Shine on me: Industry coherence and policy support for emerging industries

Georgallis, P.; Dowell, G.; Durand, R.

DOI
10.1177/0001839218771550

Publication date
2019

Document Version
Final published version

Published in
Administrative Science Quarterly

Johnson
Cornell
SC Johnson College of Business

Shine on Me: Industry Coherence and Policy Support for Emerging Industries

Administrative Science Quarterly
1–39

Reprints and permissions:
sagepub.com/
journalsPermissions.nav
DOI: 10.1177/0001839218771550
journals.sagepub.com/home/asq
SAGE

Panayiotis (Panikos) Georgallis,[1] Glen Dowell,[1] and Rodolphe Durand[1]

Abstract
Although the emergence of new industries is often attributed to state support, little is known about the conditions under which an emergent category of organizations comes to receive state support in the first place. We theorize how government support for a nascent industry is jointly determined by the industry's internal features and external forces and test our arguments by analyzing feed-in tariff policies for the emergent solar photovoltaics (PV) industry in 28 European countries from 1987 to 2012. We find that feed-in tariffs—policies that incentivize renewable energy—were more likely in countries with greater numbers of solar PV producers and where the industry was more coherent, containing fewer producers coming from industries with a contrasting identity, such as fossil fuels. Further, we find that the concentration of the incumbent (rival) energy sector in a given country enhances the effect of the number of PV producers on government policy support, but only when the emerging industry has a coherent identity. Our results shed new light on the relationship between public policy and the emergence of an industry category, and they extend our understanding of how new industries can attain valuable state support while operating in seemingly hostile environments.

Keywords: markets, institutional change, institutionalization, social movements, categories

Organization theorists have paid considerable attention to the circumstances that underlie industry emergence (Greenwood and Suddaby, 2006; Hiatt, Sine, and Tolbert, 2009; Navis and Glynn, 2010; Seidel and Greve, 2017), particularly the role of the state and policy shifts that influence whether new industries emerge and thrive (e.g., Swaminathan, 1995; Dobbin and Dowd, 1997; Russo 2001; York, Vedula, and Lenox, 2017). According to this theoretical narrative,

[1] University of Amsterdam
[2] Cornell University
[3] HEC Paris

states step in to engineer policies that fundamentally transform the patterns of new industry development. An industry then emerges as regulatory support grants both economic assistance and, critically, legitimacy to the new group of organizations. Despite its appealing parsimony, this explanation does not clarify where state support for new industries comes from in the first place.

Contrary to established sectors in which industrial policy can be an outcome of direct political influence or even capture, emergent industries often comprise a limited number of organizations with unrecognized common interests, indeterminate preferences, and unsettled power dynamics (Aldrich and Fiol, 1994; David, Sine, and Haveman, 2013). Lacking the economic and political power of established industries, what enables an emerging group of firms to receive regulatory support? Recent research has suggested that public policy for emerging industries may relate to support from social movement organizations (Sine and Lee, 2009; Pacheco, York, and Hargrave, 2014). As coalitions form to promote certain technologies as normatively superior alternatives, social movements orient policy choices through theorization and meaning-making (Dowell, Swaminathan, and Wade, 2002; Hargrave and Van de Ven, 2006). A nascent industry's achievement of regulatory support is thus facilitated by social movements that increase the salience of the new industry's benefits, help reduce uncertainty about its potential viability, and assist in the emergence of shared definitions of the industry (Sine, Haveman, and Tolbert, 2005; Pacheco, York, and Hargrave, 2014).

This explanation is incomplete, however, because not all state-sponsored nascent industries benefit from social movement support, and not all new industries benefit from state intervention even in the presence of a strong and established social movement. Recognition of a new industry likely depends on the industry's composition (McKendrick et al., 2003), and policy makers need to attend to multiple constituents and may thus consider how the emergent industry relates to or challenges existing sectors (Chun and Rainey, 2005; Hiatt and Park, 2013). Therefore, net of social movement effects, it is important to link state support for an emergent industry to the composition of the industry itself and to the structure of rival interests. Drawing on the market category literature (Navis and Glynn, 2010; Durand and Khaire, 2017; Lee, Hiatt, and Lounsbury, 2017), we argue that state support depends on the number of producers in the emergent industry and on the industry's coherence—the latter being adversely affected by the presence of producers from contrasting industry categories.[1] These effects will be further complicated by the structure of adjacent, rival interests. A concentrated rival sector should offer opportunities for an emergent industry to secure state support—more so when the new industry has a coherent identity.

