperatives increases nationally, this cognitive legitimation means that more entrants are likely to copy the business model of their predecessors, rather than trying something new (Aldrich and Fiol, 1994).

However, at the local level, the legitimization process takes on a different form. Here, the positive effect of RE cooperative density disappears when our variables on institutional relatedness are added. Both of our variables on institutional relatedness have a positive effect on RE cooperative founding, indicating a different legitimation process at the local level. In our interpretation, the local number of cooperatives that are founded in the last two years in any industry points to a sociopolitical form of legitimacy. This type of legitimacy refers to the value placed on an activity by cultural norms and expectations, where key stakeholders or audiences accept the business model as appropriate or desirable (Aldrich and Fiol, 1994). Indeed, our variable for cooperative founding captures the very temporal social settings of a district in which RE cooperatives are founded (Johnson and Powell, 2017). Even though these cooperatives are operating in different industries, they still have overlapping identities since most foundings of cooperatives

are rooted in institutional repertoires and ideological motives of local communities at particular moments in time (Boone and Özcan, 2014; Schneiberg et al., 2008). As such, when local entrepreneurs are founding cooperatives in other industries, this is reflecting the presence of a support environment for the cooperative ideology (Ingram and Simons, 2000; Staber, 1989), which is arguably much more a sociopolitical form of legitimacy than a cognitive form of legitimacy.

The effect found for local cooperative bank density also underscores the idea that more sociopolitical processes of legitimization are taking place primarily locally. A previous study already showed the supportive role that cooperative banks play for populations that share their ideology (Ingram and Simons, 2000). While cooperative banks on the one hand directly support and invest in RE cooperatives, the positive effect of the presence of cooperative banks on foundings of RE cooperatives also captures cognitive legitimacy spillovers, as cooperative banks are obviously familiar with the organizational and legal details of the cooperative form. The ideological interpretation of the two institutional relatedness variables is supported by the drop in the effect of the share of votes for the green party – as the only explicit ideological variable in the model – once the institutional relatedness variables are included. In sum, we understand the legitimization process of RE cooperatives as a combined process of increasing cognitive familiarity at the national level and increasing sociopolitical support at local levels.

While our study controls for policy periods, one could argue that national-scale regulations played a role in socio-political legitimization on the national scale. While the effects of detailed regulatory changes are beyond the scope of our study, it has been argued that most important socio-political changes on a national scale date from before 2006, the start date of our study's time frame. Observers argue that this has been achieved in at least three ways (Blome-Drees et al., 2015): the change in cooperative laws increased the attractiveness of the legal structure; regional cooperative associations accompanied regulatory changes with intensified marketing campaigns to free the registered cooperative from its 'old-fashioned' image; and the financial crisis led to a rethinking of the way the economy works and led to growing interest in alternative forms of doing business. Future research could study the influence of national and regional regulatory changes and the influence of institutionally related firms or industries simultaneously to better differentiate their effects on levels of sociopolitical legitimacy.

With our study, we attempted to widen current research on market formation in two ways. First, we highlighted the key role that technology users can play in market formation processes and how this related to regional differences. Here, new markets are created through local users adopting new technologies and hereby contributing to the market formation for renewable energy technologies. The innovation, in this context, does not

lie so much in the renewable energy technology, but the cooperative organizational form that enables users to align interests and pool resources. Second, we argued that market formation processes can be supported by 'transposition': the mobilization and adaptation of existing institutions to organize and legitimize a new practice in another field (Boxenbaum and Battilana, 2005; Powell et al., 2012). Local actors who apply existing institutions in new contexts benefit from learning and legitimacy spillovers stemming from the institutional relatedness between existing activities and new activities (Carvalho and Vale, 2018).

Our emphasis on the role of technology users and institutional relatedness may also bear lessons for local and regional policy. One may argue that a too strong focus on leveraging technological capabilities for innovative activities by local firms may obscure the opportunities for local and regional development stemming from technology adoption (Tanner, 2014). Our study shows that users (here, citizens and farmers) deploy new technology not for direct personal consumption, but for productive activities (here, energy production), thus contributing to regional diversification. Here, the process of upgrading a local economic structure is in large part a process of adoption of technologies from other regions, while building on local institutions (Boschma et al. 2017). In this sense, we show how the established theory of regional diversification based on technological relatedness can be supplemented by institutional analysis, where new productive activities benefit more from institutional relatedness rather than technological relatedness (Carvalho and Vale, 2018).

Effective adoption of new technologies goes hand in hand with the adoption of complementary institutions that render such technology effective and affordable (Gertler, 2003). The implications of our study for policymakers hold that for technology adoption programs to be effective in a particular industry, appropriate institutional changes have to be made, which can be purposefully built on institutions already present in other industries. The application of existing institutions into new contexts, however, will generally prove difficult for the actors involved. Here, the government can play a key role in supporting actors to learn how existing institutions can be introduced in new contexts and advising them on regulatory conditions that may apply.

4. UNCONVENTIONAL GATEKEEPING IN SCIENCE

Impacts of journal ownership and open access on the publication of novel scientific research

Matthijs B. Punt, Jarno Hoekman and Koen Frenken

Abstract

Scientific journals act as gatekeepers in scientific knowledge production. Prior research has shown that most tend to promote mainstream research rather than novel research. In particular, learned societies that own journals can maintain the disciplinary status quo. Literature on novelty has focused on the role of field outsiders and unconventional actors as sources of novelty, but mostly studied the role of producing and not gatekeeping actors. In this paper we turn our attention to the role of gatekeepers that have unconventional ways of organizing their gatekeeping processes and study whether this unconventional way of organizing leads to more radical novelty. Empirically, we study whether journals that are non-society-owned or Open Access are more likely to introduce novel ideas. We analyze whether these types of journals publish articles on novel research subjects as indicated by novel keywords assigned to articles by independent reviewers based on a controlled vocabulary. Our study on 725 journals founded between 2000 and 2015 in biomedical and life sciences, shows that non-society-owned and open access journals tend to publish more novel research than traditional counterparts.

4.1 Introduction

Since the seventeenth century, scientific journals have gradually emerged as the dominant way to communicate research findings in academia. Scientific journals function as gatekeepers by selecting among papers being offered for publication (Beyer et al., 1995; Crane, 1967; McGinty, 1999). Journals are also important in the legitimation of research findings. Once an article is published in a journal it is no longer merely the ideas of the author, but it is given a certain degree of scientific credibility. This makes the editors and reviewers of journals the 'defenders of good science' (Zuckerman and Merton, 1971).

Sociologists have argued that what gatekeepers in the academic field generally consider as 'good science', is science that is in line with dominant scientific paradigms (Hargens, 1988; Kuhn, 1962). This is supported by empirical studies that point out that journals' editors and reviewers tend to resist unconventional and highly novel contributions (Braben, 2004; Evans, 2007; Foster et al., 2015; Resch et al., 2000; Siler et al., 2015). For instance, an experiment by Resch et al. (2000) showed that reviewers were generally biased towards the use of unconventional methods and favored a more orthodox version of the same research paper. Similarly, Siler et al. (2015) show that research papers that are highly cited tend to be rejected by major journals at earlier instances, suggesting "that scientific gatekeeping may have problems with dealing with exceptional or unconventional submissions" (p. 364).

Only limited prior research has shed light on the role of journals and the question what makes them more likely to publish novel work. Research on novelty in science in general have focused mainly on the role played by individual scientists' characteristics in evaluating novel research, such as gender, institute affiliation, prior success, academic background and (sub)field of study (Beyer et al., 1995; Cattani et al., 2017; Evans, 2005; Merton, 1968; Trapido, 2015). These studies have shown that editors generally favor research by authors who have academic jobs, work in more prestigious academic institutes, enjoy high personal prestige, have consistent identities and are men. The limited number of studies specifically on journals found that, while many journals include novelty as important factor in their reviewer guidelines (Couzin, 2006; Seeber, 2020), novel papers are usually published in journals of a lower rank. It has been found that leading journals tend to avoid highly novel and unconventional work (Siler et al., 2015; Wang et al., 2017). Furthermore, one study found that older journals are less open towards novel research problems (Petersen, 2017).

We have, however, little understanding of what aspects of journals gatekeeping process make them more or less likely to publish novel research. In this paper we therefore build on work on field conventions and actors' field positions (Becker, 1982; Jones et al.,

2016) to study which gatekeepers break with field conventions and by doing so become important drivers of novelty. Previous studies in this line of research have mainly focused on producing actors within the creative industries, stressing that actors with certain positions in a field are more likely to introduce radical novelty than others, including outsiders (Cattani et al., 2017), disconnected actors (Phillips, 2013), mavericks (Becker, 1982), misfits (Jones et al., 2016), and amphibians (Powell and Sandholtz, 2012). What these studies share in common is that they all find that actors who introduce radical novelty are more likely to work at the fringes or periphery of a field and are more distant from isomorphic pressures and field conventional role expectations. With their focus on producers the role and importance of gatekeepers is understudied (Caves, 2000; Jones and Massa, 2013). In the context of scientific knowledge production, we will argue that gatekeepers that have unconventional ways of organizing their gatekeeping processes are also more involved in the introduction of novelty.

In this paper, we study which new scientific journals founded between 2000 and 2015 in the field of biomedical and life sciences are more permeable for novel research. We focus on two organizational novelties that break with conventional scientific journals: non-society ownership and open access publishing. While learned societies have been of great importance for the publication of scientific journals since the seventeenth century onwards (Fyfe et al., 2017; Ornstein, 1938), their prominent role has started to decline over the last decades (Larivière et al., 2015). An even more recent change in the organization of academic publishing is found in open access publishing business models, which distribute articles for free to readers while having authors pay to publish (Laakso et al., 2011). We hypothesize that both of these departures of the conventional ways of organizing scientific publishing signal variety in the gatekeeping process and that these alternative gatekeeping processes are more permeable for novel research.

We will proceed as follows. In the next section, we will briefly introduce the literature on field conventions and marginalized actors as drivers of innovation. We will discuss how this leads us to arguing how departure from conventional ways of gatekeeping can be important in the dissemination of novelty. In the next section we will turn to non-society-owned journals and open-access journals as deviations from conventional gatekeeping in science specifically. We will then discuss the data collection and analysis of our paper. Subsequently, will present our results and test our hypothesis on non-society-owned and open access journals. We conclude with a discussion on the relevance of our study for literature on the emergence of novelty within fields in general and novelty generation in science specifically.

4.2 Unconventionality and the generation of novelty

It has long been argued that novel ideas that fall outside of dominant scientific paradigms are vulnerable to penalization and rejection (Bourdieu, 2004; Fleck, 1979; Kuhn, 1962). This does not seem to be any different for the gatekeeping process of scientific journals (Hargens, 1988). Gatekeepers' reputation usually depends on their selection of products and this reputation can be harmed when their selection is not deemed legitimate. As such, a gatekeeper's default instinct is usually to reduce risk (Janssen, 1997; Siler et al., 2015).

A common way to reduce risks is to follow conventions and norms and "cover all the decisions that must be made with respect to works produced" (Becker, 1982, p. 29). The notions of field conventions and actors' field positions as used in sociology of culture are important to understand what makes some gatekeepers more likely to introduce novelty than others. This line of research is foremost based on Becker's (1982) understanding of creative products as collective action. Following this perspective, creative products are not the work of single 'geniuses', but rather a process of distributed agency, in which actors in different field positions, including producers, consumers, support personnel, audiences and gatekeepers, collaborate in processes of creation, distribution, legitimation and evaluation (Jones et al., 2016; Kawashima, 1999). In order to coordinate the activities of these different actors, creative industries have their own conventional ways of doing things that "cover all the decisions that must be made with respect to works produced" (Becker, 1982, p. 29). Becker has argued that his idea of the conventional artwork is analogous to Kuhn's (1962) 'normal science'.

Prior research has conceptualized a plurality of prototypical field positions that in some respect diverge from field conventions (Becker, 1976), including outsiders (Cattani et al., 2017), disconnected actors (Phillips, 2013), mavericks (Becker, 1982), misfits (Jones et al., 2016), amphibians (Powell and Sandholtz, 2012). The unconventionality of these different social positions roughly results from two perspectives: it may either result from choice or spontaneous positioning (Zolberg, 2010). The first perspective on unconventionality comes from Becker's (1982) mavericks, who are normally trained within the core of a field, but feel constrained in their creativity by existing conventions and embark on challenging some of them. These actors are actively flouting conventions and need to mobilize support for their (often) radical novelty (Jones et al., 2016). For example, McLaughlin (2001) has showed how Erich Fromm's position on the margins of psychoanalysis gave him the opportunity to break with conventional Freudian psychoanalysis and strive for change. The second perspective on unconventionality comes from the 'naïve' outsiders that are ignorant of prevailing conventions and their isomorphic pressures and as a result deviate from these conventions (Cattani et al., 2017; Zolberg, 2010). This type of unconventionality is often valued for their foreignness or exoticism (Phillips, 2013).

Here, we can find an example in Cattani et al.'s (2017) analysis of John Harrison's novel approach to measuring longitude at sea, who – as a carpenter and autodidact without formal education – had an outsider perspective ignorant of standard assumptions in precision timekeeping. While the source of unconventionality differs between different social positions, they all seem to build on Becker's notion of outsider as "the deviant from group rules" (Becker, 1963, p. 3) as a source of novelty.

While scholars tend to stress the 'collective action' involved in the generation of novelty, most studies nevertheless focus on producers only. Becker (1976) acknowledges that "the same sort of description could be given of other participants in these systems of collective action" (p. 705). Gatekeepers can play an important role in this collective action, because they are positioned between producers and audiences, and select among available producers by deciding who to grant access to their audiences (Foster et al., 2011). Despite calls for research on gatekeepers and their deviant social positions (Jones et al., 2016), the role of unconventional gatekeepers in novelty creation remains understudied. Prior research showed how gatekeepers with a central position in the field can function as brokers for unconventional producers (Foster et al., 2011; Khaire, 2014). The focus on gatekeepers' responses to unconventional behavior by producers ignores the possibility that gatekeepers are themselves involved in unconventional activities. Indeed, the choices of gatekeepers do not only affect reputations of the selected producers, but also their own authority and reputation (Bourdieu, 1983; Janssen, 1997). If gatekeepers are, as any other actor, exposed to a field's conventions and their isomorphic pressures, one can ask the question whether gatekeepers deviating from conventions support the production of radical novelty.

4.3 Unconventionality in academic publishing

In the field of science, editors of journals and owners of journals play important roles as gatekeepers. Editors of journals, supported by reviewers, are directly involved in the editorial decision-making and play an important role by funneling manuscripts down one path or another (Beyer et al., 1995; Crane, 1967). The activities by these editors and reviewers are embedded in the missions and goals of the journal, which are usually determined by the owners of the journal (e.g. learned societies, universities or commercial publishing companies) (Fyfe et al., 2017). In this role as gatekeepers, journals affect knowledge accumulation progress, paradigm trends and scientific breakthroughs. They are instrumental to the survival and direction of scholarly circles, schools of thought, and scientific disciplines (McGinty, 1999). Indeed, Kuhn (1962) and Bourdieu (1975) already noted that journals are often used to reproduce 'scientific paradigms' or dominant criteria for 'official science'.

Traditionally, journals were often founded by learned societies to encourage and promote research in particular disciplines (Fyfe et al., 2017; Schofer, 2003). Societies are mission-driven organizations that have a particular agenda about the advancement of their discipline (Late et al. 2020; Singleton, 1981). The academics that lead learned societies are often also involved as journal editors. Their motives in gatekeeping are often based on maintaining standards and quality within their discipline along the line of their society's agenda and as expected by their fellow-members (Singleton, 1981; Ware, 2008). This traditional ownership of journals gives scientific societies a powerful position in the reproduction of the scientific field but also makes them more risk-averse and wary of more radical novelty that goes against the mainstream thinking within the society (Rilling, 1986; Ware, 2008; Zuckerman and Merton, 1971).

After the Second World War, the role of these societies slowly weakened and commercial journals gained ground in academic publishing (Larivière et al., 2015). These journals broke with the conventional way of organizing, by turning scientific publishing into a profitable business. With this came new ways of gatekeeping. In this context, McGinty (1999) found that editors make meaning of their gatekeeping function not only by considering "the shape and form of their disciplines" (p.62), but also with a keen eye on the journal's commercial viability. This shift of focus marks a transformation of scientific publishing away from purely the professional logic found in the paradigmatic standards of the learned societies towards a market institutional logic held by new publishers pursuing commercial interests (Thornton and Ocasio, 1999). While these logics are not necessarily incompatible they do seem to influence each other (Lexchin and Light, 2006). Commercial journals do not abandon *per se* the mission to advance a discipline in a certain direction, but they may adopt a commercial logic alongside these missions which might lead to more lenient agenda setting (Fyfe et al., 2017). As a result, non-society-owned journals would be more flexible and susceptible towards novelty (Singleton, 1981). Thus, we expect that non-society-owned journals provide more opportunities for publishing novel research compared to traditional journals.

A more recent break with conventional scientific publishing is the introduction of open access business models next to traditional subscription-based journals. These open access journals make scientific articles freely accessible to anybody rather than only to paying subscribers (Laakso et al., 2011). Instead, they charge authors an article processing fee, typically only once the paper has been accepted for publication. This marks a change in the market logic adopted by commercial publishers. Because open access journals often do not produce a printed version of their journal the costs of entry have been lowered (Willinsky, 2003).

For established subscription-based journals novelty and societal relevance are traditionally central to the acceptance criteria (Arns, 2014). However, because of print space constraints, in dealing with these novelty and importance criteria these journals often disproportionally focus on theoretical and disciplinary significance, which is more likely to constrain rather than promote creativity and true novelty (Siler, 2017; Strang and Siler, 2015). Lamont (2016) has argued that the lowering of entry barriers through Open Access democratizes evaluation processes and a broader diversity of evaluation criteria might emerge. Open access journals are thus not only different because of their paperless and unrestricted online access, but also because of different methods of gatekeeping, that are argued to present opportunities to niche and novel research subjects (Laakso et al., 2011).

Open access journals, use 'scientific soundness' or 'technical competency' as main acceptance criterion (Arns, 2014; Siler, 2017). In their study of motivations behind this 'soundness-only approach', Spezi et al. (2018) describe a number of justifications used by so-called 'open access mega-journals' for this approach. Judgements on disciplinary significance and societal relevance are, according to these open access journals, always subjective and should therefore rather be made post-publication by the scientific community. Open access journals claim that the weight traditionally placed on novelty and significance results in biased scholarly communication and is actually counter-productive to the progress of science (Spezi et al., 2018). Because of this focus on 'scientific soundness' alone, open access journals are less invested in specific disciplinary paradigms, which is why we expect that open-access journals provide more opportunities for publishing novel research compared to traditional journals.

4.4 Data and methods

4.4.1 Sampling

To test whether non-society-owned and open access journals publish more novel research than other journals, we construct a sample of journals using Medline, the largest bibliographic database on biomedical and life sciences, as provided by the National Library of Medicine (NLM). We chose Medline because a distinctive feature of this database is that all the records are indexed with Medical Subject Headings (MeSH), which we use to study the publication of novel research. We queried the NLM catalog in March 2018 to sample journals that were indexed by Medline and that were founded between 2000 and 2015. We choose this timeframe because the number of foundings of open access journals rapidly increased only after 2000 (Laakso et al., 2011). We focus on newly founded journals because this makes it easier to identify access and ownership status of journals from founding onwards. To study the novelty of research published by

these journals in their early years, we decided to focus on the first 50 research articles published by each of these journals. Not all journals are, however, indexed from their founding date onwards and therefore we decided to only select journals that are both written and indexed within 3 years after founding. Finally, some journals are only partially indexed because the scope of these journals goes beyond the biomedical and life sciences. To have an unbiased idea of the novelty published by these journals we only selected those journals that are fully indexed. Following these criteria, we ended up with 725 journals for which we collected additional data.

4.4.2 Dependent variable

In order to study the novelty of research published by our set of journals we use Medical Subject Headings (MeSH), a classification of the content of articles published in journals that are indexed by Medline. Instead of keywords provided by authors of the articles, MeSH descriptors are assigned to articles by NLM indexers. The 2018 MeSH vocabulary contained 28,939 descriptors and articles can be classified by using multiple descriptors. In our database, the average MeSH descriptors assigned to a journal (for their first 50 articles) is 559 and the average MeSH descriptors assigned to a single article is 11. The MeSH vocabulary changes yearly and new MeSH descriptors are created regularly.[7] As such, we can judge the novelty of research published in a journal by looking at the age of the MeSH descriptors assigned to this research. For each of the first 50 articles published in the journals under study, we determine how often they are assigned a novel MeSH descriptor. Following prior research (Uzzi et al., 2013) we use the 10th-percentile to determine novelty, meaning in our case a MeSH descriptor is considered novel when it is among the top 10% most recently introduced MeSH descriptor in our dataset. To compute novelty for each MeSH descriptor used in a publication of a new journal we assess in which year the MeSH descriptor is first used in Medline and consider the MeSH descriptor novel when it is among the top 10% most recently introduced MeSH descriptors at the time of publication and non-novel otherwise. This is calculated on a year-basis, meaning that we take the 10% of MeSH descriptors that are introduced in the most recent years. Because many MeSH descriptors are introduced in the same year we cannot take the exact 10% most recently introduced MeSH descriptors. The percentages for all years lie between 8.88% and 9.91%. To compute a novelty score per journal, we simply count the number of novel MeSH descriptors that are assigned to the first 50 articles of a journal and take that count as the dependent variable.

7 For more information on these changes see the introduction to MeSH on the NLM website (https://www.nlm.nih.gov/mesh/introduction.html)

4.4.3 Independent and control variables

We operationalize the two key independent variables by using two dichotomies that equal '1' if they break with conventional publishing (non-society-owned/open access) or '0' if they do not (society-owned/non-open-access). To identify whether journals are owned or officially affiliated with learned societies we used the journals' official websites. For all of these journals this information was found either in the title of the journal or the journal description page on the website. From these websites we also gathered the geographical scope of these societies, to see whether there is a difference between societies with an international or local/national orientation. To classify whether journals were founded open access we used the Directory of Open Access Journals (DOAJ), an online directory that indexes quality open access peer-reviewed journals. This directory has a considerably better coverage of open access journals than the Medline database (Liljekvist et al., 2015), making it a suitable database to construct our open access variable with.

To rule out alternative explanations for our journals' publication of novel research, we include several control variables. We control for variables on the publisher level related to possible impact of the publishers behind the journals on the novelty published in these journals. First, we control for the type of publisher using definitions of Siler and Frenken (2020), who distinguish between 'large for-profit publishers'; 'small for-profit publishers'; 'academic publishers' and 'society publishers', and adding 'not-for-profit publishers'. Note that for the category society publishers we refer to journals that are published by a society. Not all journals owned by a society are necessarily also published by this society (with a correlation of only .49, see Table I). While some society-owned journals are published by the society themselves (i.e. society publishers), other society-owned journals have decided to outsource the publication process to different types of publishers (usually large for-profit publishers). As such, not all society-owned journals are automatically coded as society-publisher. In defining large for-profit publishers we take those mentioned by Larivière et al. (2015) as major oligopolistic publishers, being Emerald, Reed-Elsevier, SAGE, Springer Nature, Taylor & Francis, Wiley-Blackwell, and Wolters Kluwer. Small-for profit publishers are then defined as any other for-profit publisher. We also added the type 'non-profit publisher', for those publishers that were not for-profit but also not a learned society or academic publisher. We use large for-profit publishers as reference category.

Besides the publisher types, we also control for the publisher using data on the back catalogue of publishers in the biomedical and life sciences at the time of publication of a focal journal. Here, we used the Medline database to calculate the (log-transformed) number of journals owned by the publisher. In this calculation we also considered the discontinuation or change of publisher by journals and the merger or acquisition of publishers as indicated in the NLM catalog.

We also control for some variables on the journal level. First, we use a dichotomized variable to control whether a journal is a review journal. The purpose of review journals is covering existing literature and therefore these journals might by definition publish less novel research. On the other hand, because these types of journals are designed to give an overview of a specific topic, they might have an increased number of MeSH categories and as such possibly an inflated novelty score. This information is gathered from the NLM catalog where it is reported under 'publication type'.

Furthermore, to consider the possibility that some disciplines offer more opportunities for novel research than others, we control for the disciplines in which the journals are (mainly) active. To do so we use 27 core categories from Scopus' All Science Journal Classification (ASJC). On average our journals are assigned 1.77 categories per journal and therefore we created dummy variables for each category. Our 725 journals were assigned a total of 1,281 subject categories. Some categories were assigned to a very low number of journals (such as Decision Sciences and Arts and Humanities) and we therefor decided to group categories that did not account for more than 1% of the assigned categories (less than 12 times) in a category 'other'. As a result, we end up with a categorical variable with 18 categories measuring whether a journal belongs to a particular discipline or not. As a journal can be assigned to multiple disciples, we added a variable measuring how many categories were assigned to a journal. This variable controls for the multidisciplinary nature of journals which has been associated with novelty in previous research (Fontana et al., 2020; Fortunato et al., 2018).

Finally, we control for some basic background variables of the journal. We use a country dummy to control for the journals' country of origin. Because English is the main language in most scientific journals we add a dummy testing whether journals are only accepting papers written in English or not. These variables are obtained from the NLM catalog.

4.4.4 Analysis

We use negative binomial regression to model the differences in novelty scores between our journals. This technique is appropriate because the dependent variable is a count variable and is overdispersed because the variance is exceeding the mean. The B-coefficients of this regression can be converted to the effect in percentages using the following formula (Wooldridge, 2002):

$$100 \times [\exp(B) - 1]$$

4.5 Results

Table 4.1 presents some descriptive statistics for the journals in our sample. On average our journals were assigned almost 13 novel MeSH descriptors in their first 50 articles. Furthermore, these descriptive statistics show that 17% of our journals was founded as open access. 39% of our journals are owned by a society, with 9% having a local or national scope, 17% having an international scope and 13% having a US scope. Table A4.1 in the appendix shows the descriptive statistics for the 18 Scopus disciplines in which the journals are active.

The results of our negative binomial regression are presented in Table 4.2. Based on the log-likelihood per model we find that all of these models are a significant improvement to their previous model. Model 1 contains only control variables and shows few significant results. Publishing only in English shows to a have a positive effect on the number of novel MeSH descriptors assigned to a journal. Furthermore, the number of Scopus disciplines per journal also has a positive effect on the number of new MeSH descriptors. Finally, the dummies for publisher types show that journals published by societies have a decreased number of novel MeSH descriptors compared to journals published by large for-profit publishers.

In model 2 we add a dummy for the 18 Scopus disciplines and a journal country dummy. As a result of this, none of the other control variables are significant in this model. In table A4.2 in the appendix we present the effects for the different Scopus disciplines. There seems to be a pattern where journals in more applied disciplines, such as 'nursing', 'health professionals', 'environmental science' and 'psychology', have decreased number of novel MeSH descriptors, while journals active in more fundamental disciplines, such as 'biochemistry, genetics and molecular biology' and' immunology and microbiology', have an increased number of novel MeSH descriptors. 'Social sciences' also shows an increased number of MeSH descriptors.

Our independent variables are added in models 3 to 5. The variable for open access as our first independent variable is added in model 3. This variable shows a fairly strong and positive effect, meaning that journals that are founded open access are assigned 43% (100 × [exp(0.360)-1]) more novel MeSH descriptors compared to journals that are not founded open access. Model 4 presents the results when our independent variable of society ownership is added, but when open access is left out. As the variable for publisher type already suggested, this model shows a fairly strong but negative effect for society ownership. This means that journals that are owned by

Table 4.1 Descriptive statistics and correlations

	Variable	Mean	SD	Pearson Correlations														
				(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1)	Novelty score	12.83	12.20	1.00														
(2)	Open access	0.17		0.12	1.00													
(3)	Society owned	0.39		-0.18	-0.13	1.00												
(4)	Local society	0.09		-0.12	0.03	0.39	1.00											
(5)	International society	0.17		-0.09	-0.11	0.57	-0.14	1.00										
(6)	US society	0.13		-0.06	-0.10	0.49	-0.12	-0.17	1.00									
(7)	Review journal	0.11		0.06	-0.12	-0.22	-0.11	-0.10	-0.11	1.00								
(8)	Back catalogue publisher (logged)	3.08	2.05	-0.03	-0.04	0.18	0.01	0.13	0.10	-0.10	1.00							
(9)	Number of Scopus disciplines	2.55	1.38	0.15	-0.02	-0.01	-0.09	0.11	-0.05	-0.05	0.03	1.00						
(10)	English journal	0.98		0.08	0.03	-0.10	-0.27	0.03	0.05	0.05	0.06	0.03	1.00					
(11)	Large for-profit publisher	0.36		0.01	-0.11	0.15	-0.05	0.15	0.08	-0.06	0.70	0.05	0.07	1.00				
(12)	Small for-profit publisher	0.43		0.05	0.07	-0.45	-0.21	-0.20	-0.26	0.17	-0.43	-0.03	0.03	-0.65	1.00			
(13)	Academic publisher	0.05		-0.02	0.08	0.00	0.00	0.03	-0.03	-0.06	-0.12	-0.05	-0.02	-0.16	-0.19	1.00		
(14)	Society publisher	0.13		-0.07	-0.04	0.49	0.35	0.08	0.32	-0.10	-0.24	0.01	-0.11	-0.29	-0.34	-0.09	1.00	
(15)	Non-profit publisher	0.03		0.00	0.07	-0.07	0.03	-0.06	-0.07	-0.04	-0.11	-0.01	-0.04	-0.13	-0.15	-0.04	-0.07	1.00

Table 4.2 Negative binomial regression models on the number of novel MeSH categories assigned to a journal

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
English journal	0.727 **	0.236	0.225	0.162	0.167	0.098
	(0.279)	(0.320)	(0.317)	(0.317)	(0.314)	(0.316)
Back catalogue publisher (logged)	-0.002	-0.003	-0.013	0.008	-0.003	-0.005
	(0.026)	(0.025)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Publisher type:						
Small for-profit publisher	0.030	0.039	0.001	-0.022	-0.047	-0.043
	(0.101)	(0.097)	(0.095)	(0.095)	(0.095)	(0.095)
Academic publisher	-0.117	0.043	-0.033	0.037	-0.035	-0.044
	(0.197)	(0.194)	(0.184)	(0.183)	(0.183)	(0.183)
Society publisher	-0.161	-0.214	-0.216	-0.021	-0.055	-0.057
	(0.152)	(0.144)	(0.125)	(0.136)	(0.135)	(0.140)
Non-profit publisher	0.016	-0.006	-0.172	-0.082	-0.218	-0.198
	(0.228)	(0.213)	(0.200)	(0.199)	(0.200)	(0.200)
Review journal	0.159	0.075	0.135	0.024	0.084	0.088
	(0.107)	(0.099)	(0.099)	(0.099)	(0.099)	(0.099)
Number of Scopus categories	0.106 ***	0.002	0.014	0.004	0.015	0.016
	(0.024)	(0.033)	(0.032)	(0.033)	(0.032)	(0.016)
Open access			0.360 ***		0.320 ***	0.319 ***
			(0.089)		(0.089)	(0.089)
Society owned				-0.296 ***	-0.249 **	
				(0.083)	(0.082)	
Society locations:						
Local/National society						-0.404 **
						(0.149)
International society						-0.266 **
						(0.094)
USA society						-0.147
						(0.118)
Intercept	1.549 ***	2.124 ***	2.143 ***	2.296 ***	2.282 *	2.338 *
	(0.311)	(0.344)	(0.341)	(0.343)	(0.340)	(0.343)
Discipline dummy	NO	YES	YES	YES	YES	YES
Country dummy	NO	YES	YES	YES	YES	YES
Log-likelihood	-2574.8	-2487.5	-2479.2	-2481.3	-2474.9	-2473.6
AIC	5169.6	5095	5080.5	5084.6	5073.7	5075.2
n	725	725	725	725	725	725

Standard errors in parentheses. ***p≤0.001, **p≤0.01, *p≤0.05

societies are assigned 26% (100 × [exp(-0.296)-1]) less novel MeSH descriptors when compared to journals that are not owned by a society. When our independent variables are added simultaneously in model 5 we find that both effects remain robust. Here, journals that are founded open access receive 38% more novel MeSH descriptors, while society-owned journals receive 22% less novel MeSH descriptors.

Lastly, model 6 replaces our binary society ownership variable with a dummy that captures societies' geographical orientation. Here, journals that are not owned by a society are the reference category. This model shows a negative and significant effect for local or national societies and international societies. When the coefficients are converted to percentages we find that journals owned by local or national societies are assigned 33% less novel MeSH descriptors when compared to journals that are not owned by a society. This effect is smaller for international societies with 23% less novel MeSH descriptors. Lastly, journals that are owned by societies that focus on the United States do not show a significant effect and we can therefore not claim that these journals are likely to have a lower number of novel MeSH terms when compared to journals that are not owned by a society.

Finally, to test the robustness of our findings on open access and society ownership in the models 5 and 6, we also ran these models without the country and discipline dummies. This showed no significant changes in these independent variables and also the effect sizes generally remain the same. The only difference is that when these dummies are removed from model 6, the variable for US societies also shows a significant negative effect ($p \leq 0.05$).

4.6 Conclusion and discussion

The aim of this paper was to test whether new ways of gatekeeping also lead to more novelty in the research that is published. Our study provided insight to scientific journals as gatekeepers in scientific knowledge production and studied whether gatekeeping practices are associated with the publication of novel findings. Specifically, we studied whether journals that deviate from conventional publishing practices will also be more involved in the introduction of scientific novelty. We found evidence that more conventional journals indeed tend to promote more mainstream research, while non-society-owned and open access journals are more likely to publish novel research.

Our study contributes to the literature on outsider novelty and conventions (Becker, 1982; Cattani et al., 2017; Jones et al., 2016) and confirms the broader hypothesis that peripheral actors are more likely to deviate from a field's conventions. Where previous

studies mainly focused on producing actors (see Jones et al., 2016 for an overview), our study highlights the role of new journals as gatekeepers that deviate from the traditional conservative way of gatekeeping maintaining research, and instead adopt a more liberal stance towards novelty. As such, our study breaks with the notion of gatekeepers as a relatively homogeneous groups of actors that have a central position in their field and a generally risk-averse way of gatekeeping (Caves, 2000; Foster et al. 2015; Franssen and Kuipers, 2013; Hirsch, 2000), by shedding light on specific characteristics and possible heterogeneity among gatekeepers.

While the study specifically contributes to literature on gatekeepers, conventions and outsider novelty (Cattani et al. 2017; Jones et al. 2016), by studying scientific journals as intermediaries, or more specifically as gatekeepers, it could also be useful for scholars working in institutional studies more generally. The role of intermediaries tends to be understudied in a range of institutional literatures, with notable exceptions including Khaire (2017) in a study on market categorization, Glynn and Lounsbury (2005) in a study on institutional logics and Greenwood et al. (2002) in a study on institutional change. While some research on intermediaries emphasizes the importance of intermediaries the legitimization of novelty and the instigation of institutional change, our understanding of the specific roles and activities of these intermediaries remains scant (Khaire, 2017). We contribute to this by emphasizing the heterogeneity in the nature of intermediaries' activities, specifically gatekeeping processes, which can hold different institutional logics that makes them more or less susceptible to novelty and change.

It is important to note that our study does only study the novelty of research and does not provide insight in the relationship between gatekeeping and the quality or legitimacy of research. Thus, while we find that non-society-owned journals and Open Access journals tend to publish more research on novel topic, we cannot say anything about the (perceived) quality of this research nor the legitimacy of these topics in the wider field biomedical and life sciences. Future research could study what possible trade-offs between novelty, quality and legitimacy there are for implementing unconventional gatekeeping processes, which might be especially relevant for fields, such as science, that deal with 'novelty-expecting audiences' (Taeuscher et al., 2020).

Our study presents some important questions for future research. A first follow-up question to ask in the context of our study is how these journals have been able to successfully break away from the field's conventions. Here, a perspective from institutional entrepreneurship can be helpful, where scholars have theorized about the enabling conditions and effective strategies for institutional entrepreneurs to change established institutions in their own favor (Battilana et al. 2009). This theory can be further integrated in a multilevel framework as applied to technological transitions in the

past (Hoogstraaten et al., 2020). A second follow-up question holds whether our findings about deviating journals are specific to the domain of scientific knowledge production, or whether gatekeepers that deviated from fields' conventions in other domains have had similar impacts on novelty. From an institutional perspective, scientific knowledge production is similar to other creative industries in the sense that the valuation of products itself is institutionalized in a review system dominated by expert critics (Khaire, 2017). In this regard, our key hypothesis can be tested in other creative activities as well.

A last follow-up question revolves around modern learned societies. While during the 1950s and 1960s learned societies were not organized based on a commercial logic, by the 1990's they were seeking ways to adopt more commercial strategies alongside their academic missions (Fyfe et al., 2017; Late et al., 2020). Indeed, research on learned societies is often based on an understanding of traditional societies as developed since the early 17th century (Hopkins, 2011). Future research should identify whether these modern learned societies are indeed still organized around strict disciplinary or professional logics. While the age of learned societies themselves is beyond the scope of our study, we do show that modern society-owned journals publish more mainstream research, indicating that they might still be mostly based around a professional logic, even if the commercial logic is playing an increasingly important role.

The study is not without limitations. We confined our analysis to new journals only, thus ignoring already existing journals that changed ownership structure or business model. A future study could compare new journals with established journals, further scrutinizing an earlier result that older journals tend to publish less novel research (Petersen, 2017). Furthermore, we limited the analysis to the medical and life sciences. Our focus on medical and life sciences brought with it the benefit of using MeSH terms attributed by independent experts rather than producer added key words to measure novelty. Extending this study to other disciplines would thus requires the construction of an alternative novelty indicator. In a more comprehensive study, covering more disciplines, one could study the impact of changes in ownership and access across disciplines, which would also provide systematic evidence as input for current science policy debates.

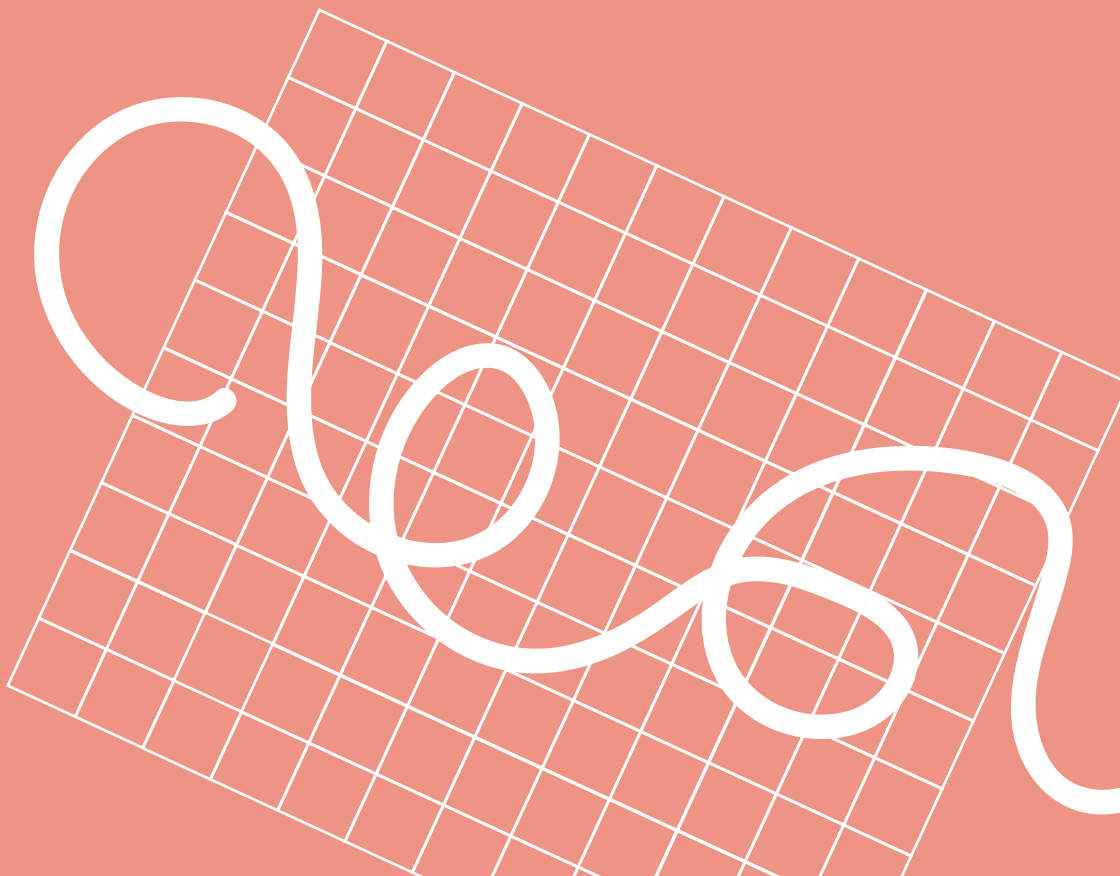
Finally, our way of operationalizing novelty requires some reflection. While most studies on scientific novelty use citations as indicators of novelty, our study uses MeSH descriptors as research topics. Mishra and Torvik (2016) have shown that "individual topic novelty is rare in bio-medicine while combinatorial pairing of concepts is the norm" (p. 1). As our study is mostly interested in more radical forms of novelty, our measure of MeSH descriptor age seems appropriate for our intention. Prior research on scientific novelty has relied on novelty indicators based on novel combinations of topics or citations (Uzzi et al., 2013; Wang et al., 2017), and even specifically of MeSH descriptors (Boudreau et

al., 2016). It might be a limitation of our measure that it only takes new MeSH descriptors in consideration and is oblivious to new combinations of MeSH descriptors. However, this 'recombination novelty' has recently been criticized and new combinations of MeSH descriptors might not necessarily always capture novelty (Fontana et al., 2020). However, another shortcoming of our measure might be that MeSH terms mostly represent the introduction of research topics or areas that are recognized by the independent indexers at Medline. As such, the novelty in our research mostly represents relatively successful attempts to enter new research topics, while novelty that has not received a dedicated descriptor in the Medline index falls outside of our study's scope. Future research could test to what extent our findings hold when different operationalizations of scientific novelty are used.

5. SIGNALS IN THE WAVES OF SURF

Category development and signals in surf music

Matthijs B. Punt and Alex van Venrooij



Abstract

The aim of this paper is to investigate to what extent the understanding of market categories changes over time and how this is reflected in the importance of different category signals in periods of category maturation and revival. We test the changing influence of different types of category signals on inclusion rates of surf music compilation albums, which represent the understanding of "surf music" from a market-based perspective. We find that "elaborate" signals to the category label of surf music showed to be important during both the stage of maturity and revival. However, restricted category signals using surf slang actually lost their importance over time. Finally, signaling surf-related locations had no effect in early times, but increased chances of inclusion during a revival. By addressing these changes over time in the importance of category signals, we add to recent studies on mechanisms of categorization during different stages of category development.

This chapter is published as:

Punt, M. B. & van Venrooij, A. (2020). Signals in the waves of surf: Category development and signals in surf music. *Sociological Perspectives*, Advanced online publication. doi: 10.1177/0731121420950367.

5.1 Introduction

In many social domains, systems of categorization impose coherence on the social world by partitioning items into groups and providing anchors for judgments about value and quality (Hsu and Hannan, 2005; Vergne and Wry, 2014). These categorical systems have important consequences for communities, organizations, and consumers that navigate these social domains. Prior research has indeed found that lack of fit with established categories can lead to penalties and lowered evaluations (Zuckerman, 1999). As a result, actors often try to convey an identity that fits their desired category. One way in which actors do this is by signaling membership, by drawing attention to certain features institutionalized within the cognitive schema of that category (Hsu and Hannan, 2005), or by signaling category-specific vocabularies (Loewenstein et al., 2012). Category membership itself can also act as a collective market signal (Negro et al., 2015). When high-quality actors find it easier to gain membership into a distinctive category than low-quality actors, categorical membership can become a signal for hard-to-observe quality differences.

Categories are, however, not stable and change over time. Categories are found to go through different stages of development (Granqvist and Ritvala, 2016; Grodal and Kahl, 2017), such as emergence (Ruef, 2000), diffusion (Purdy and Gray, 2009), maturity (Hsu and Grodal, 2015; Lounsbury and Rao, 2004), decline (Kennedy and Fiss, 2013; Kuilman and van Driel, 2012), and revivals (Lena, 2012; Raffaelli, 2013; 2018). What remains unclear in this literature, however, is how these dynamics affect the meaning and importance of different identity signals. Negro et al. (2015)—one of main studies on categories and signals—focus on contemporaneous category signaling, where producers' signaling and audiences' response take place in a relatively short time span. Yet, we investigate how contemporary responses to category signals differ from retrospective responses in later stages of category development. Barnett et al. (2012) have shown how identity claims can constrain future opportunities of organizations, as identity claims from an earlier period—such as the names of organizations—can serve as a 'residue of history'. This suggests that the effects of signaled identity claims remain stable over time and leaves historical traces of categorical membership, even if the history of the category is largely forgotten. Prior research has, however, not compared different types of signals. In this paper, we will argue that categorical dynamics can lead to changes in the importance of different types of signals. Although some types of signals remain important over time, other signals might be especially important in early periods and fade over time.

To make this argument, we draw upon a conceptual distinction from cultural sociology between 'restricted' and 'elaborate' codes (Bernstein, 1964). We argue that 'restricted' signals play a more important role in gatekeepers' boundary work in the original phase

of a category than in times of category revival. “Restricted” signals are more specifically embedded in bounded cultural frameworks and are therefore more likely to lose their appeal over time. “Elaborate” signals, with a more general meaning, will remain important in categories’ boundary work in later phases of the development of a category. Finally, signals that follow collective narratives of a category, which have developed over time as indicators of authenticity, will have an increased importance in revival periods.

Empirically, we study categorical dynamics in the market category of ‘surf music’. This case is interesting for three main reasons. First, as detailed in the second section of this paper, surf has a clear pattern of emergence, maturation, decay, and revival (Crowley, 2011). This pattern allows for studying effects of signals at different stages of the category life cycle. Second, the genre of surf music was a highly codified genre that was strongly connected to a particular location—California—and highly embedded in a subcultural scene of surf culture, with clear surfing vocabulary and membership codes, which makes the case interesting for analyzing how “restricted” membership signals fared over time as the category developed farther from its origins in time and space (Bergesen, 1984; Cralle, 1991). Third, the surf genre allows for the empirical study of signaling and genre inclusion due to the availability of archival data gathered by surf historians, which provides a comprehensive overview of a wide population of acts active in surf music. To study changes in the effects of different types of signals, we compare the inclusion rates of surf tracks that exhibit different signals, on compilation albums released during surf music’s heydays and during its revival. As compilation albums necessarily select from a wider population of artists and tracks, in the aggregate, the inclusion on compilation albums reflects how the understanding of the “boundaries” of the category of surf shifted over time, which allows us to assess how changes in categorical meanings affect the salience of different types of signals.

Our paper aims to make several contributions to the literature. The process of categorization is ubiquitous, and our findings contribute beyond the scope of surf music. In general, our study contributes to the understanding how changing standards of categorization impact what actors are successful. Our findings show how certain attributes of categorization lose their meaning over time, while others get more prominent roles in classification processes. Our study has some specific contributions to the study of categories. First, by specifying different types of category membership signals, we respond to calls for further research on how labels or names can be used by actors to position themselves in markets or categories (Granqvist et al., 2013; Verhaal et al., 2015). Furthermore, by studying the effects of signaling over time, we also contribute to a growing body of research that is interested in category dynamics and evolution and the drivers of categorization in different stages of the category life cycle, specifically category revivals (Granqvist and Ritvala, 2016; Grodal and Kahl, 2017).

The paper is structured as follows. We first review the historical development of surf music. We then discuss studies from organizational sociology on different stages of the categorical life cycle and cultural sociological literature on linguistic codes and theorize why the impact of category signals might vary over time. In the subsequent section, we describe our data and methods. Next, we present our regression models and end with a conclusion and discussion.

5.2 The Genre of Surf Music

The surf music genre shows a clear pattern of emergence, diffusion, decay, and revival. Figures 5.1 and 5.2 illustrate how surf music emerged at the dawn of the 1960s, with a rapid rise in the number of new "surf" artists (Figure 5.1), and an increased number of compilation albums labeled as surf (Figure 5.2). Especially, artists like Dick Dale and the Beach Boys were important driving forces behind the growing popularity of this genre in this early period. Their first surf tracks are considered as starting point of the genre around 1961 (see Figures 5.1 and 5.2). As young artists, they created a sound that was imitated throughout the country and even the world (Crowley, 2011). Figure 5.3 illustrates the diffusion of surf music in this early period. It first originated in California and around

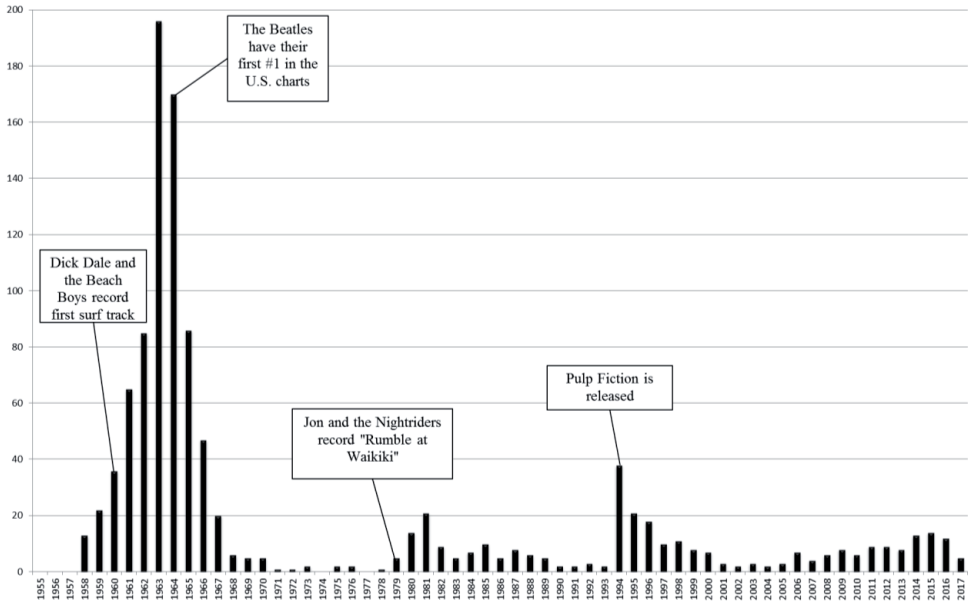


Figure 5.1 Number of new artists releasing a track in the surf genre for the first time each year (www.discogs.com) (n = 1,782)

1963 surf music had spread throughout the United States and was experiencing a boom in popularity. The great majority of the surf bands arose during this period, and artists working in different genres jumped on the bandwagon (Blair, 2015).

However, even at the end of the 1960s, still more than half of the surf tracks came from California (see Figure 5.3). A distinctive subcultural lifestyle also remained somewhat exclusive to California, as it was considered the "prototypical" surfing state (Crowley, 2011). Indeed, the Californian roots were a strong identity feature of surf music, and the broader surf culture and artists tried to capture "the essence of being a teenager and living in Southern California" (Blair, 2008, p. v). To signal this distinctive surf culture, band names, song titles, album titles, and lyrics often included references to specific subcultural lingo that surfers were using to describe a broad range of topics related to surfing (e.g. its participants, environment, and techniques; Cralle, 1991), as well as the specific geographic locations ("California" or "Hawaii"") or locales (beaches, bays, piers, and coasts) that were important for surf culture (Blair, 2015; Schmidt, 2007).

Toward the end of the 1960s, the popularity of the genre diminished as sudden as it emerged. The "British invasion" of bands such as the Beatles to the United States resulted in a shift toward different music styles. This decrease set in during 1964, and both Figures 5.1 and 5.2 show that when the Beatles scored their first number one hit in the U.S. music charts, the number of artists entering the genre and the number of compilation albums using the "surf" label started to decrease. Toward the end of the decade, the genre had its

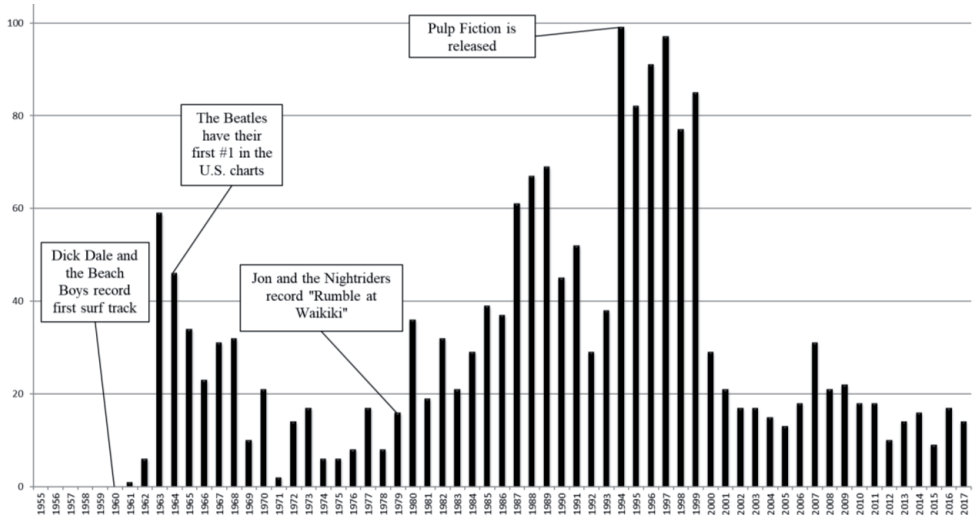


Figure 5.2 Number of surf music compilations albums released yearly (www.discogs.com) (n = 1,096)

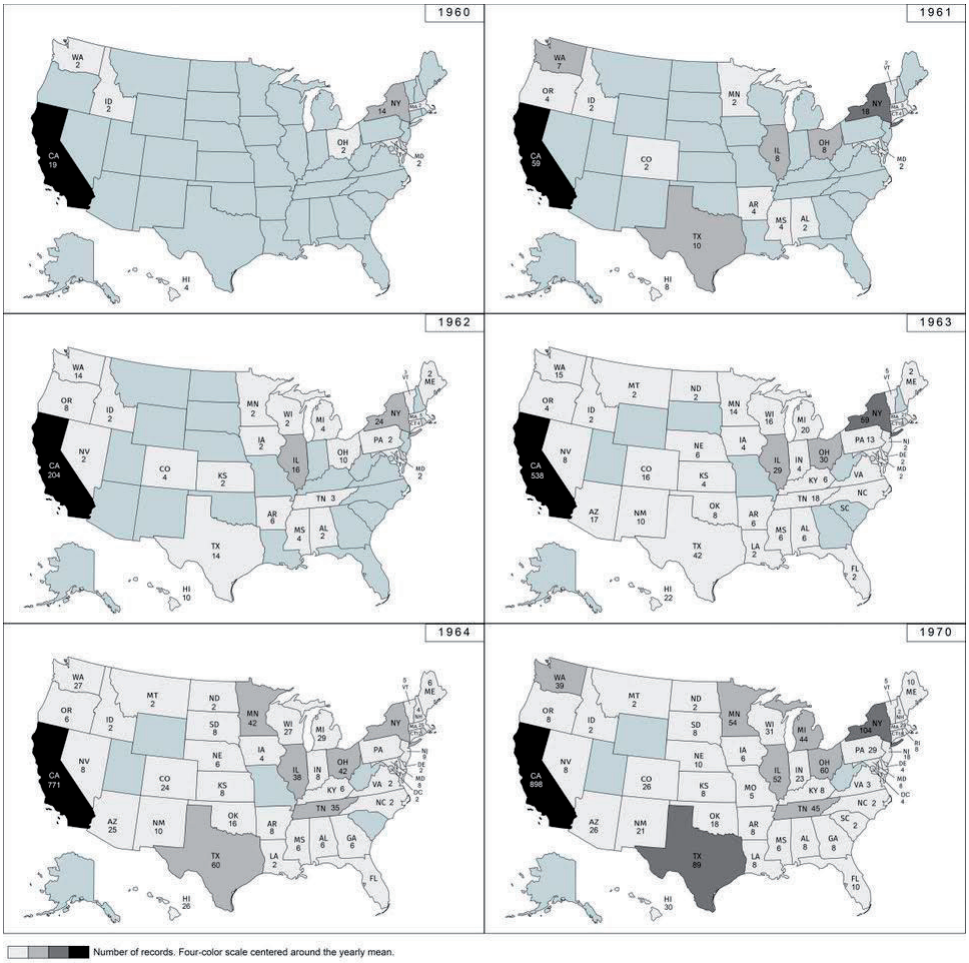


Figure 5.3 Distribution of surf tracks produced between 1959 and 1970 over the United States. Maps show cumulative number of record by the end of the respective years.

sunset when "music turned away from the beaches" (Blair, 2015, p. 57) and both figures show that, after 1970, not many new artists or compilation albums entered the market.

During the early 1980s, surf music experienced a modest revival, often claimed to be ushered in by Jon & the Nightriders who did an homage to surf music in 1979 (Crowley, 2011; Schmidt, 2007). However, surf music's biggest revival started around 1994, the release year of Quintin Tarentino's Pulp Fiction. This film used surf tracks from the 1960s and the soundtrack of the film turned out to be a commercial hit (Blair, 2015). Again, Figures 5.1 and 5.2 show an increase in artists entering the genre and compilation albums using the surf label from 1980 onward. This "second" and "third wave" popularized the

genre with new audiences and did so with reference to its roots in the 1960s (Blair, 2015). These revivals are most clearly depicted in Figure 5.2, with high peaks in the use of the surf label on compilation albums. The peaks in Figure 5.1 remain relatively modest, and, combined, these figures show that the reiteration of surf music was mostly driven by renewed attention for the music produced during the heydays in the 1960s. This also aligns with the narrative of surf, which indeed depicts these later waves of interest for surf music as "revivals" of the music produced in the 1960s, with only some redefinition by emerging artists (Crowley, 2011; Schmidt, 2007).

5.3 Categorical Dynamics and Membership Signaling

Among organizational sociologists, categories are considered as a group of similar organizations that, together with a set of relevant external audiences, come to a mutual understanding of what membership in this organizational category entails (Hannan et al., 2019; Vergne and Wry, 2014). One of the central elements is the concept of identity, which serves as a taken-for-granted basis for audiences to assess membership and generate expectations. Hsu and Hannan (2005) define this organizational identity as consisting of "social codes, or sets of rules, specifying the features that an organization is expected to possess." Recently, there is a growing emphasis in organization theory on understanding how categories and its boundaries evolve over time (Hannan et al. 2019), such as category emergence (Bogaert et al., 2010; Ruef, 2000), category durability (Lounsbury and Rao, 2004), category change (Negro et al., 2011), and category decline and demise (Kennedy and Fiss, 2013; Kuilman and van Driel, 2012).

Although much research stops after category demise, and ignores what happens afterward, categories can also go through revivals (Grodal and Kahl, 2017). Several studies have pointed out how—even though a category might have lost its place in cognitive representations of audiences (Grodal and Kahl, 2017; Kuilman and van Driel, 2012) or has become an "empty category," that is, a category without any active members (Kennedy and Fiss, 2013; Kuilman and van Driel, 2012; Pólos, Hannan, and Carroll, 2002)—categories can experience multiple cycles and can be "forgotten" multiple times, each time having a revival in later periods (Grodal and Kahl, 2017).

The narrative about the category can also change over time. Croidieu and Anand (2018), for example, show how "memory work" shifted the meaning of one particular event (the "Paris event") in the California wine industry from an anecdotal status to a turning point for this industry. Where in earlier times this event only played a marginal role in defining the California wine industry, historic notions of the industry changed so that it started to play a crucial defining role in later periods. Studies on artistic revivals found that,

especially in these times, the narrative around a category changes, because revivals are often targeted at different audiences (Hill and Bithell 2014; van Poecke, 2017). The role of gatekeepers is especially important here, because their boundary work often connects products to contemporary audiences, even if that means extracting these products from their historical or cultural contexts (Griswold, 1986; Hancock, 2008).

The notion of membership signaling is already well discussed in literature on market categories. Here, signaling is often seen as a process of self-categorization to highlight categories that contribute to a positive identity in a certain situation (Granqvist et al., 2013; Negro et al., 2015; Verhaal et al., 2015). In this paper, we focus on linguistic signals (Kim et al.,, 2016) following research on how vocabularies or specific words can shape (collective) action and achieve specific ends (Burke, 1935; Mills, 1939). In the context of category studies, this means that vocabularies can bridge individual cognitions and come to a collective understanding of a category or genre (Loewenstein et al., 2012). This implies the existence of a cognitive association between specific words and categories, meaning that different labels can be used to describe what a category is about. Prior research has shown that actors or products that are prototypical of a category are usually more appealing to audiences, but what this prototypicality means is subject to change over time (Hannan et al., 2019). We can thus expect that products that signal the prototypical identity features of the time will be more favorably evaluated by contemporary audiences.

In this paper, we argue that the effect of different kinds of signals on market category inclusion can vary in strength over time. Our basic assumption is that certain categorical attributes become more or less prevalent over time for defining the category. Following one of the main studies in category signaling by Negro et al. (2015), we expect to find these changes, especially, in the decisions made by gatekeepers of a field. Signaling has been included in previous longitudinal studies but mostly as a possible residue of history, especially when these signals are embedded in names or other static features of the organizational identity. Barnett et al. (2012) show, for example, how the market memory of organizational identity is often prone to forgetting and that organizational naming can counteract this lack of remembrance. Likewise, we argue that signals are indeed a way to enhance market remembrance, but that what is remembered, and therefore which signals are important for categorical inclusion, can change over time. Although signaling has often been interpreted as a way to counter the forgetting of identities, we will argue that signaling itself is also prone to change over time.

5.3.1 Elaborate and Restricted Category Signals

We draw upon Basil Bernstein's (1964) sociolinguistic theory of language codes, and his distinction between "elaborate" and "restricted" codes, to argue that a shift can occur over time in the type of signal that is central to a category. Bernstein developed the concept

of "elaborate" and "restricted" codes to understand how language or speech systems reflect differences in social organization and levels of solidarity. Albert Bergesen (1984) has applied these to the dynamics of art styles and has argued that the development in the social organization of art styles can lead to the use of different artistic codes. We expect a difference in the importance of "elaborate" and "restricted" signals in different phases of category development.

According to Bernstein (1964), elaborate codes develop among low-solidarity groups and start from an expectation of difference from other actors and are characterized by preparation and delivery of relatively explicit and universalistic meaning. This universalistic meaning implies that elaborate codes are also comprehensible for persons other than those in your peer groups. In terms of category signals, elaborate codes therefore can refer to signals that are also intelligible for external audiences. Most prior studies of categorical signaling have looked at the signaling of the category label itself as a very direct and general category signal (e.g., Kuilman and Driel, 2012, on labels such as "airways" or "airlines"; Rosa et al., 1999, on the label "mini-van"; Granqvist et al., 2013, on the nanotechnology label). In general, these studies agree that this "elaborate" category signaling of the category label is creating an association between the firms and the category (Granqvist et al., 2013). Moreover, prior studies have found that while the meaning of category labels can change over time, the labels themselves are durable over time (Loewenstein et al., 2012; Ocasio and Joseph 2005). For example, the importance of the "dot-com label" changed after the burst of the dot-com bubble (Lee, 2001). However, in both periods, firms that were signaling the label were strongly associated to the market category of "Internet firms." We argue that these elaborate codes do not easily lose their meaning and "transcend" time and place, because they are also intelligible for broader audiences that are targeted during revivals. As such, elaborate signals will have an enduring positive effect of market category inclusion.

Hypothesis 1: The effect of elaborate category signals on gatekeepers' inclusion in the market category is positive regardless of the period.

Restricted codes tend to emerge in tightly bound social groups that are characterized by shared identifications in which communication relies heavily on tacit knowledge (Bernstein, 1964). Because the use of restricted codes is often directed toward peers, these codes are used somewhat less consciously and have more particularistic meanings compared to elaborate codes (Bernstein, 1964). In terms of category signals, restricted codes are thus constructed among other category members. Compared to elaborate types of signals, restricted category signals have only received scant attention. Some papers have shown how organizations can use rhetoric and language to signal the shared narrative of a market category (Lamertz et al., 2005; Verhaal et al., 2015). Phillips (2011)

describes the use of certain "slang" terms as signals in jazz whose meaning might have been known among jazz participants ("jelly"), but are probably less common knowledge. However, Phillips does not explicitly make a distinction between elaborate ("jazz," "jass," or "blues") and more restricted signals ("hot," "jelly") and treats them as equally unambiguous signals. We argue that certain signals are more restricted as they function as code among high-solidarity groups, and others are more elaborate general signals. Bergesen (1984), for example, argues that with the growth of an artistic style, and the expansion of the audiences to which the art work needs to "speak," the restricted code that made sense among a limited group of participants loses its appeal.

In line with this, we argue that, especially in times of category revival, restricted signals are more prone to lose their appeal, as, during revivals, gatekeepers are often targeting different and broader audiences and seek out cultural products with relevance for the time, that connect to these contemporary audiences (Griswold, 1986). It seems doubtful whether restricted vocabularies find the cultural resonance needed to gain acceptance by contemporary audiences and can stand the "test of time" (Ocasio and Joseph, 2005), specifically through times of inactivity without the "institutional maintenance" to preserve these restricted social codes (Jones and Massa, 2013). In terms of category studies, one could thus say that what is prototypical of the category changes with the changing audiences from the original period to the revival period. Therefore, we expect that the situated meaning of restricted category signals might be more important as signals of prototypicality in the original period of the category when gatekeepers addressed a more specific insider audience. However, these restricted signals probably lose importance in the revival period as they are less likely to correspond with the prototypical view of surf music of broader audiences targeted in this period.

Following literature on category signaling in general would lead us to disregard time and predict as a baseline that restricted category signals will have a positive effect regardless of time (Hypothesis 2a). However, when we take time into account, we expect the effect of these restricted signals to decrease.

> **Hypothesis 2a:** The effect of restricted category signals on gatekeepers' inclusion in the market category is positive regardless of the period.

> **Hypothesis 2b:** The effect of restricted category signals on gatekeepers' inclusion in the market category inclusion decreases from the original to the revival period.

5.3.2 The Importance of Place Signals

Besides "elaborate" and "restricted" codes, place signals can also affect category market inclusion, especially in categories that are strongly "codified" as place-based. In the case of music, genres often tend to cluster in specific geographic areas as new conventions develop out of the activities of localized avant-garde "scenes" (Lena, 2012). These geographic origins can become symbolically meaningful when the local site of production is "encoded" into the genres' identity. In those cases, locations of production can be used as information cues toward audiences (Roth and Romeo, 1992). "Emplaced" products are often seen as more authentic or meaningful to their local communities (Beverland, 2005; Barnett et al., 2012; Cheyne and Binder, 2010). Specific place signals can thus cause audiences to associate a product with particular categories. Mere emplacement is, however, not enough, but it requires the "right" place signals (Romanelli and Khessina, 2005).

Notions of authenticity change over time, and therefore the importance of place signals might do so too. As already discussed above, Barnett et al. (2012) have argued that notions of authenticity are prone to forgetting and that time renders inaccurate our collective memory of what is actually authentic. Moreover, one might even say that images of authenticity always involve "projecting an image that is partly true and partly rhetorical" (Beverland, 2005:1008). Over time, narratives arise that define and distinguish the authentic from the inauthentic (Fine, 2003). This means that products are not authenticated for their material attributes, but rather for corresponding to biographical narratives of the category (Carroll and Swaminathan, 1991; Kahl et al., 2010; Svejenova, 2005). This aligns with studies that show that, during artistic revivals, gatekeepers selectively employ the past (Hill and Bithell, 2014), extracting the category from its historical and cultural contexts (Hancock, 2008).

Narrativized notions of place specifically have been shown to play a vital role in the re-emergence of categories. Raffaelli (2013; 2018), for example, describes how in the re-emergence of the Swiss mechanical watchmaking industry the legacy identity as "Swiss" was invoked. Kuilman (2005) also shows how Shanghai's historic identity as China's financial center enabled the re-emergence of foreign banks here after periods of economic isolationism. In these examples, place labels have gained a type of narrativized importance over time, and using these labels can have positive effects regardless of the actual material attributes of these products. From this perspective, place-based authenticity is a rhetorical tool used by gatekeepers and their narratives determine what aspects are highlighted (Carroll and Wheaton, 2009). These narratives of authenticity are often intelligible for wider audiences as they function as prototypical representations of a category without having to understand the specific qualities of that category (Kovács et al., 2013). Following prior research, we expect that, during revivals, gatekeepers engage

in a form of "demographic profiling" (Lena and Peterson, 2008, p. 706), by emphasizing narratives of origin that are prototypical to a category for the broader audience. Therefore, we argue that these narrativized codes will have an increased importance in the revival period compared to the original period.

We follow prior research in distinguishing location and locale as two dimensions of place, where the former refers to the macro-order dimension of place as a specific point on a map (e.g., California), while the latter refers to the psychical settings and actual shapes and contours of places in which people live, social relations are constituted, and everyday interactions are routinized (Agnew, 1987; Cheyne and Binder, 2010). This seems particularly important for surf music, a genre where myths and narratives seem to flourish (Stranger, 2017). Specifically, the broader surf culture in which the genre is embedded is characterized by narratives on both dimensions of place.

For the dimension of location, there are California myths (Crowley, 2011; Leaf, 1978) and Hawaiian legends of ancient sportsmen (Finney and Houston, 1996). On the locale dimension, surf culture is characterized by narratives such as the myth of "the perfect wave" or "secret surf spots" and legends about the "Vals" (people from the valley) (Stranger, 2017). While market memory of where surf musicians originally came from will possibly fade over time, signals to locations and locales that correspond with narratives on surf music will find the resonance needed to gain attraction (Ocasio and Joseph, 2005). We expect that the development of this place-based narrativization will result in stronger effects for place signaling in later periods than in earlier periods.

As with Hypothesis 2, following category signaling literature in general would lead us to disregard time differences and a baseline prediction of a positive effect for location and locale signaling (Hypothesis 3a/4a), while when time is considered, we expect the effect of this type of signal to increase(Hypothesis 3b/4b):

Hypothesis 3a: The effect of location signals on gatekeepers' inclusion in the market category is positive regardless of the period.

Hypothesis 3b: The effect of location signals on gatekeepers' market category inclusion increases from the original to the revival period.

Hypothesis 4a: The effect of locale signals on gatekeepers' inclusion in the market category is positive regardless of the period.

Hypothesis 4b: The effect of locale signals on gatekeepers' market category inclusion increases from the original to the revival period.

5.4 Data and Methods

5.4.1 Research Sample

Our data collection is based on discographical data from John Blair's (2008) "The Illustrated Discography of Surf Music." This discography contains information about thousands of surf music tracks from the early 1960s. Blair's discography is generally regarded as the most complete overview of surf music released in the early 1960. A key advantage of the discography is that it includes not only more renowned artists in surf music but also minor or unknown artists. From this discography, we obtained information on 2,547 surf music tracks released during the original period of surf music, between 1958 and 1970, with "tracks" being our unit of analysis. Blair's inclusion of tracks into this surf discography is based on a systematic selection of songs based on a multiplicity of characteristics (i.e., instrumentation, sound, titles, lyrics). For a thorough understanding of the selection process, we refer to the detailed explanation in Blair's discography (pp. vi–vii).

For collecting data missing in Blair's discography, such as general information about tracks, artists, or labels, we consulted a number of online databases: auction Web sites for vinyl (www.discogs.com; www.45cat.com; www.popsike.com) and genre-specific Web sites (www.reverbcentral.com; www.surfguitar101.com).

5.4.2 Dependent Variable

To capture changes in the effects of category signals, we aim to explain the difference between the number of times a track is included in the market category "surf music" by gatekeepers during surf's first wave and during the revival. Gatekeepers' market category inclusion is operationalized through quantifying how often tracks are included on surf compilation albums in the early period (1959–1970) and in the late period (1980–2017). Tracks that are more often included on compilation albums can tell us what is considered prototypical surf music in those times. This operationalization tells something about how categorical signals are differently picked up by producers of surf compilations in the early and revival stages of the genre. Previous studies have often taken a different measure of market category inclusion in the music industry, including awards, chart success, or mentions in critical texts such as reviews or biographies. Compilation albums, however, allow us to take the granularity of musical categorization into account. Usually, there is much overlap in how different genres are treated by critics (Van Venrooij, 2009), and the most specific music charts and awards are still on the level of meta-categories such as "rock" and "pop" (Schmutz, 2005). For a small genre such as surf music, we therefore have to consider forms of "subcultural" market positioning and we argue that surf music compilation albums are a form of "subcultural canonization," reflecting a

practical classification (Bourdieu, 1996) by grouping tracks considered most important for surf music as a genre.

We compare inclusion rates of tracks on compilations between two different periods, which we demarcate based on our description of the development of surf music presented above. For the early period, we used the year of the first and last track in our sample (1958 and 1970). For the late period, we used 1980 as the start year of the "second wave" and gathered data until 2017, the last full year before we gathered these data. The variables of early and late compilation album inclusion are constructed using online discographic database and auction Web site Discogs (www.discogs.com). This user-generated database has a focus on Vinyl and CD recordings and with more than 16,000 releases categorized as "Surf" serves as a useful database for the current research (for more information and discussion on this database as a data source, see van Venrooij 2015). Using a Web site scraper, the tracks included on 1,782 compilation albums labeled as surf are collected, 263 for the early period and 1,519 for the late period. We only used compilation albums that contain various artists and single artist compilations are excluded. Subsequently, for each track included in our data set, we tracked how often it was included on surf compilation albums during both the early and the late period. To give an impression of the kinds of songs that fare well, a top 10 of tracks included on these compilation albums is found in Table 5.1.

Table 5.1 Top ten tracks included in the early and late compilation album canon

Early period			Late period		
Track title	**Artist**	**Count**	**Track title**	**Artist**	**Count**
Wipe Out	Surfaris	14	Wipe Out	Surfaris	99
Surfin Safari	Beach Boys	7	Surf City	Jan & Dean	92
Surfer´s Stomp	Jim Waller & the Deltas	7	Pipeline	Chantays	62
Pipeline	Chantays	6	Surfin Bird	Trashmen	62
Surfin USA	Beach Boys	6	Miserlou	Dick Dale & The Del Tones	61
I Get Around	Beach Boys	5	Surf Rider	Lively Ones	61
Church Key	Dave Myers & His Surftones	5	Surfin USA	Beach Boys	58
Surf Party	Astronauts	5	Surfin Safari	Beach Boys	52
Surf City	Jan & Dean	4	Bustin Surfboards	Tornadoes	50
Hot Doggin	Astronauts	4	Walk Don't Run 64	Ventures	50

5.4.3 Independent Variables

In this article, we constructed four independent variables that represent the types of signals outlined above. These signals are examined in both the name of the artist and the title of the track. Lyrics are excluded because many surf tracks are instrumental.

These independent variables are coded dichotomously, as either "containing" or "not containing" the specific vocabulary. The language used in both the track titles and act names is combined here, as there is no reason to expect a difference between their signals. By looking at the titles and names, we follow prior research that argues that these are by far the clearest symbolic signal (cf. Glynn and Abzug, 2002; Phillips, 2011).

For each type of signal specified in the theory, we compiled a list of words that form one of the vocabularies discussed above. First, for the elaborate category signals, we follow prior studies on category signals and use the references to the category label "surf" or variations on this (i.e., mostly "surfin(g)" and "surfer"). We found 496 tracks signaling this category label in total. Second, the restricted category signals are based on inductive coding of the track titles and band names. We analyzed the vocabulary in the track titles and band names by comparing them with specific vernacular described in reference works on surf music (Blair, 2015; Crowley, 2011; Schmidt, 2007) and surf slang in particular (Cralle, 1991). This mostly includes words that have little meaning outside of surf culture and are confined to members of surf culture. Many of these words originated in the California surf community but also spread to other surf communities across the country (Cralle, 1991). This iterative process of moving back and forth between the titles and names in our sample and the reference work on surf music resulted in the identification of 36 surf slang words that were used 280 times in the track titles and band names (Table 5.2).

Third, for place signals we look at both location and locale. For location signaling, track titles and band names are inductively examined for references to California-related and Hawaii-related geographical locations. California is widely considered as the surfing state and was the most prominent home to the surfing life-style. Hawaii is often mythologized as the "birth place" of surfing, and we found that references to Hawaii are included in many band names and track titles.

Table 5.3 shows the specific geographical locations that were used for operationalizing the location signals. We excluded the word "Hollywood" in our operationalization of this variable, because this location probably has too many different connotations besides its connotation with California[8]. Only 54 location signals were used in our sample. Besides this, Table 5.3 shows the words used for operationalizing locale signals. We inductively studied the track titles and band names to find these locale terms. The definition of locale

8 As a robustness check, we also ran our models with a location signaling variable that included the word Hollywood. This showed no difference in the significance or direction of our results but did result in a slightly weaker effect for our location signaling variable in all our models, which is probably due to the many connotations the word Hollywood has.

Table 5.2 List of words used to operationalize the restricted category signaling variable

Word	Specification	Count
Banzai	Nickname of a surf break in Hawaii	3
Bombora	A spot where waves break on the "outside"	3
Break	An obstruction causing a wave to break or the breaking of the wave itself.	31
Bunny	A young woman who spends her time at the beach	9
Cowabunga	Exclamation often used by surfers	1
Hang(ing) Five	A trick in which one is curling five toes around the front of your board	3
Hang(ing) Ten	A trick in which one is curling ten toes around the front of your board	4
K-38	Nickname to a famous surf spot at kilometer 38 of the Baja Highway 1	1
K-39	Nickname to a famous surf spot at kilometer 39 of the Baja Highway 1	1
Nose	The front of the surf board	2
Pipe	A wave that breaks so that it create a tube.	11
Stomp	Foot-stomping dance to surf music	63
Curl	Another word for wave	5
Wipe out	Falling of your surf board (while on a wave)	20
Barrel	The inside of a breaking wave	1
Surf(ing) Safari / Surfari	Surfing somewhere out of town	48
Beach Bum	Someone who visits the beach very frequently	2
Big Kahuna	Best surfer on the beach	1
Biter	Someone who copies everything surfers do	2
Burn(ing)	Stealing a wave from another surfer	4
Stringer	Strip that runs down the middle of the board	1
Cookin(g)	When surf conditions are good	1
Crusher	Someone who surfs hard	1
Hot Doggin(g) / Hot Dogger	Umbrella term for stunts on a surf board	4
Baggies / Baggys	Loose-fitting (surf) shorts	12
Gladiator	Male with more than one strap on his sandals	3
Goofy (Foot)	Surfing with the right leg/foot forward (common for left-handed persons)	3
Gremlin / Gremmie	Young surfer or trouble-maker on the beach	7
Hodad(dy)	Someone who pretends to surf by coming to good beaches	2
Kamikaze	Awesome	2
Soul Surfer	A good surfer who surfs for spiritual reasons	1
Soup	The foamy water of a broken wave	5
Spinner	Turning 360 degrees on your board	3
Surf Gypsy / Gypsy surfer	A surfer who does not return home but sleeps on the beach	3
Tube	The inside of a breaking wave	3
Woody	Station wagon with wooden side panels used by surfers.	14

Table 5.3 List of words used to operationalize location signaling and locale signaling variables

Location signaling	Count	Locale signaling	Count
California	**36**	Bay	7
Including:		Beach	119
Anaheim		Coast	6
Azusa		Dune	2
Balboa		Reef	3
Cucamonga		Sand	37
Huntington Beach		Sea	35
Malibu		Shore	4
Newport Beach		The blue	3
Pacific		Tide	25
		Water	11
Excluding:			
Hollywood			
Hawaii	**18**		
Including:			
Honolulu			
Makaha			
Waikiki			

here is the actual physicality of space where people interact in their daily lives (Agnew, 1987). For surfing, we found 252 locale references, mostly related to the beach or the sea.

5.4.4 Control Variables

We included a number of control variables. First, we control for the possibility that commercial success, as measured by success in the Billboard Hot 100, influences the inclusion on compilation albums. Therefore, we consider whether the tracks in our sample were hits in the Billboard Hot 100 (www.billboard.com). Second, using the same data, we also considered the number of hits that artists had prior to the time of compilation inclusion. This means that for every artist, we collected the number of hits they scored up to 1959 for our early period and up to 1980 for our late period. A third variable measuring success is the size of the label on which the song was released. This variable is operationalized by taking the number of tracks released on each of the labels included in the discography by Blair (2008), thereby capturing the size of labels within the genre of surf music specifically. Fourth, we control whether artists originated from California, because, as detailed above, the genre of surf music was highly embedded in the Californian life style and this state experienced the most vibrant surf music scene (also see Figure 5.3). Fifth, we assess whether tracks originated from central music production cities. We use Florida and Jackson's (2010) list of cities with the most musicians in 1970

to identity the central music cities during the heydays of surf music. Sixth, we included a dichotomous variable that measures whether the tracks were vocal or instrumental surf songs. Within the surf genre, different actors were active in either instrumental surf music or vocal surf music, both making authenticity claims when it comes to "true surf music." These data were also derived from John Blair's discography. Furthermore, we used Blair's discography to control for whether a track was released on the A-side or B-side of a record, as A-side tracks might be more likely to be included on compilations. Finally, for the late period, we control for compilation inclusion in the early period. Table 5.4 shows the descriptive statistics of the independent and control variables and a correlation matrix. These independent and control variables were found for 1,803 surf tracks from Blair's discography, and therefore, our analysis will be limited to these tracks.

5.4.5 Negative Binomial Regression

Negative binomial regression was used to model the compilation inclusion of the tracks, as the dependent variable is constructed as count data or nonnegative integers and the data are overdispersed. To model changes in the effects of our independent variables on compilation inclusion in the two time periods, and test the first four hypotheses, we have constructed a panel data structure of track by time period (1.803 tracks in two time periods). Because standard errors in panel data can have heteroscedasticity and autocorrelation, we run our negative binomial regressions with robust standard errors using the *sandwich* package in R (Zeileis, 2020). We also include a period dummy and interact the independent variables with this dummy to capture these effects' change over time.

To test the effects of different types of signaling, the independent and control variables are entered in blocks. To measure the model improvement of these different blocks, the log-likelihood of these different nested models is compared to each other and with the null model using the likelihood ratio test:

$$LR = -2 \times [(loglik(m_1)) - (loglik(m_2))]$$

where *loglik*(m_*) denotes the two models that need to be compared. This formula gives a log-likelihood ratio chi-square that can be used to evaluate the improvement of fit per model. The degrees of freedom, used for the test of significance, equal the number of unique variables from model B. For negative binomial regression the B-coefficients can be converted to the effect in percentages using the following formula:

$$100 \times [\exp(B) - 1]$$

This formula demonstrates the effect (in percentages) that a one-unit change in a variable will have on the expected number of compilation inclusions. This conversion allows for better comparison between the different variables.

Table 5.4 Descriptive statistics and correlations

	Variable	Mean	SD	Min	Max	Pearson correlations													
						(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1)	Hit	0.02	0.149	0	1														
(2)	Prior hits artist (1959)	0.10	0.735	0	12	0.15													
(3)	Prior hits artist (1980)	1.54	6.187	0	45	0.25	0.38												
(4)	Label size	12.45	16.961	1	77	0.08	0.11	0.39											
(5)	Music center origin	0.23	0.419	0	1	0.03	0.02	-0.01	0.06										
(6)	Instrumental	0.62	0.486	0	1	-0.05	-0.10	-0.19	-0.07	-0.12									
(7)	Beach Boys	0.01	0.110	0	1	0.12	-0.02	0.78	0.38	-0.06	-0.14								
(8)	A-side track	0.46	0.499	0	1	0.07	0.02	-0.03	-0.03	0.01	0.01	-0.05							
(9)	Californian origin	0.50	0.500	0	1	0.03	-0.07	0.05	0.22	0.12	0.11	0.11	-0.01						
(10)	Elaborate signal	0.19	0.392	0	1	0.09	-0.01	0.03	0.08	0.02	-0.12	0	0.01	0.09					
(11)	Restricted signal	0.11	0.309	0	1	0.04	-0.04	0.01	0.07	0.02	0.04	0.01	0.03	0.18	0.16				
(12)	Locale signal	0.09	0.290	0	1	0.07	0.02	0.30	0.08	0.00	-0.11	0.35	-0.01	0.01	-0.06	-0.02			
(13)	Location signal	0.02	0.149	0	1	0.03	0.00	0.03	0.00	0.04	0.00	0.02	0.03	0.03	0.01	-0.02	-0.01		
(14)	Early compilation inclusion	0.19	0.714	0	14	0.27	0.03	0.23	0.16	-0.04	0.02	0.22	0.02	0.13	0.19	0.31	0.06	-0.01	
(15)	Late compilation inclusion	1.21	5.611	0	99	0.50	0.03	0.23	0.17	0.02	0.01	0.2	0.04	0.11	0.14	0.06	0.06	0.04	0.47

5.5 Results

Table 5.4 presents descriptive statistics for all the variables. A first observation is that in both the early period and the late period, the average times a track was included on the compilation albums is relatively low (0.19 times in the early period and 1.21 times in the late period). As it is often the case in cultural fields, the distribution is highly skewed with a few tracks in our sample attracting most inclusions. What is more surprising, however, is the correlation between the early and late compilation inclusion, which, considering these dependent variables is operationalized identically, is "only" moderate (.47). This means that, although we measure the same compilation process, different tracks are included in the surf compilation canon in the different time periods. This might already suggest that different standards are used for inclusion by gatekeepers during these two periods. When looking at our four signaling variables, we can see that elaborate signaling is with 19 percent by far the most used type of signaling. Only 2 percent of the tracks included location signals—making it the least used form of signaling. What might be even more important is that our signaling variables show only weak correlations (with a maximum correlation of .16). This means that the use of these different types of signaling proves to be relatively exclusive and tracks (or their bands) do not often use different signals together.

5.5.1 Tests of Hypotheses

All models in Table 5.5 used panel data to test the four hypotheses. These models show variance inflation factors (VIFs) not exceeding 4.19, suggesting our variables do not seem to create problematic collinearity.

Model 1 is the base model containing the control variables, and as expected, this model proves to be a strong significant improvement compared to the null model ($\chi 2 = 598.98$, $df = 9$, $p < .001$). In this first model, almost all control variables show a positive and significant effect. Unsurprisingly, this model shows that compilation inclusion in the late period increases when tracks were already included on compilations in the early period. In general, compilation album inclusion increases the most when the track was a hit in the 1960s. In addition, tracks are also more often included on compilation albums when they are instrumental or released on the A-side of a record. Label size also increases the number of times these tracks are included. Prior hits by the recording artist are significant in the first model but turn insignificant from Model 3 onward. Furthermore, tracks that originated from California had an increased inclusion. Indeed, these results show that, on average, tracks that originated from California had 80.6 percent higher inclusion rates on compilation albums compared to tracks that originated elsewhere.

In Model 2, the four different types of signals are included as time-invariant variables. This model shows a significant improvement to Model 1 ($\chi 2 = 102.96$, df = 4, $p < .00$). Because for every track these signals remain constant over the two periods of this research, we should interpret the signal variables in this model as time-invariant. This model thus shows that without making a distinction between the two periods, elaborate signals, locale signals, and location signals all show a significant positive effect, while in this model, restricted signals are insignificant. Compilation inclusion increases the most when tracks signal surf-related locations, followed by the elaborate signals of the surf genre label and the surfing locale signals. Following this model, we can confirm Hypotheses 1, 3a, and 4a and would have concluded that these three forms of signals are important for inclusion in market categorization devices by gatekeepers. However, when we consider the difference between the original period and the revival of surf music, we find a different pattern.

In Model 3, we interact a time dummy with the different types of signals to test whether the effects of these signals differ per period. Again, this model shows a significant improvement compared to Model 2 ($\chi 2 = 353.21$, df = 5, $p < .001$). In this model, the main coefficients for the different types of signals represent the effect of these signals for the early period. To obtain the effects for the revival period, we have to add the interaction coefficients to the main coefficient for each type of signal. The significant main effect for restricted signals indicates that, for the early period, tracks that signaled restricted vocabulary yield more inclusions than tracks that did not use this type of signal. However, the interaction effect between time and restricted signals is negative and significant, so this effect changed in the revival period. For the late period, the positive effect of restricted signals is completely diminished. Figure 5.4 shows the change in average marginal effects for our four types of signaling from the original to the revival period in Model 3, and here we can clearly see that the positive effect for restricted signals in the original period turns negative in the revival period. This strong negative interaction effect confirms Hypothesis 2b that the effect of restricted signals will decrease from the original to the revival period. The interaction effect between time and elaborate signals is insignificant, so our model shows no difference between the early and the late period for the effect of elaborate signals. This is also shown in Figure 5.4 by the relatively small difference in the average marginal effect between the two period, together confirming Hypothesis 1.

Model 3 shows a significant interaction effect between time and location signals, indicating that for the late period, there is an increased effect of location signals. Figure 5.4 also shows that the average marginal effect for location signals changes from a small negative effect to quite a strong positive effect. These findings confirm Hypothesis 3b that the effect of location signals will increase from the original to the revival period.

Table 5.5 Negative binomial regression models on compilation album inclusion for panel data

Variable	Model 1	Model 2	Model 3	Model R1	Model R2
Control variables:					
Hit	2.360 ***	2.313 ***	2.296 ***	2.005 ***	0.917 ***
	(0.271)	(0.277)	(0.224)	(0.205)	(0257)
Prior hits artist	0.025 **	0.030 **	-0.002	-0.016	0.103 *
	(0.009)	(0.010)	(0.011)	(0.009)	(0.043)
Label size	0.023 ***	0.024 ***	0.023 ***		
	(0.002)	(0.002)	(0.002)		
Music center	0.024	0.030	0.030	0.174	0.180
	(0.128)	(0.128)	(0.115)	(0.140)	(0.138)
Instrumental	0.738 ***	0.950 ***	0.875 ***	0.775 ***	0.772 ***
	(0.111)	(0.115)	(0.108)	(0.114)	(0.114)
Beach Boys dummy	-0.529	-0.800	0.295	1.245 **	1.373 **
	(0.376)	(0.427)	(0.475)	(0.426)	(0.485)
A-side	0.293 *	0.312 *	0.308 **	0.270 **	0.258 **
	(0.127)	(0.131)	(0.117)	(0.086)	(0.086)
Early compilation	0.516 ***	0.424 ***	0.279 ***	0.118	0.078
	(0.061)	(0.060)	(0.058)	(0.070)	(0.076)
California track	0.591 ***	0.546 ***	0.513 ***	0.264	0.270
	(0.130)	(0.139)	(0.126)	(0.157)	(0.157)
Independent variables					
Elaborate signal		0.740 ***	1.087 ***	1.083 ***	1.141 ***
		(0.161)	(0.177)	(0.173)	(0.171)
Restricted signal		0.279	1.697 ***	1.746 ***	1.761 ***
		(0.148)	(0.179)	(0.165)	(0.163)
Locale signal		0.512 **	0.399	0.333	0.363
		(0.181)	(0.261)	(0.272)	(0.279)
Location signal		1.598 ***	-0.170	-0.314	-0.269
		(0.206)	(0.592)	(0.476)	(0.464)
Interactions:					
Time x Elaborate			-0.390	-0.302	-0.387
			(0.256)	(0.205)	(0.203)
Time x Restricted			-1.997 ***	-1.858 ***	-1.870 ***
			(0.259)	(0.233)	(0.237)
Time x Locale			0.094	0.250	0.219
			(0.327)	(0.304)	(0.323)
Time x Location			1.843 **	1.820 ***	1.790 ***
			(0.619)	(0.481)	(0.470)
Time x Hit					1.581 ***
					(0.342)

Continue

Continued

Variable	Model 1	Model 2	Model 3	Model R1	Model R2
Time x Prior hit artist					-0.131 **
					(0.044)
Time x Beach Boys					0.444
					(0.844)
Intercept	-2.278 ***	-2.748 ***	-4.136 ***	-4.861 ***	-4.853 ***
	(0.127)	(0.126)	(0.195)	(1.083)	(1.083)
Time dummy			2.082 ***	2.164 ***	2.150 ***
			(0.158)	(0.139)	(0.139)
Label dummy	NO	NO	NO	YES	YES
Log-likelihood	-2894.6	-2843.1	-2667	-2299	-2290
AIC	5811.2	5716.2	5373	5576.6	5564.9
Maximum VIF	1.70079	1.92041	4.1942	4.212	4.333
n	3,606	3,606	3,606	3,606	3,606

Standard errors in parentheses are robust standard errors. ***p≤0.001, **p≤0.01, *p≤0.05.

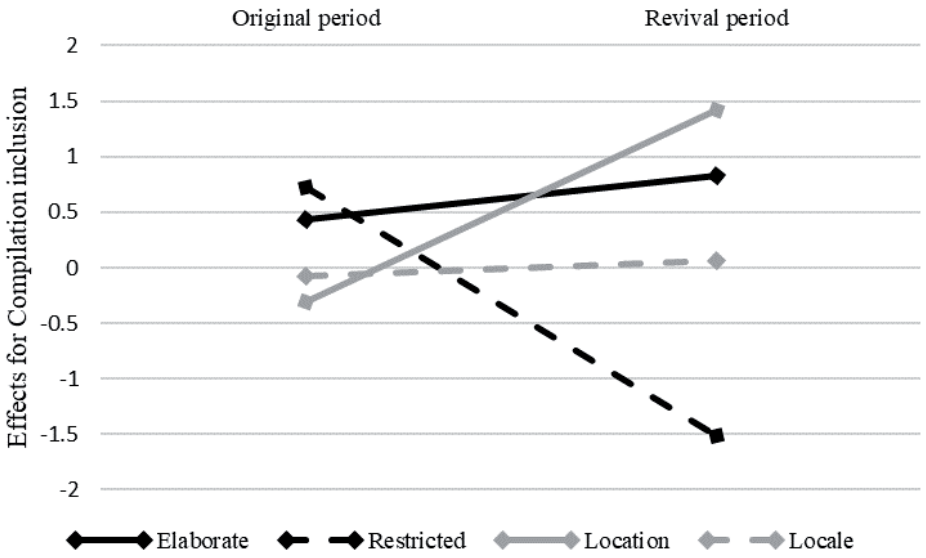


Figure 5.4 Average marginal effects for the four types of signaling in the two different time periods

Locale signals does not show an interaction effect in Model 3, which is also shown by the flat line in Figure 5.4, so we do not find support for Hypothesis 4b.

Finally, Table 5.5 also includes two robustness checks. In Model R1, we add the record labels on which the tracks were released as a dummy variable. This dummy variable needs to control for all the variance that might be explained by tracks being released on any of the different labels. We add this variable mostly because of the possibility that the labels that released the compilations (for both the original and the revival period) might be the same as or have commercial interests in the labels that released the original tracks. By controlling for the labels on which the original tracks were released, we do consider not only the size of the label but also their back catalog and other commercial interests these labels might have when they released compilations albums. This robustness model does not show any significant changes in our independent variables and also the effect sizes generally remain the same. In Model R2, we interact some of the success variables (hit, prior hit by artist, and the Beach Boys dummy) with a time variable. We control for this because artists that become more popular over time might be more likely to restrict the use of their music on compilations albums, which would mean that these variables have a different effect in the revival period. However, this model shows no real differences with our previous models, and mostly tells us tracks that were a hit are more often included in the revival period, while tracks by artists with prior hits are more often included in the original period.

A striking result throughout our models is that although elaborate signals show an effect in both periods, in neither period it proves the most important form of signaling. What is interesting here is that the forms of signal that show time-dependent effects have the strongest effects in their periods of relevance.

5.6 Conclusion and Discussion

The aim of this paper was to investigate to what extent the understanding of a category changes over time and how this is reflected in the importance of different signals in periods of category maturation and revival. As expected, signals to the general category label of surf music showed to be important during both the original heydays of the genre and during the later revival. This shows us that these elaborate category signals can stand the test of time because of their intelligibility to a broad audience. However, we also argued that not all signals that mattered in the early period retain their historical importance. We find that restricted category signals can actually lose their appeal for the category at large and become less important over time. Location signals, however, gain importance over time. Although these signals had no effect on compilation inclusion

in the early period, in the late period, they increase the chances of inclusion. These results suggest that notions of prototypicality seem to change over time, from a more restricted in-group notion to a notion that follows a certain "myth of origin" that is better interpretable to a broader audience.

In broader sociological vein, our study contributes to the understanding of how changing patterns of categorization also change the ways in which individuals efficiently process information (Zerubavel 1996), in our case how producers of surf compilation albums decide on their selections. As such, our findings on the changing roles of signals throughout the life cycles of a genre have implications that go beyond the case of music. Categorization is a ubiquitous process, and changing signals can have similar importance in other markets or social domains. Although prior studies have shown that the same product can be differently evaluated in separated classification systems (Porac et al., 1989; Zhao 2008), our study argues that the same product can also be differently evaluated in the same classification system over time. Moreover, our findings add to the understanding of boundary work during times of genre revival. Previous studies already showed that, during revivals, different audiences are addressed compared to the original period and these audiences are not always aware of a genre's history and origins (Hancock, 2008; Lena, 2012; Van Poecke, 2017). As a result, gatekeepers' boundary work often includes selecting products that resonate with contemporary audiences' view of a genre (Griswold, 1986). Our study contributes to the understanding of this boundary work by underlining the importance of changing notions of prototypicality for market category inclusion by gatekeepers.

The study of revivals also has more specific implications for the study of market categorization. Recent studies have shed light on the varying drivers of categorization during different stages of category development but often stop at the stage of category demise (Granqvist and Ritvala, 2016; Kennedy and Fiss, 2013). However, Grodal and Kahl (2017) have argued that some categories go through multiple cycles, opening up the possibility to study categories' revival. Our study contributes to these studies on categorical life cycles by examining the dynamics during this stage of category revival. Previous research has already acknowledged the possibility for categories to stay "empty" for some time (Carroll and Swaminathan, 1991; Dobrev, 2001), but these studies found the "social codes" of categories to be unaffected by these periods of inactivity (Pólos et al., 2002). Our study thus adds to the understanding of changing "social codes" used by gatekeepers to assess market category inclusion during times of category re-emergence. However, we need to consider that we are studying an art form. Studying revivals has a long history in the sociology of the arts (Griswold, 1986; Hancock, 2008; Lena, 2012), and, indeed, artistic forms might be more likely to be remembered over long intervals

of time and thus more susceptible to revivals (Pólos et al., 2002). Future research could continue to examine the stage of re-emergence in other types of categories.

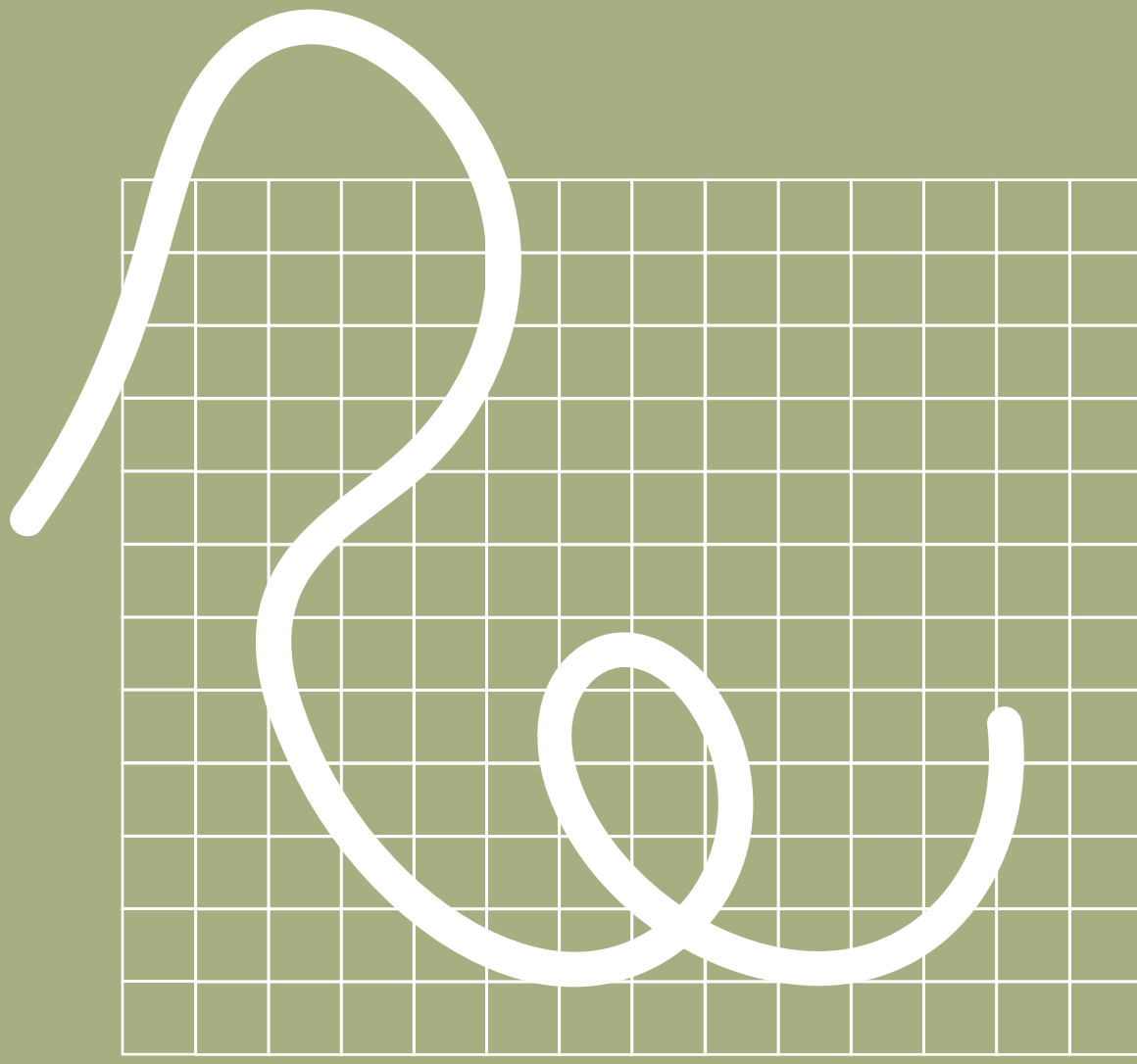
Although examining actors that emerged during times of revival is beyond the scope of our study, examining this stage of re-emergence opens up the opportunity to study how these revivalist actors build on their categorical ancestors after times of categorical inactivity, a process that is highly dependent on processes of remembrance, selection, and narrativization (Griswold, 1986; Hill and Bithell, 2014; Raffaelli, 2013; 2018). This reviving and revising of the social codes of a historical category is an interesting addition to the notion of institutional maintenance, a more active form of maintaining the social codes and institutions in a specific field or market over time (Jones and Massa, 2013). Our study suggests that more general and more easily narrativized features of a category are more likely to play a role in re-emergence. This might be an especially interesting avenue for research when we compare well-studied dynamics of category emergence (Bogaert et al. 2010; Ruef 2000) with dynamics during category re-emergence.

Although it is commonly acknowledged in category studies that external audiences impose constraints and create opportunities for category members (Hsu and Hannan, 2005; Zuckerman, 1999), little attention has been paid to changes in target audiences. Prior studies have made a distinction between insider and outsider audiences to study how their interaction influences meaning making and boundary work of a category (Hsu et al. 2009; Koçak et al. 2014). We contribute to these studies by arguing that changes in the extent to which audiences have expertise in or familiarity with a category can influence categorical schemas over time, in our case category signaling. Future studies could study the interactions among insider and outsider audiences in more detail, also including the role of gatekeepers in this process (Boulongne et al., 2019).

A limitation of our research in this sense is that the boundary work in our case is mostly represented by work done by producers of surf compilation albums. Compared to "traditional" gatekeepers, these producers are not only dealing with category boundary work but are also driven by commercial interests and the availability of tracks in their labels' back catalogs. Future research could show us whether these dynamics of remembering and forgetting are also found when other cases and actors are considered. Moreover, our study has only implicitly theorized the relation between the strength of signals and the "costs" involved in acquiring these signals. Negro et al. (2015) have argued that more distinctive category signals function as stronger market signals but also involve higher costs that high-quality producers find easier to pay than low-quality producers. In our case, the restricted codes could also be argued to be costlier to acquire as these would require familiarity and knowledge of the subcultural codes. The finding that gatekeepers of the category of surf to a larger extent drew on these costlier codes in the earlier period

could be a function of their stronger embeddedness in the scene, which would have enabled them to use the costlier, restricted codes in their construction of the category. The decline of the use of restricted codes over time could therefore also be a result of the costs involved in acquiring distinctive category signals—which were easier to acquire by the insider audiences in the original period of surf music, than by the outside members of the later period. As such, we extend the idea of Negro et al. (2015) by distinguishing between types of signals, and it would be interesting for future research to study how the costs for category signaling might change in different stages of category development.

6. CONCLUSION



6.1 Summary

This thesis is positioned at the interface between innovations studies and institutional studies and draws attention to institutional change instead of technological change as main source of innovation in the study of innovation (Raffaelli and Glynn, 2015; Vermeulen and Raab, 2007). Traditionally, innovation studies depart from the conceptualization of innovation as primarily technological change. Even when institutional change is considered, it is usually studied in co-evolution with technological change (Dosi, 1982; Geels, 2002; Nelson and Winter, 1982; Rip and Kemp, 1998). As such, technological change is often treated as innovation, while institutional change is seen as the enabling or constraining factors in the innovation process (Coriat and Weinstein, 2002; Edquist and Johnson, 1997; Nelson, 2008; Nelson, 2020). This thesis, instead, follows a recent direction in innovation studies by studying innovations that are primarily institutional in nature (Boon et al., 2019; Fuenfschilling and Truffer, 2016; Moors et al., 2018; Pelzer et al., 2019). This type of innovation is highly dependent on finding legitimacy for their new activities (Geels and Verhees, 2011; Raffaelli and Glynn, 2015), as institutional innovation by definition goes against some of the existing institutions and therefore may face strong resistance.

The aim of thesis is twofold. First, I attempt to analyze the diffusion of institutional innovations across space and time with special emphasis on the structural heterogeneity in cities and regions (Chapter 2 and Chapter 3). Second, I aim to study how institutional innovations brought about by gatekeepers shape the selection of scientific and cultural outputs (Chapter 4 and Chapter 5). This thesis thus pays special attention to two important aspects of this legitimating process: structural heterogeneity in institutions between different (geographical) fields and the role of different legitimating actors in the institutionalization of innovations.

The spatial heterogeneity in institutions is central to the first two cases of this thesis. In Chapter 2 the aim is to identify the institutional conditions that affect the diffusion of platform companies across the globe. Specifically, this chapter studies the decisions made by platform companies to introduce their services in locations around the world. These platform services are often contested as they go against local regulations and norms (Mair and Reischauer, 2017; Uzunca et al., 2018). I make a distinction between formal and informal institutions on which platform companies can rely in their location decisions (North, 1990). I do so by studying the case of Uber and focus on their controversial service UberX, which connects unlicensed drivers to taxi passengers challenging local taxi regulations in many cities. Considering formal institutions, I find that Uber prefers locations where competition and innovations is stimulated by national regulations. Besides this, national political and labor market institutions only partially show an

influence on Uber's location decisions. Furthermore, I argue that Uber is able to follow their globally mobile user base that carries the informal institutions supporting the introduction of their service in a particular location. These traveling users can function as a 'trusted community' in the locations they visit, which shares particular codes of conduct and norms with the platform company (Li et al., 2019).

Where Chapter 2 focuses on location decisions made in the diffusion process of one particular service, Chapter 3 looks at the local market formation for an institutional innovation in general. In this chapter I analyze to what extent the regional adoption of an organizational form is influenced by regional institutional conditions. I build on the idea that firms with new organizational forms can benefit from the local presence of institutionally related firms, which can facilitate institutional structures that legitimize this new organizational form (Carvalho and Vale, 2018). This chapter focuses on the case of the founding of renewable energy (RE) cooperatives in Germany. By applying an organizational ecology model this chapter I find that the national stock of existing RE cooperatives has a legitimizing effect on subsequent foundings. I argue that if the national number of RE cooperatives increases, this also increases the cognitive legitimacy of this type of organization, as new entrants are more likely to copy this business model, instead of trying something new (Aldrich and Fiol, 1994). At the local level, the legitimation process is not so much influenced by the stock of RE cooperatives, but rather by the local presence of institutionally related organizations in different industries. I argue that this cooperative activity in different industries is indicative of increased socio-political legitimacy for the cooperative organizational form in general.

In the next chapter the focus of this thesis shifts from spatial heterogeneity to the role of gatekeepers in the legitimization process. Chapter 4 studies scientific journals as gatekeepers of scientific knowledge production. In this gatekeeping process most journals tend to publish mainstream research that is in line with dominant scientific paradigms (Kuhn, 1962). Building on the literature on novelty coming from outsiders and mavericks (Becker, 1982; Jones et al., 2016), this chapter argues that gatekeepers can also be a source of novelty. This is based on the idea that novel scientific articles that fall outside the mainstream will have more legitimacy with journals that adopt an unconventional business model themselves. Specifically, I find that non-society-owned and open access journals, which challenge the conventions of scientific publishing, are providing more opportunities for novel research to be published than conventional journals.

Chapter 5 turns to the changes in gatekeeping that can take place over time. Specifically, in this chapter I am is interested in the understudied periods of re-emergence or revival of specific markets or fields (Raffaelli, 2013; 2018). In periods of revival, gatekeepers usually tend to target different and broader audiences (Griswold, 1986). This chapter

focuses on the music industry and specifically looks at the genre of surf music, a genre that originated during the sixties and experienced a revival around the eighties and nineties. I argue that during different periods gatekeepers are selecting musical actors and products that signal different stereotypical meanings of what the genre is about. During the original period of the music genre, gatekeepers favored musical tracks that signaled a subcultural and restricted understanding of surf music, as this appealed to the insider audiences of this music. However, during the revival of the genre, gatekeepers selected more music tracks that were signaling a more narrativized idea of the music genre, which was more appealing to the mass audiences targeted during this revival. Where Chapter 4 is mostly concerned with different types of gatekeepers publishing different types of cultural artefacts, this chapter shows us how the same product can be subject to changing legitimacy standards over time.

In this concluding chapter, I reflect on the learnings from my study for institutional studies (6.2) and innovation studies (6.3). I will also go into the overarching notion of institutional innovation introduced in Chapter 1 and further elaborated below (6.4). I end with some final reflections on some of the limitations encountered throughout the research and avenues for future research (6.5).

6.2 Institutional studies

Institutional theory has a long tradition in inquiring how structures such as rules, schemas, routines and values function as guidelines for social behavior (Goffman, 1959; Scott, 2005) and organizational forms (DiMaggio and Powell, 1983). Innovation, then, has been one of the most challenging types of social behavior to explain from an institutional perspective:, when institutions and innovations meet, two seemingly contradictory forces collide, one providing stability to social systems and the other invoking change (Hargadon and Douglas, 2001; Vermeulen and Raab, 2007). This presents a conundrum: innovations both emerge from and change institutional environments. Prior institutional studies mainly addressed this question by studying how innovations require and can gain legitimacy in their institutional environments. This thesis – following a more structuralist approach – contributes to this in two important ways: by analyzing the geography of legitimization in the diffusion of institutional innovations and by unpacking the role that intermediaries can play in institutional change.

6.2.1 The geography of legitimization

Prior research in the tradition of institutional theory has acknowledged that diffusion of innovations is hampered when actors are embedded in different institutional frameworks (Rossman, 2014; Strang and Meyer, 1993) or, in terms of institutional theory, in situations

where institutional complexities arise (Greenwood et al., 2011; Smets and Jarzabkowski, 2013). In response, studies on diffusion have started to shift attention towards institutional heterogeneity by considering the microprocesses that help to account for the diffusion and legitimization of innovations (Chandler and Hwang, 2015; Hwang and Colyvas, 2011; Powell and Colyvas, 2008). These studies approach institutional complexities by emphasizing the iterative relations between institutional forces and actors, in which the latter are simultaneously agentic and embedded in local institutional structures (Chandler and Hwang, 2015; Kennedy and Fiss, 2009). Chapter 3 shows how users of innovations can play a crucial role in the diffusion and local legitimization of innovative practices, specifically by adopting practices that are institutionally related to previously adopted practices. This chapter shows that households and farmers are more likely to unite in energy cooperatives when they are located in regions where the cooperative organizational form is more common in other industries. This shows how actors are embedded in certain institutions and how their decisions to adopt new practices are influenced by the consistency with earlier locally adopted practices, something Shipilov et al. (2010) have called 'multiwave diffusion'.

Institutional complexities arising from geographically separated institutional environments have received only limited attention (Lounsbury, 2007; Meyer and Höllerer, 2016), while these are likely to play an important role in cross-regional or cross-national diffusions of innovations. One line of research that takes this international institutional complexity into account is the application of institutional theory in the scholarly study of multinational enterprises (MNEs) (Kostova and Zaheer, 1999; Kostova et al., 2008; Meyer et al., 2011). These studies argue that MNEs operate simultaneously in different geographically separated institutional environments and as such face different and even conflicting institutional pressures. The core tenet here is that with increasing distance between these different institutional environments come increased difficulties in balancing central control and adaptation to local contexts. This is very much in line with my findings on the role that economic institutions play in Uber's location decisions in Chapter 2.

Prior research further stressed that, in order to acquire legitimacy, MNEs can rely on local social agents that are both embedded in the local environment and are familiar with the MNE's activities to endorse their value in local environments (Pant and Ramachandram, 2012). Chapter 2 shows how Uber follows their global user base that is travelling *between* different geographic fields. This shows the opportunities that MNEs, and specifically platform MNEs, have to mobilize social agents that can negotiate local institutional environments and thus carry legitimacy between different locations. Walgenbach et al. (2017) have argued that while previous studies on the global diffusion of MNEs has focused on discrepancies between local formal or regulative institutional environments

"the world polity is composed of many different types of social actors, each with unique sources of legitimacy and power" (p. 109). It has been argued that under these 'post-national constellations' (Habermas, 2001) the power to legitimize behavior is shifting to business firms and civil society actors (e.g. social movements) (Scherer et al., 2013) and Chapter 2 contributes to this by emphasizing the role of individual innovation users that can play a role in the legitimization of innovations.

6.2.2 Intermediaries and institutional change

Extant literature has looked at producers or entrepreneurs as powerful instigators of institutional change, often studied as 'institutional entrepreneurs' (Jones et al., 2016; Khaire, 2017; Lounsbury and Crumley, 2007; Maguire et al., 2004). However, institutional studies have acknowledged that there is a diverse set of actors that can act as 'carriers' of institutions or legitimacy (Dacin et al., 2002; Zilber, 2002) and as such some studies have started to look at different actors involved in institutional change (Delbridge and Edwards, 2008; Greenwood et al., 2002). Besides institutional entrepreneurship, Delbridge and Edwards provided two additional roles in which other actors can influence institutional change: opportunity creation and the change of consumption. The first part of this thesis has focused on users, who can play an important role in the change of consumption. In the second part of the thesis I shift my attention to market intermediaries, which are often in the explicit roles to confer legitimacy to other actors and as such could play a role both in the creation of opportunities and in the change of consumption.

Especially in highly institutionalized markets or industries, formal legitimating or standard-setting intermediaries (e.g. consumer watchdogs, professional associations quality certifiers, critics) are limiting admittance to privileged categories, definitions or memberships (Lee et al., 2016; Trank and Washington, 2009). A specific line of institutional research that has studied the role of these intermediaries are studies on market categorization. Most research in this tradition has emphasized how legitimacy is influenced by market intermediaries in mature markets with settled institutions (Hsu, 2006; Ruef and Scott, 1998; Zuckerman, 1999). Only few studies looked at markets where the institutions are in flux (Greenwood et al., 2002; Khaire and Wadhwani, 2010; Rao et al., 2003) and these studies claim that intermediaries are especially important in legitimizing institutional changes in markets because their assessments of innovations in these markets are usually independent from how well these innovations fare (Khaire, 2017). However, these intermediaries' explicit roles and activities in creation and change of institutions remain understudied (Foster et al., 2011; Khaire, 2017).

In this thesis I studied gatekeepers, a special type of intermediary as they are directly involved in evaluating outputs and promoting specific products to the audiences and often have immediate economic stakes in the sales of these products (Foster et al.,

2011; Janssen and Verboord, 2015; Khaire, 2017). Previous literature has argued that intermediaries are reorienting and constructing institutions in new or changing markets especially because they are independent from the producers of innovations (Khaire, 2017; Saunders and Fine, 2008). In this thesis I contribute to this literature by arguing how gatekeepers are actually involved in institutional change because of their stakes in the innovations.

Chapter 4 finds that gatekeepers can actually change institutions by introducing a commercial logic into field where other institutional logics are dominant. Gatekeepers are often presented as a homogenous group of intermediaries with a central position within their fields and who are not very susceptible to change in order to reduce risk (Foster et al., 2011; Hirsch, 1972; 2000; Hsu, 2006) and this thesis tries to address gatekeepers in a more heterogenous fashion. Chapter 4 shows how different type of scientific journals, who act as gatekeepers in the field of science (Crane, 1967), can organize their gatekeeping around different institutional logics. Gatekeepers that break with conventions in scientific publishing show to be more susceptible to scientific novelty as well. The heterogeneity in gatekeeping is also found in Chapter 5 in the evolving boundary work of gatekeepers over time. This chapter shows how gatekeepers are changing institutions through a commercial logic, by adjusting their boundary work to what is sensible for their shifting audiences. I especially show how gatekeepers use new institutional frames to revitalize a market for different audiences during a markets revival. Here, the thesis also contributes to a rich tradition in institutional theory and organizational ecology that focuses on the emergence of new fields and organizational forms, by studying the process of re-emergence that has received only scant attention in these literatures. (Raffaelli, 2013; 2018). Another way in which this thesis contributes to the study of heterogeneity among intermediaries' is by highlighting differences among different gatekeepers.

6.3 Innovation studies

As this thesis is positioned at the interface between innovation studies and institutional studies, it also makes contributions to the field of innovations studies. Here, the thesis mostly contributes to literature on the legitimization processes of innovations, by emphasizing the distributed nature of this process, in particular by studying a wider public of consumers (Geels and Verhees, 2011) and the role of intermediaries, or more specifically gatekeepers, in mediated markets (Binz et al., 2016a). In situations where innovations are contested by (local) institutional environments, different actors play important roles in the legitimization process. This is especially the case for innovations that are highly institutional in nature. These innovations often face strong resistance

from regulators or incumbents, and as such often lack a form of regulatory or normative legitimacy.

One way of gaining legitimacy for these innovations is through technological exaptation, the process of using an existing technology for a new phenomenon or need (Andriani and Cattani, 2016). Since innovations are then institutionally new but technologically known they can already count on higher levels of pragmatic and cognitive legitimacy, as they build on existing technology. In the case of UberX, for example, the technology behind peer-to-peer sharing already existed in other markets such as file-sharing. As such, consumers could be easily educated and subsequently played an important role in the legitimization of Uber's services as they recognize the usefulness of applying this technology to the problems in the taxi market (Pelzer et al., 2019). When new institutional structures are applied to existing technologies, gatekeepers can also have a crucial role in developing institutional frameworks in which innovations are looking for legitimacy (Hsu, 2006; Janssen and Verboord, 2015). This is especially the case for mediated markets where the direct usefulness to audiences is limited and producer-consumer interactions are mediated by an audience of critics or intermediaries (Zuckerman, 1999). In that respect, the chapter on surf music shows a more extreme case of exaptation, where the same product is used to revive or reinvent a field for a new audience.

However, another way in which these institutional innovations can gain legitimacy is through transposition of institutions. Here, innovation takes place by transposing existing institutions from a domain where it is already institutionalized into a new domain (Boxenbaum and Battilana, 2005; Powell et al., 2012). In the case of energy cooperatives, the innovation is built on both pre-existing energy technologies and pre-existing organizational structures. In this case the implementation of existing technologies under more ideologically driven business models can rely on the legitimacy created by like-minded actors, as these already influenced the structures of the institutional environment.

This thesis explored both the implementation of pre-existing technologies and pre-existing institutions in the innovation process, especially by studying the actors that define the institutional environment for these innovations. This has been shown to depend on the configurations of technological and institutional novelty that make up an innovation. Future research could explore the common grounds between innovation studies and institutional studies to study how innovations balance between pre-existing technologies (i.e. the literature on technological exaptation) and pre-existing institutions (i.e. the literature on the transposition of institutions).

6.4 Institutional innovation

As a more overarching contribution of this thesis, I attempted to advance the study of institutional innovation, a concept that is rarely discussed and even more rarely distinguished from the broader concepts of institutional change on the one hand and innovation on the other hand. Two studies by Hargrave and van de Ven (2006) and Raffaelli and Glynn (2015) have played an important role in the conceptualization of institutional innovation. Hargrave and van de Ven (2006, p. 866) have defined institutional innovation as "institutional change as a difference in form, quality, or state over time in an institution". Raffaelli and Glynn (2015) have added to this that institutional innovations refer to legitimate changes that disrupt cognitive, normative and regulative institutions in an organizational field. In this thesis I approached institutional innovation as the establishment of new configurations of institutions that create opportunities for existing or hardly new technologies or practices.

The thesis addresses four cases, where the successful introduction of a new business model or organizational practice was accompanied by institutional innovation that challenged the status quo in the organizational field. Hence, the radicalness of the innovation process in these cases did not lie so much in the business model (platform, cooperative, open access or new ownership structures, changing boundary work) as such nor the underlying artefacts (taxi app, renewable energy, digital papers, records), but in the changes to the established institutions. While many of my cases include business models that are new to the industry, I consider institutional innovation to be the institutional changes that result from these new business models. This is in line with literature on business model innovation where the changes take place on the level of the organization (even when the changes are new to the industry as well) (Foss and Saebi, 2016), while institutional innovation involves change on a higher level (i.e. the market, industry or field). Thus, institutional innovations can also involve changes in organizational practices (see Chapter 5), governance structures (see Chapter 3 and 4) or even new products (see Raffaelli and Glynn's (2015) example on the iPod), that are accompanied by changes in existing institutions.

As such, I argue that institutional innovations introduce new ways of configuring new or existing technologies or practices with their social environment (e.g. Uber's introduction of algorithmic matching in the taxi industry, the rise of energy cooperatives adopting renewable energy technologies, open access journals' exploitation of digital publishing technologies and compilation album producers using existing records in new ways to market a genre with new audiences), distinguishing it from the broader concept of institutional change. Furthermore, institutional innovation goes beyond the process of institutional change as a result of (technological) innovation, but focuses

on the institutional change as being the innovation itself, which impacts not only the actors involved but also the field as a whole. By studying four cases where the nature of innovation is predominantly institutional, this thesis specifically responds to calls from scholars in institutional theory for a better conceptualization of the diffusion of institutional innovations and the evaluations of institutional innovations by different audiences (Raffaelli and Glynn, 2015).

While the contributions to institutional studies might be more obvious, the conceptualization of institutional innovation as new configurations between existing technologies or practices with social environments could also be taken up by innovations scholars. While innovation studies has started to adopt the idea of institutional entrepreneurship (Hoogstraaten et al., 2020), this concept represents cases of 'hyper-muscular, heroic entrepreneurs' or social movements that are striving for normative changes in institutional structures (Garud and Karnøe, 2003; Raffaelli and Glynn, 2015; Van Wijk et al., 2013). The more structural conceptualization of institutional innovation used in this thesis is compatible with general notions of innovation and conceptualizations of innovations as socio-technical configurations (Rip and Kemp, 1998), and might be worth exploring in more detail in the context of more traditional innovations studies.

While the concept of institutional innovation is studied in each of the four empirical chapter in the thesis, it remains somewhat underdeveloped in the individual chapters, as I chose to embed each of the chapter in more specific literatures. Future studies can be more explicit in studying the unique characteristics of institutional innovation in the legitimization, diffusion and evaluation processes I discuss. Furthermore, this thesis mostly focuses on the early stages of an institutional innovation – i.e. diffusion and emergence – and as such the processes of institutionalization and maturation of the innovation mostly fall out of the scope of this thesis. I treat institutional innovation as the introduction of a new institution or a new set of coherent institutions, but it is beyond the scope of this thesis to study variation over place and time in this new institutions. As such, I agree with Raffaelli and Glynn (2015) in that future research should advance our understanding of the temporal conditions of institutional innovations. Finally, future research could study institutional innovations and technological innovation in a more comparative nature, to study the where the two processes differ or where they meet.

6.5 Limitations

Throughout the thesis, I already pointed to some limitations encountered in each of the specific empirical studies. In addition, I identified two overall limitations in my studies on institutional innovation as collected in this thesis. First, while the thesis answers

to calls for inclusion of different legitimating actors in the innovation process (Binz et al., 2016a; Kaplan and Tripsas, 2008), I did not analyze the interaction between these different legitimating audiences. This in part reflects the structuralist approach of the thesis in which agency is central theoretically but not empirically, resorting to analyses at aggregate levels. Future research could zoom in on the actors discussed in this thesis (e.g. global users or unconventional gatekeepers) and discuss their interactions with other actors within the institutional environment. One approach that might prove fruitful here, and that could have been utilized more in this thesis, is through the theory of institutional logics (Thornton and Ocasio, 1999). While Chapter 4 shortly discusses how different actors in a field base their evaluation on different institutional logics, future research could study how the institutional environment of innovations consists of different actors that adhere to differing institutional logics and how these actors and logics interact.

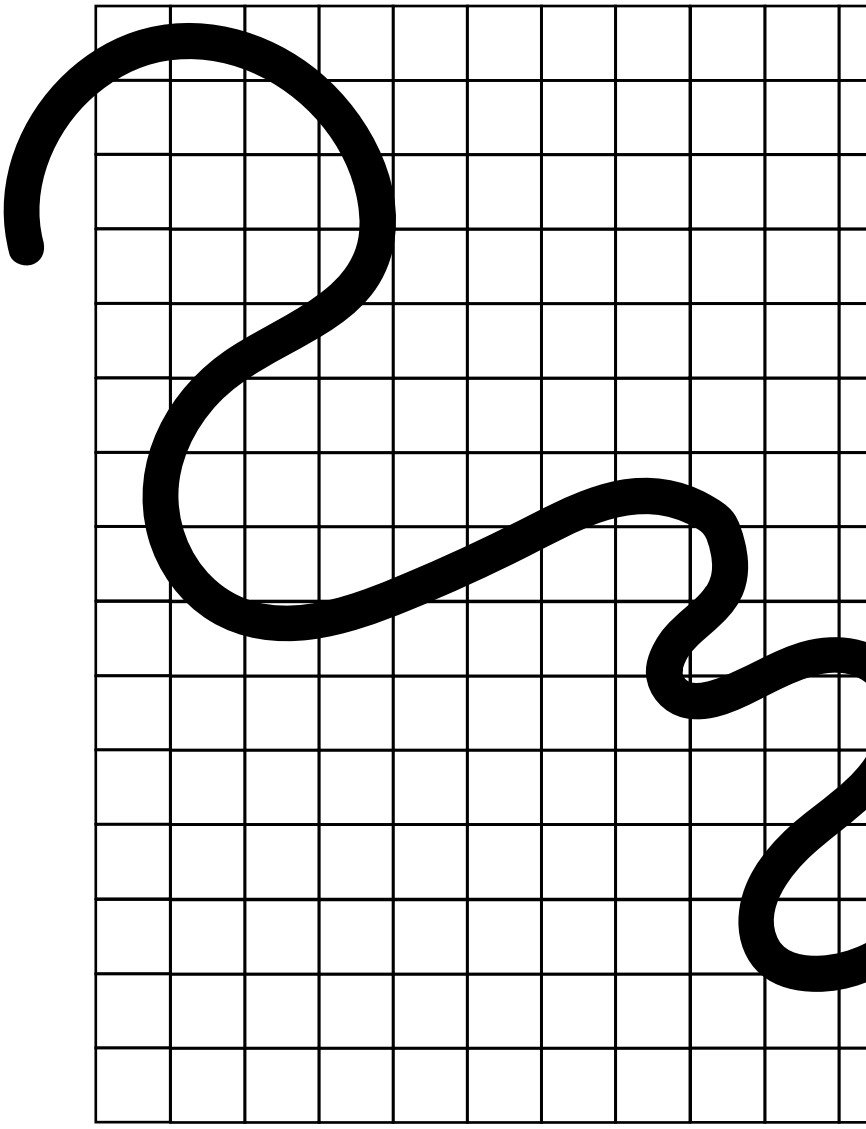
A second limitation relates to my analysis of diffusion as a process of distributed agency (Geels, 2004; Vargo et al., 2020), where I added a geographical dimension by showing how global actors within an organizational field can span different geographical fields, carrying legitimacy for an innovation from one geographical field to another. These kinds of mechanisms might make the legitimation process of innovations less dependent on the local institutional environment, but also complicates innovation's institutional environments as it exposes innovations to the simultaneous influence of local and global institutional pressures (Scherer et al., 2013). However, there is a shortcoming in the way diffusion is studied in this thesis, which is that it does not really separate the process of diffusion from the process of institutionalization (Colyvas and Jonsson, 2011). Ideally, the two processes are analyzed as separate, as in principle an innovation may diffuse without becoming institutionalized and, reversely, an innovation may get institutionalized but largely fail to diffuse. While the thesis acknowledges and studies to some extent institutional change required in the diffusion of innovations (Vargo et al., 2020), it was beyond the scope of this thesis to analyze whether these innovations also became institutionalized on the long run, or in other words how innovations "stick" in the locations where they have "spread" (Colyvas and Jonsson, 2011). An interesting angle for future research would be to study whether innovations that require institutional change in their diffusion are also more or less easily institutionalized once they have diffused to a certain location. This also raises the question how the two processes of diffusion and institutionalization take place iteratively and simultaneously over time.

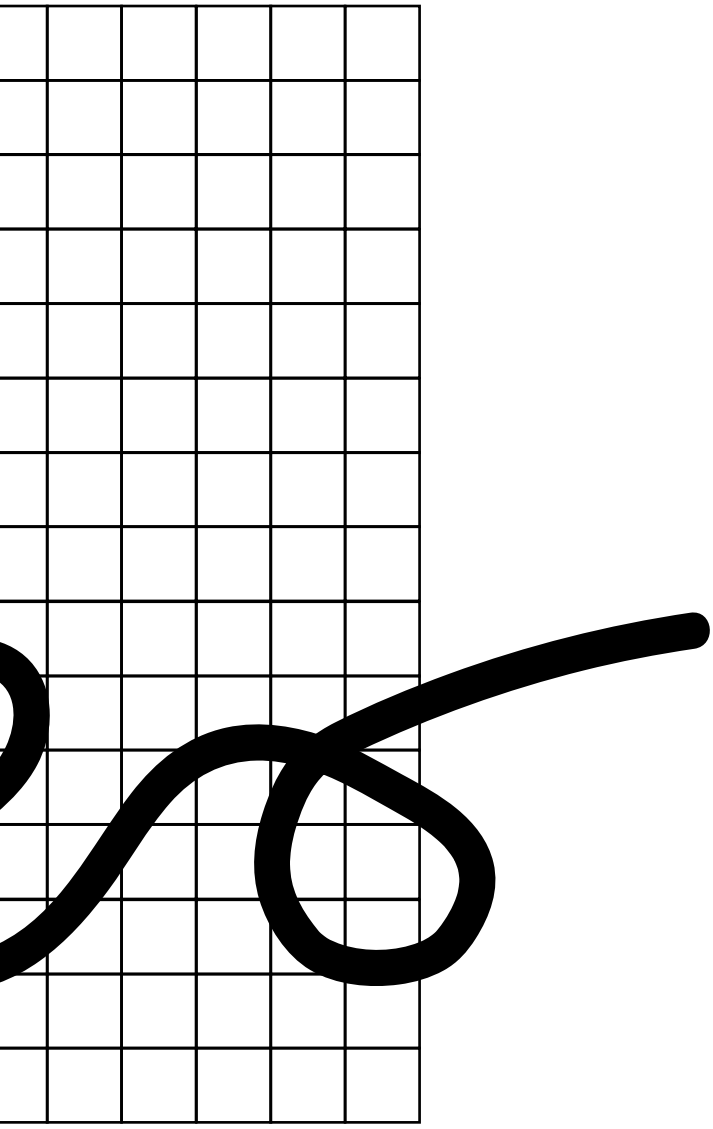
A final overall limitation concerns the way I looked at institutional innovation. My empirical work mostly tends towards an analysis of institutional innovation as immaterial. As a result, the thesis pays limited attention to the material aspects of the innovation. This provides room for future research to add to our understanding of the material side of institutional innovations. While this type of innovations by definition has only

marginal material impacts, future research should not only focus on the materiality of the innovations, but also the material consequences of institutions and institutional change (Jones et al., 2013). In the case of UberX, for example, some regulators resisted Uber's app-based service, as alternative public information systems were already in place to ensure consumer safety (Pelzer et al., 2019). And, in the case of the diffusion of renewable energy, the success of the cooperative form may also depend on the material embedding of the renewable energy technology at hand (Gailing and Röhring, 2016). While the field of innovation studies has a long tradition in studying how technological innovation prompts institutional changes, an interesting follow-up question would be to what extent the fate of institutional innovations depends on material contexts and accommodating technological changes.

In sum, this thesis explored the complementarity of institutional studies and innovation studies (Vermeulen and Raab, 2007). I believe that for future research an institutional perspective can provide new insights on traditional questions in innovation studies, on topics such as diffusion and legitimation. This might prove especially fruitful in order to get a better understanding of innovations that are primarily of an institutional nature, found in recent trends, for instance, in the platform economy or open access publishing. The other way around, institutional studies could benefit from an understanding of innovation as socio-technical configurations, to address the importance of technology or materiality in processes of institutional change and innovation.

APPENDICES





Appendices to Chapter 2

Appendix A2.1 Descriptive statistics of the number of cities with UberX per country

Country	n	UberX introductions							
		Total	%	2012	2013	2014	2015	2016	2017*
North America	*575*	*243*	*42.3*	*3*	*20*	*122*	*64*	*33*	*1*
Canada	53	17	32.1	0	0	6	10	1	0
Costa Rica	1	1	100.0	0	0	0	1	0	0
Dominican Republic	13	2	15.4	0	0	0	1	1	0
Guatemala	8	1	12.5	0	0	0	0	1	0
Mexico	138	28	20.3	0	0	2	6	20	0
Panama	2	1	50.0	0	0	0	1	0	0
Puerto Rico	4	4	100.0	0	0	0	0	4	0
United States	297	189	63.6	3	20	114	45	6	1
Other	59	0	0.0	0	0	0	0	0	0
Europe	*893*	*119*	*13.3*	*0*	*2*	*37*	*38*	*39*	*3*
Austria	5	1	20.0	0	0	1	0	0	0
Belarus	17	1	5.9	0	0	0	0	1	0
Belgium	7	1	14.3	0	0	1	0	0	0
Bulgaria	7	1	14.3	0	0	1	0	0	0
Croatia	3	2	66.7	0	0	0	1	1	0
Czech Republic	5	3	60.0	0	0	1	0	1	1
Denmark	4	1	25.0	0	0	0	0	1	0
Estonia	2	1	50.0	0	0	0	1	0	0
France	40	9	22.5	0	1	5	3	0	0
Germany	95	5	5.3	0	0	5	0	0	0
Greece	8	1	12.5	0	0	0	1	0	0
Hungary	9	1	11.1	0	0	1	0	0	0
Ireland	3	1	33.3	0	0	1	0	0	0
Italy	33	5	15.2	0	0	5	0	0	0
Lithuania	5	1	20.0	0	0	0	1	0	0
Netherlands	23	4	17.4	0	0	1	2	0	1
Norway	4	1	25.0	0	0	0	0	1	0
Poland	47	20	42.6	0	0	1	5	14	0
Portugal	8	2	25.0	0	0	2	0	0	0
Romania	24	4	16.7	0	0	0	1	3	0
Russia	213	16	7.5	0	0	2	5	9	0
Slovakia	2	1	50.0	0	0	0	1	0	0
Spain	89	3	3.4	0	0	3	0	0	0
Sweden	6	3	50.0	0	0	1	1	1	0
Switzerland	5	4	80.0	0	0	3	1	0	0
Turkey	79	1	1.3	0	0	1	0	0	0

Continue

Continued

Country	n	UberX introductions							
		Total	%	2012	2013	2014	2015	2016	2017*
Ukraine	47	2	4.3	0	0	0	0	1	1
United Kingdom	70	24	34.3	0	1	2	15	6	1
Other	33	0	0.0	0	0	0	0	0	0
Asia	*1,842*	*106*	*5.8*	*0*	*0*	*32*	*44*	*26*	*4*
Azerbaijan	4	1	25.0	0	0	0	1	0	0
Bahrain	1	1	100.0	0	0	0	1	0	0
Bangladesh	31	1	3.2	0	0	0	0	1	0
China	416	29	7.0	0	0	7	13	9	0
India	428	28	6.5	0	0	10	15	3	0
Indonesia	134	4	3.0	0	0	0	2	2	0
Japan	203	2	1.0	0	0	1	1	0	0
Jordan	6	1	16.7	0	0	0	1	0	0
Kazakhstan	24	3	12.5	0	0	0	0	2	1
Lebanon	6	1	16.7	0	0	1	0	0	0
Malaysia	37	10	27.0	0	0	2	3	4	1
Myanmar	21	1	4.8	0	0	0	0	0	1
Pakistan	65	2	3.1	0	0	0	0	2	0
Philippines	85	3	3.5	0	0	1	1	0	1
Qatar	2	1	50.0	0	0	0	0	1	0
Saudi Arabia	25	6	24.0	0	0	2	4	0	0
Singapore	1	1	100.0	0	0	1	0	0	0
South-Korea	45	1	2.2	0	0	1	0	0	0
Sri Lanka	12	1	8.3	0	0	0	1	0	0
Taiwan	12	3	25.0	0	0	1	1	1	0
Thailand	20	2	10.0	0	0	1	0	1	0
United Arab Emirates	6	2	33.3	0	0	2	0	0	0
Vietnam	34	2	5.9	0	0	2	0	0	0
Other	224	0	0.0	0	0	0	0	0	0f
Africa	*495*	*15*	*3.0*	*0*	*0*	*7*	*4*	*4*	*0*
Egypt	37	1	2.7	0	0	1	0	0	0
Ghana	11	1	9.1	0	0	0	0	1	0
Kenya	7	2	28.6	0	0	0	1	1	0
Morocco	24	1	4.2	0	0	0	1	0	0
Nigeria	86	2	2.3	0	0	1	0	1	0
South Africa	52	6	11.5	0	0	5	1	0	0
Tanzania	16	1	6.3	0	0	0	0	1	0
Uganda	3	1	33.3	0	0	0	1	0	0

Continue

Continued

Country	n	UberX introductions							
		Total	%	2012	2013	2014	2015	2016	2017*
Other	259	0	0.0	0	0	0	0	0	0
South America	*427*	*75*	*17.6*	*0*	*0*	*3*	*12*	*48*	*12*
Argentina	32	1	3.1	0	0	0	0	1	0
Bolivia	7	1	14.3	0	0	0	0	1	0
Brazil	228	43	18.9	0	0	1	5	30	7
Chile	27	8	29.6	0	0	0	1	2	5
Colombia	40	19	47.5	0	0	1	5	13	0
Peru	22	2	9.1	0	0	1	0	1	0
Uruguay	1	1	100.0	0	0	0	1	0	0
Other	70	0	0.0	0	0	0	0	0	0
Oceania	*30*	*16*	*55.2*	*0*	*0*	*9*	*1*	*4*	*2*
Australia	19	13	68.4	0	0	7	1	3	2
New Zealand	10	3	30.0	0	0	2	0	1	0
Other	1	0	0.0	0	0	0	0	0	0
	4,262	574	13.5	3	22	210	163	154	22

*only includes introductions from the first two months

Appendices to Chapter 3

Table A3.1 Logistic regression models of renewable energy cooperative founding separated by renewable energy type including robustness test with district dummies

Variable	Solar	Wind	Bio
Population density	-0.398	-0.467	-1.074 ***
	(0.186)	(0.248)	(0.198)
GDP per capita	0.046	-0.160	0.048
	(0.087)	(0.094)	(0.058)
National energy price	1.943 ***	-0.006	0.033
	(0.169)	(0.053)	(0.061)
Solar irradiance	-3.457 ***		
	(0.903)		
Windspeed		-0.978 ***	
		(0.157)	
Votes for Green Party	0.605 ***	0.033	-0.029
	(0.013)	(0.020)	(0.020)
Focal RE local density	-1.616 ***	-2.311 ***	-2.211 ***
	(0.127)	(0.729)	(0.352)
(Focal RE local density^2)/100	1.322	2.681	2.338
	(1.459)	(0.908)	(0.814)
Other RE local density	-0.092	0.053	0.183
	(0.095)	(0.106)	(0.112)
(Other RE local density^2)/100	0.930	-1.978 *	-1.259
	(0.976)	(0.822)	(0.975)
Focal RE national density	0.021 ***	0.158 ***	0.063 ***
	(0.001)	(0.034)	(0.011)
(Focal RE national density^2)/100	-0.003 ***	-0.132 ***	-0.033 ***
	(0.0003)	(0.029)	(0.006)
Local cooperatives foundations	0.724 ***	0.430 ***	0.540 ***
	(0.057)	(0.080)	(0.073)
Local cooperative banks density	0.197 ***	0.113	-0.068
	(0.031)	(0.037)	(0.040)
Policy period 2012-2014	-0.038	0.377	0.291
	(0.189)	(0.551)	(0.362)
Policy period post 2014	-0.327	-3.723 ***	-0.741
	(0.373)	(0.470)	(0.709)
Intercept	-39.808 ***	-7.804 ***	-8.195 ***
	(3.344)	(1.044)	(1.070)
District dummy	YES	YES	YES
Log-likelihood	-1583.1 ***	-253.4	-494.1

Standard errors in parentheses are robust standard errors clustered by quarter and NUTS3 region. N= 17,644; ***p ≤ 0.001, **p ≤ 0.01, *p ≤ 0.05

Appendices to Chapter 4

Table A4.1 Descriptive statistics and correlations

	Variable	Mean	SD	Pearson Correlations														
				(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(16)	Agricultural and Biological Sciences	0.06	0.24	0.01	0.08	-0.05	-0.02	-0.04	-0.02	-0.02	-0.02	0.16	0.03	-0.04	0.01	0.02	0.00	0.05
(17)	Biochemistry, Genetics and Molecular Biology	0.32	0.47	0.32	0.01	-0.08	-0.06	-0.02	-0.04	0.02	-0.06	0.38	0.09	-0.02	0.01	-0.06	0.03	0.03
(18)	Chemical Engineering	0.03	0.17	0.15	-0.06	0.03	0.03	-0.02	0.03	0.01	-0.04	0.26	0.02	-0.03	-0.01	-0.04	0.10	-0.03
(19)	Chemistry	0.02	0.14	0.08	-0.01	0.01	-0.01	-0.01	0.04	-0.02	0.04	0.18	0.02	0.04	-0.04	-0.03	0.03	-0.02
(20)	Computer Science	0.02	0.16	0.10	0.07	0.00	-0.02	0.02	-0.01	-0.06	-0.06	0.17	0.02	-0.05	0.00	0.05	0.02	0.02
(21)	Engineering	0.05	0.22	0.12	-0.07	0.04	0.02	0.07	-0.03	0.00	0.01	0.21	0.03	-0.01	-0.07	0.01	0.13	-0.04
(22)	Environmental Science	0.03	0.16	-0.06	0.04	-0.02	-0.05	0.00	0.01	-0.06	0.00	0.19	0.02	-0.03	-0.04	0.05	0.06	0.02
(23)	Immunology and Microbiology	0.09	0.29	0.10	0.02	-0.09	-0.06	-0.02	-0.05	0.04	-0.01	0.16	0.04	0.03	-0.03	-0.07	0.00	0.08
(24)	Materials Science	0.03	0.17	0.15	-0.04	0.03	0.06	0.01	-0.02	-0.04	0.05	0.25	0.02	0.03	-0.06	-0.04	0.07	-0.03
(25)	Mathematics	0.02	0.13	0.03	0.11	-0.01	-0.04	0.06	-0.05	-0.01	0.00	0.21	0.02	0.02	-0.03	-0.03	0.01	0.04
(26)	Medicine	0.74	0.44	-0.16	0.00	0.07	-0.02	0.06	0.04	-0.03	0.08	-0.04	-0.08	0.06	-0.02	0.03	-0.08	0.00
(27)	Neuroscience	0.09	0.29	-0.04	0.04	0.02	-0.03	0.05	-0.01	-0.03	0.06	0.09	-0.03	0.02	-0.02	-0.02	0.02	0.00
(28)	Nursing	0.04	0.19	-0.12	-0.03	0.08	-0.01	0.10	0.01	-0.05	0.08	0.13	-0.03	0.09	-0.07	0.06	-0.04	-0.04
(29)	Pharmacology, Toxicology and Pharmaceutics	0.10	0.31	0.11	-0.09	-0.17	-0.11	-0.09	-0.05	0.12	-0.07	0.17	0.04	-0.10	0.18	-0.01	-0.09	-0.03
(30)	Psychology	0.02	0.14	-0.11	-0.04	0.06	0.06	-0.04	0.09	-0.05	-0.03	0.08	-0.13	-0.01	-0.05	0.06	0.06	-0.03
(31)	Social Sciences	0.04	0.19	0.02	0.02	0.00	-0.04	0.02	0.01	-0.07	-0.05	0.18	-0.03	-0.05	-0.02	0.06	0.07	-0.04
(32)	Health Professions	0.02	0.14	-0.07	-0.01	0.00	-0.01	0.04	-0.03	-0.05	0.06	0.10	0.02	0.03	-0.01	0.06	-0.06	-0.03
(33)	Other	0.04	0.20	-0.05	0.05	0.03	0.01	0.05	-0.02	-0.01	-0.03	0.07	0.03	-0.03	-0.02	0.08	0.04	-0.04

Table A4.1 *continued*

Variable	Pearson Correlations																
	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)
(16) Agricultural and Biological Sciences	1.00																
(17) Biochemistry, Genetics and Molecular Biology	0.05	1.00															
(18) Chemical Engineering	-0.05	0.10	1.00														
(19) Chemistry	0.00	0.14	0.15	1.00													
(20) Computer Science	0.10	0.10	0.02	-0.02	1.00												
(21) Engineering	-0.03	0.03	0.40	0.01	0.00	1.00											
(22) Environmental Science	0.17	-0.04	-0.03	0.10	0.03	0.00	1.00										
(23) Immunology and Microbiology	0.07	0.03	0.05	-0.04	-0.02	-0.07	-0.02	1.00									
(24) Materials Science	-0.05	0.05	0.48	0.15	-0.03	0.63	-0.03	-0.06	1.00								
(25) Mathematics	0.10	0.10	-0.02	-0.02	0.33	0.02	0.05	0.03	-0.02	1.00							
(26) Medicine	-0.24	-0.35	-0.13	-0.12	-0.17	-0.12	-0.04	-0.07	-0.15	-0.14	1.00						
(27) Neuroscience	-0.04	-0.03	-0.03	-0.04	0.04	-0.05	-0.02	0.01	-0.06	0.00	-0.08	1.00					
(28) Nursing	0.01	-0.12	-0.04	-0.03	-0.03	-0.05	0.01	-0.04	-0.04	0.03	0.07	-0.04	1.00				
(29) Pharmacology, Toxicology and Pharmaceutics	-0.02	0.09	0.02	0.08	0.00	0.00	0.08	-0.02	0.02	-0.04	-0.10	-0.06	-0.07	1.00			
(30) Psychology	-0.04	-0.08	-0.03	-0.02	0.04	-0.03	-0.02	-0.05	-0.03	-0.02	-0.05	0.19	0.02	-0.05	1.00		
(31) Social Sciences	0.01	-0.08	0.01	-0.03	0.15	0.02	0.19	-0.06	0.01	0.09	-0.01	-0.01	0.11	-0.07	0.07	1.00	
(32) Health Professions	-0.04	-0.06	-0.03	0.05	-0.02	0.10	0.04	-0.05	0.03	0.06	0.04	-0.01	0.07	0.01	-0.02	0.07	1.00
(33) Other	0.03	-0.06	0.08	0.12	0.01	0.05	0.01	-0.07	0.04	0.03	-0.18	-0.07	-0.01	-0.05	-0.03	0.06	0.07

Table A4.2 Coefficients for Scopus disciplines in the negative binomial regression models

	Model 2	Model 3	Model 4	Model 5	Model 6
Agricultural and Biological Sciences	-0.059	-0.091	-0.052	-0.082	-0.087
	(0.136)	(0.135)	(0.135)	(0.134)	(0.134)
Biochemistry, Genetics and Molecular Biology	0.548 ***	0.517 ***	0.530 ***	0.504 ***	0.502 ***
	(0.085)	(0.084)	(0.084)	(0.084)	(0.084)
Chemical Engineering	0.228	0.212	0.208	0.198	0.193
	(0.205)	(0.202)	(0.203)	(0.201)	(0.201)
Chemistry	0.398	0.378	0.396	0.375	0.366
	(0.236)	(0.234)	(0.234)	(0.232)	(0.232)
Computer Science	0.403	0.355	0.459 *	0.402 *	0.422 *
	(0.207)	(0.205)	(0.205)	(0.203)	(0.203)
Engineering	0.262	0.282	0.246	0.267	0.274
	(0.185)	(0.183)	(0.184)	(0.182)	(0.183)
Environmental Science	-0.358	-0.376	-0.424 *	-0.431 *	-0.434 *
	(0.209)	(0.206)	(0.208)	(0.206)	(0.205)
Immunology and Microbiology	0.363 ***	0.335 **	0.320 **	0.304 **	0.307 **
	(0.110)	(0.109)	(0.110)	(0.109)	(0.109)
Materials Science	0.199	0.199	0.167	0.172	0.191
	(0.242)	(0.239)	(0.241)	(0.238)	(0.239)
Mathematics	-0.296	-0.415	-0.328	-0.420	-0.438
	(0.259)	(0.258)	(0.256)	(0.256)	(0.256)
Medicine	-0.065	-0.085	-0.056	-0.073	-0.086
	(0.087)	(0.086)	(0.087)	(0.086)	(0.086)
Neuroscience	-0.024	-0.088	-0.037	-0.090	-0.084
	(0.112)	(0.112)	(0.112)	(0.111)	(0.111)
Nursing	-0.498 **	-0.494 **	-0.465 **	-0.466 **	-0.471 **
	(0.176)	(0.175)	(0.175)	(0.174)	(0.174)
Pharmacology, Toxicology and Pharmaceutics	0.140	0.152	0.124	0.138	0.123
	(0.111)	(0.110)	(0.110)	(0.109)	(0.109)
Psychology	-1.005 ***	-0.978 ***	-1.019 ***	-0.990 ***	-1.017 ***
	(0.263)	(0.262)	(0.262)	(0.261)	(0.263)
Social Sciences	0.458 **	0.454 **	0.401 *	0.408 *	0.399 *
	(0.172)	(0.170)	(0.171)	(0.170)	(0.170)
Health Professions	-0.590 *	-0.545 *	-0.576 *	-0.538 *	-0.541 *
	(0.242)	(0.240)	(0.240)	(0.238)	(0.238)
Other	-0.355 *	-0.364 *	-0.354 *	-0.361 *	-0.365 *
	(0.165)	(0.163)	(0.164)	(0.162)	(0.162)

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Summary

Innovation studies have generally accepted that innovations and their institutional environment are co-evolving and that institutional change is necessary for technological change to take place. However, these studies do not account for innovations where institutional change is central to the innovation and technological novelties do not play a role *per se,* as found in recent developments such as the platform economy or open access publishing. In this thesis I start from this idea of institutional innovation, which I define as innovation that introduces new ways of configuring existing technologies and the social environment. To study institutional innovation, this thesis takes a more structural approach that is compatible with general notions of innovation and conceptualizations of innovations as socio-technical configurations. It does so in two important ways. First, I analyze the diffusion of institutional innovations across space and time highlighting the structural heterogeneity in institutions across geographically separated locations. Second, I study how institutional innovations brought about by gatekeepers shape the selection of scientific and cultural outputs.

The spatial heterogeneity in institutions is central to the first two cases of this thesis. In Chapter 2 the aim is to identify institutional conditions that affect the diffusion of platform companies across the globe. Specifically, this chapter studies the decisions made by platform companies to introduce their services in locations around the world. The institutional innovation here is found in institutions that connect supply and demand in new ways through platforms in different markets. In this chapter I make a distinction between formal and informal institutions on which platform companies can rely in their location decisions. I study the case of Uber and specifically study in which cities they introduced their controversial service UberX, which connects unlicensed drivers to taxi passengers challenging local taxi regulations in many cities. Considering formal institutions, I find that Uber prefers locations where competition and innovations is stimulated by national regulations. Besides this, national political and labor market institutions only partially show an influence on Uber's location decisions. Furthermore, I argue that Uber is able to follow their globally mobile user base that carries the informal institutions supporting the introduction of their service in a particular location. These traveling users can function as a 'trusted community' in the locations they visit, because they share particular codes of conduct and norms with the platform company.

While Chapter 2 focuses on location decisions made in the diffusion process of one particular service, Chapter 3 looks at the local market formation for an institutional innovation in general. In this chapter I analyze to what extent the regional adoption of an organizational form is influenced by regional institutional conditions. I build on the

idea that firms with new organizational forms can benefit from the local presence of institutionally related firms, which can facilitate institutional structures that legitimize this new organizational form. This chapter focuses on the case of the founding of renewable energy (RE) cooperatives in Germany. By applying an organizational ecology model I find that the national stock of exiting RE cooperatives has a legitimizing effect on subsequent foundings. I argue that if the national number of RE cooperatives increases, this also increases the cognitive legitimacy of this type of organization, as new entrants are more likely to copy this business model, instead of trying something new. At the local level, the legitimation process is not so much influenced by the stock of RE cooperatives, but rather by the local presence of institutionally related organizations in different industries. I argue that this cooperative activity in different industries is indicative of increased socio-political legitimacy for the cooperative organizational form in general.

In the next chapter the focus of this thesis shifts from spatial heterogeneity to the role of gatekeepers in the legitimization process. Chapter 4 studies scientific journals as gatekeepers of scientific knowledge production. In this gatekeeping process most journals tend to publish mainstream research that is in line with dominant scientific paradigms. Building on the literature on novelty coming from outsiders, this chapter argues that gatekeepers can also be a source of novelty. This is based on the idea that novel scientific articles that fall outside the mainstream will have more legitimacy with journals that adopt an unconventional business model themselves. Here, the institutional innovation is found in new ways of gatekeeping and new institutional logics that come with changes in scientific journal ownership and open access policies. I find that non-society-owned and open access journals, which challenge the conventions of scientific publishing, are providing more opportunities for novel research to be published than conventional journals.

Chapter 5 turns to the changes in gatekeeping that can take place over time. Specifically, in this chapter I am interested in the understudied periods of re-emergence or revival of specific markets or fields. In periods of revival, gatekeepers usually tend to target different and broader audiences. This chapter focuses on the music industry and specifically looks at the genre of surf music, a genre that originated during the sixties and experienced a revival around the eighties and nineties. As such, this chapter studies a music genre as an institution and the intuitional innovation is found in changes in the boundary work and categorization by gatekeepers of this genre. I argue that during different periods gatekeepers are selecting musical actors and products that signal different stereotypical meanings of what the genre is about. During the original period of the music genre, gatekeepers favored musical tracks that signaled a subcultural and restricted understanding of surf music, as this appealed to the insider audiences of this music. However, during the revival of the genre, gatekeepers selected more music tracks that

were signaling a more narrativized idea of the music genre, which was more appealing to the mass audiences targeted during this revival. Where Chapter 4 is mostly concerned with different types of gatekeepers publishing different types of cultural artefacts, this chapter shows us how the same product can be subject to changing legitimacy standards over time.

In the concluding Chapter 6, I reflect on the learnings from my study for institutional studies and innovation studies. For institutional studies I discuss how my study mostly adds to our understanding of the geography of legitimization and to literature on intermediaries and institutional change. I then discuss how the thesis contributes to innovation studies by exploring both the implementation of pre-existing technologies and pre-existing institutions in the innovation process. In this final chapter I also devote a paragraph to the overarching notion of institutional innovation as introduced in the first chapter. I end with some reflections on some of the limitations encountered throughout the research and avenues for future research.

Nederlandse samenvatting

Innovatiestudies nemen over het algemeen aan dat innovaties co-evolueren met hun institutionele omgeving en dat technologische verandering ook institutionele verandering vereist. Echter, deze studies houden geen rekening met innovaties waar de institutionele verandering centraal staat en waar technologische vernieuwing niet *per se* een rol speelt, zoals bijvoorbeeld bij innovaties in de platformeconomie en in de wetenschappelijke uitgeverijwereld. In dit proefschrift vertrek ik vanuit het idee van 'institutionele innovatie', wat ik definieer als een innovatie die nieuwe manieren introduceert om bestaande technologieën en de sociale omgeving te configureren. Om institutionele innovatie te bestuderen, volgt dit proefschrift een relatief structuralistische benadering die past bij de notie van innovaties als socio-technische configuraties. Ten eerste analyseer ik de verspreiding van institutionele innovaties over ruimte en tijd, door de structurele heterogeniteit in instituties tussen verschillende geografische locaties te benadrukken. Ten tweede bestudeer ik hoe institutionele innovaties die door zogenoemde *gatekeepers* worden geïntroduceerd, de selectie van wetenschappelijke en culturele producten vormen.

De ruimtelijke heterogeniteit in instituties staat centraal in de eerste twee cases van dit proefschrift. Hoofdstuk 2 heeft als doel om institutionele omstandigheden te identificeren die de wereldwijde verspreiding van diensten van platformbedrijven beïnvloeden. Dit hoofdstuk bestudeert in het bijzonder de beslissingen van platformbedrijven om hun diensten te introduceren op verschillende locaties over de hele wereld. De institutionele innovatie is hier gelegen in instituties die vraag en aanbod in verschillende markten op nieuwe manieren samenbrengen door middel van online platformen. In dit hoofdstuk maak ik onderscheid tussen formele en informele instituties waarop platformbedrijven hun locatiebeslissingen kunnen baseren. Als casus bestudeer ik Uber en in het bijzonder in welke steden dit platform zijn controversiële dienst UberX hebben geïntroduceerd, wat vaak in strijd is met lokale taxiregulering doordat chauffeurs zonder vergunningen aan taxipassagiers worden gekoppeld. Met betrekking tot de formele instituties vind ik dat Uber de voorkeur geeft aan locaties waar concurrentie en innovatie worden gestimuleerd door nationale regelgeving. Verder laten nationale politieke instituties en arbeidsmarktinstituties slechts gedeeltelijk een invloed zien op de locatiebeslissingen van Uber. Daarnaast laat ik zien dat Uber in staat is om hun mobiele appgebruikers over de wereld te volgen omdat deze gebruikers gemeenschappelijke informele instituties delen met het platform die het lokaal makkelijker maken hun UberX service te introduceren. Deze reizende gebruikers kunnen functioneren als een 'vertrouwde gemeenschap' op de locaties die ze bezoeken, omdat ze bepaalde gedragscodes en normen delen met het platformbedrijf.

Terwijl hoofdstuk 2 zich vooral richt op locatiekeuzes die gemaakt worden door een bedrijf in het diffusieproces van één specifieke dienst, kijkt hoofdstuk 3 naar de lokale markvorming voor een institutionele innovatie als een gedistribueerd proces. In dit hoofdstuk analyseer ik in welke mate de regionale institutionele omstandigheden effect hebben op de regionale adoptie van een bepaalde organisatievorm. Hier bouw ik voort op het idee dat bedrijven met nieuwe organisatievormen kunnen profiteren van de lokale aanwezigheid van bedrijven die institutioneel verwant zijn en zo institutionele structuren kunnen faciliteren die deze nieuwe organisatievorm legitimeren. In dit hoofdstuk staat de oprichting van coöperaties voor duurzame energie in Duitsland centraal. Door een organisatie-ecologisch model toe te passen, ontdek ik dat het nationale aantal al bestaande coöperaties voor duurzame energie een legitimerend effect heeft op de oprichting van meer van dit soort coöperaties. Ik beargumenteer dat als het aantal coöperaties voor duurzame energie in een land toeneemt, dit ook de cognitieve legitimiteit van dit type organisatie vergroot, aangezien nieuwkomers eerder geneigd zijn dit businessmodel te kopiëren in plaats van iets nieuws te proberen. Op lokaal niveau wordt het legitimatieproces niet zozeer beïnvloed door de hoeveelheid coöperaties voor duurzame energie, maar eerder door de lokale aanwezigheid van institutioneel verwante organisaties in verschillende industrieën. Hier beargumenteer ik dat coöperatieve activiteit in verschillende industrieën indicatief is voor een toegenomen sociaal-politieke legitimiteit voor de coöperatieve organisatievorm over het algemeen.

In het volgende hoofdstuk verschuift de focus van dit proefschrift van ruimtelijke heterogeniteit naar de rol van gatekeepers in het legitimatieproces. Hoofdstuk 4 bestudeert wetenschappelijke tijdschriften als gatekeepers van wetenschappelijke kennisproductie. In dit selectieproces kiezen de meeste tijdschriften er meestal voor om onderzoek te publiceren dat in lijn is met dominante wetenschappelijke paradigma's. Voortbouwend op literatuur over noviteiten afkomstig van buitenstaanders, stelt dit hoofdstuk dat gatekeepers ook een bron van noviteit kunnen zijn. Dit is gebaseerd op het idee dat nieuwe wetenschappelijke artikelen die buiten de bestaande kaders vallen, meer legitimiteit kennen bij tijdschriften die zelf een onconventioneel bedrijfsmodel hanteren. Hier bestaat de institutionele innovatie uit nieuwe manieren van *gatekeeping* en een nieuwe institutionele logica die gepaard gaat met veranderingen in type eigenaren van wetenschappelijke tijdschriften en *open access*-beleid. Ik laat zien dat tijdschriften die geen eigendom zijn van wetenschappelijke genootschappen of die *open access* publiceren, en op deze twee manieren tegen de conventies van wetenschappelijk publiceren ingaan, meer mogelijkheden bieden om nieuw onderzoek te publiceren dan conventionele tijdschriften.

Hoofdstuk 5 gaat in op de veranderingen in *gatekeeping* die in de loop van de tijd kunnen plaatsvinden. In dit hoofdstuk richt ik mij in het bijzonder op de hernieuwde opkomst en

heropleving van specifieke markten of velden. In deze periodes van heropleving van een markt richten gatekeepers zich meestal op een nieuw en breder publiek. Dit hoofdstuk richt zich op de muziekindustrie en kijkt specifiek naar het genre van surfmuziek, een genre dat ontstond in de jaren zestig en een heropleving beleefde rond de jaren tachtig en negentig. Als zodanig bestudeert dit hoofdstuk een muziekgenre als institutie en institutionele innovatie als veranderingen in de selectie- en categoriseringsprocessen die gatekeepers hanteren binnen dit genre. Ik beargumenteer dat gatekeepers muzikale actoren en producten selecteren die aan bepaalde tijdsgebonden stereotype betekenissen van het surfgenre voldoen. Tijdens de oorspronkelijke periode van het muziekgenre gaven gatekeepers de voorkeur aan muzikale producten die een subcultureel en ingewijd begrip van surfmuziek signaleerden, omdat dit aansloot bij het *insider*-publiek van deze periode. Echter, tijdens de heropleving van het genre selecteerden gatekeepers muzikale producten die een geromantiseerd beeld van surfmuziek signaleerden, omdat dit beter aansloot bij het bredere publiek waar de gatekeepers zich in deze periode op richtten. Waar hoofdstuk 4 dus voornamelijk gaat over verschillende soorten gatekeepers die verschillende soorten culturele artefacten selecteren, laat dit hoofdstuk zien hoe hetzelfde product in de loop van de tijd aan veranderende legitimiteitsnormen kan worden onderworpen.

Het afsluitende hoofdstuk 6 biedt een reflectie op de bijdrages uit mijn studie voor institutionele studies en innovatiestudies. Voor institutionele studies bespreek ik hoe mijn studie vooral bijdraagt aan het begrip van de geografie van legitimering en van de rol van intermediairs en institutionele verandering. Vervolgens bespreek ik hoe het proefschrift bijdraagt aan innovatiestudies door het onderzoek van het innovatieproces in termen van zowel de implementatie van reeds bestaande technologieën als reeds bestaande instituties. In dit laatste hoofdstuk wijd ik ook een paragraaf aan het overkoepelende idee van institutionele innovatie, zoals geïntroduceerd in het eerste hoofdstuk. Ik eindig door te reflecteren op een aantal van de beperkingen waar ik tijdens het onderzoek mee te maken heb gekregen en op mogelijkheden voor toekomstig onderzoek.

Acknowledgments

We have arrived at the section of my PhD-thesis that at times has made me anxious. Of course, this is a grateful section to write and I can finally let go of the very formal way of writing. However, it has made me anxious because I cannot rely on any of my data nor on prior literature; so anybody who knows me well would understand that I am lost. Anybody who knows me well also knows about my predilection for lists and statistics. As a result of this I started analyzing my email and Whatsapp correspondence over the last 4 years in order to identify everyone who I have to acknowledge. This has resulted in the following ideal types of acknowledgees: inner intellectuals, frivolous fellows and delightful distractors.

Inner intellectuals

With over 1,750 received emails, this group mostly contributed to the intellectual support I have received in writing this thesis. With 1,025 emails my promotor Koen has to be the captain of this group. Koen, thank you for providing me the opportunity to do this PhD. You have given me a lot of freedom in my work, but you also played an important role in helping me to make pragmatic decisions. Even though we often looked at things through entirely different lenses, it fascinates me how easily you could find similarities or translations between our ideas. Jarno, thank you for your daily supervision that has been crucial for this thesis. I am especially grateful for your optimism and patience, that I frequently needed when running into problems or 'uninteresting findings'. It amazes me how easily you could find a pattern or story in my sometimes very confusing or needlessly elaborate ideas.

Besides Koen and Jarno I would like to thank the coauthors who's work contributed to my thesis. In particular I would like to thank Alex, who's help has been very valuable for one of the chapters of my thesis and who has been important in my application for this PhD position in the first place. I would also like to thank Thomas for his contribution to one of the chapters in this thesis. The last of these inner intellectuals I would like to thank is Christophe, for the conversations we had about organizational ecology and categories, which have been very helpful to me in writing this thesis, and for giving me the opportunity to visit the University of Antwerp during my PhD.

Frivolous fellows

The frivolous fellows consist of people who accompanied me for the last four years in the limbo between my personal and academic life. This is illustrated by the neat balance of professional emails (n = 248) and friendly Whatsapp messages (n = 8,816) I received from this group. Marjolein, I cherish the memories of all the good times we had together

in the office and the countless times you have made me laugh (either by being funny or by being clumsy). Alje, I really appreciated all the 'grand theories' you presented on our whiteboard and the ridiculous sound you can make with your cheeks. Mignon, I really enjoyed the academic city trips we made together, and you made a not to be named city a lot more fun. Mary, I know this acknowledgment is important to you, so I will give you an extra sentence. Thank you for all the nice interruptions of my work, when you came bursting into our office with one of your crazy business ideas or one of your (to me often quite relatable) rants.

I also have to thank many other colleagues at the Copernicus Institute, my fellow PhD students, 'the Innovation Lads and Ladies, and some of the people with whom I have been teaching, such as Alexander, Taneli, Karla and many others.

Delightful distractors

These delightful distractors are mostly people from outside academia, who have been distracting me with 108,957 Whatsapp messages in the last four years. I should say thank you for distracting me from my work from time to time, and I should say sorry for treating you like 'disastrous distractors' from time to time. While this group is really to extensive to acknowledge each of you individually, I can cover most of you by thanking the following Whatsapp-groups: "De bonnenadministratie" (989), "Bike boys" (3,058), "The Gentlemen" (748), "De Klapdeur, 🍺 & Koren" (2,887) "Terraforming Mystica" (1,710), "Puntjes" (3,931) and "Familie" (6,360). However, I have to highlight some of the support I have received from people within this group.

Let me start with the big fish of the delightful distractors. With 59,236 messages she is the real heavyweight in terms of my incoming Whatsapp messages. She is the designer of this thesis. Lisa, thank you for supporting me over the last four years in all aspects of my life. Thank you for being patient with me when I stressed out, thank you for believing in me when I needed this and thank you for sharing in my joy. I am looking forward to our new adventures and I hope I can and will repay your support whenever you need me.

Ma and pa, thank you for supporting me in my decisions and for being there for me in both stressful and cheerful times. Your support ranges from listening to my rants to helping me out with drilling a hole, from walking our dog to telling me it will all be all right.

Tim and Thomas, thank you for being my 'frivolous fellows' in different universities and for sharing PhD experiences, either in serious settings or over a beer in de Klapdeur. Also, more practically, thank you for proof reading this thesis.

Maxz, you have my eternal gratitude for this one figure you helped me design for this thesis.

I also thank Mitzki and Pjotr, who I will address as human beings right now in order to keep up appearances, for their emotional support whenever I came home.

Finally, Vosse, it will be a while before you can read this, but thank you for setting such a natural deadline for me.

Curriculum vitae

Matthijs Benjamin Punt was born on the 20th of November 1990 in Capelle aan den IJssel. In 2014 he obtained a Bachelor of Arts degree in Arts and Culture Studies ('Algemene Cultuurwetenschappen') from Erasmus University Rotterdam (EUR) in the Netherlands. He obtained a Master degree in Sociology of Culture, Media and the Arts (cum laude), also at Erasmus University Rotterdam in 2016. During this Master he also did a research internship at the Cultural Sociology group of the Faculty of Social and Behavioral Sciences of the University of Amsterdam (UvA), with dr. Alex van Venrooij. He wrote his Master thesis on the topic of place-based aesthetics in the development of music genres.

In 2016, Matthijs started to work as a PhD candidate at the Copernicus Institute of Sustainable Development of Utrecht University on the research project called 'The genealogy of novelty: an evolutionary explanation of breakthrough inventions in science, technology and the arts'. This project was funded by the Netherlands Organization for Scientific Research (NWO) within the Vici-program and led by prof. dr. Koen Frenken. His work on this project was mainly focused on the common ground between innovation studies and institutional studies. Matthijs attended and presented his work at different international academic conferences and workshops in a range of disciplines, including organization studies, economic geography and sociology. During his time as a PhD candidate he also obtained a guest position at the Antwerp Centre of Evolutionary Demography of the University of Antwerp (UA) with prof. dr. Christophe Boone.

From 2020 onwards Matthijs is working as a lecturer at the Copernicus Institute of Sustainable Development at the Innovations Studies group.

List of publications

Punt, M. B., Bauwens, T.J.F., Frenken, K. & Holstenkamp, L. (2021). Institutional relatedness and the emergence of renewable energy cooperatives in German districts. *Regional Studies*, in press. doi: 10.1080/00343404.2021.1890708.

Punt, M. B. & van Venrooij, A. (2020). Signals in the waves of surf: Category development and signals in surf music. *Sociological Perspectives*, Advanced online publication. doi: 10.1177/0731121420950367.