Our study addresses some blind spots in our understanding of what determines regulatory support for emergent industries. Complementing research that views such policy as exogenous (Grossman and Horn, 1988; Haveman, Russo, and Meyer, 2001; Yan and Ferraro, 2016) or that emphasizes pressure by the industry itself and by social movement organizations (Hiatt and Park, 2013; Pacheco, York, and Hargrave, 2014), we consider the importance of an

[1] We follow prior work in viewing an industry as a separate category of producers, a "collectively understood organizational classification" (Porac, Wade, and Pollock, 1999). Therefore we use the terms "industry" and "industry category" interchangeably.

emergent industry's distinctiveness in relation to rival industries. By viewing regulators as an audience, we also engage with the literature on categories (e.g., Navis and Glynn, 2010; Kim and Jensen, 2011; Durand, Granqvist, and Tyllström, 2017), examining whether the impact of industry category emergence on government policy depends on the structure of established industries. Most notably, we seek to broaden understanding of how nascent, relatively powerless industries can attain valuable state endorsement while operating in seemingly hostile environments.

NEW INDUSTRY CATEGORIES AND POLICY SUPPORT

During our study period, from 1987 to 2012, the solar photovoltaic (PV) industry in European countries benefited from feed-in tariff (FIT) policies: a support scheme offering long-term contracts for generating renewable electricity, whereby the government guarantees the purchase of renewable electricity that is fed into the grid at a particular price, or tariff, and typically for a guaranteed number of years. European governments used FITs extensively to endorse the emerging industry by creating a market for solar energy, and FITs have been widely considered the most successful policy for promoting the nascent solar PV industry (Flamos et al., 2009; Hoppmann et al., 2013; Georgallis and Durand, 2017).

The energy policy literature has documented how regulators promoted PV production across Europe and has identified a number of motivations, such as addressing mounting sustainability concerns and reducing energy dependency on foreign resources (Flamos et al., 2009). But the most commonly cited reasons for European governments' use of FITs are to foster local investment and to develop a domestic industry (Jacobsson and Lauber, 2006; Peters et al., 2012). Thus FIT schemes appear to be less an example of environmental policy than of industrial policy: regulatory support that generates protected market space for a new industry to flourish (Georgallis and Durand, 2017) and grants socio-political legitimacy to that industry (Swaminathan, 1995; Russo, 2001; York and Lenox, 2014).

Governments considering such support must balance current economic efficiency, which may be best served by maintaining incumbent industries (Grossman, 1989), against investments in technologies that may be important for the nation's future competitiveness or that serve other goals, such as furthering social or environmental objectives. Such policies are particularly important for complex systems, in which change occurs through a complicated socio-political process (Tushman and Rosenkopf, 1992) and for which incumbents embedded in the system can have significant advantages. Governments can thus use policies such as FITs to reduce an industry's liability of newness (Wholey and Sanchez, 1991; DeVaughn and Leary, 2016).

Yet the legitimacy bestowed on an industry category by state regulatory support is unlikely to occur in a vacuum. Whatever the government's goals are, policy makers' willingness to support an emergent industry must relate to their understanding of whether there is in fact a new industry to be built or protected, i.e., whether the set of firms producing a new product forms a "sensible organizational community" (Porac, Wade, and Pollock, 1999). Thus policy support is likely driven by characteristics of the participants in the emergent industry category, as these firms shape policy makers' understandings of the new category's viability and distinctiveness (Durand and Khaire, 2017). Moreover, policy support is costly for regulators to enact. Beyond the direct financial cost that a policy such as the FIT incurs for the government, there is the potential for political cost depending on the extent to which the new industry might threaten powerful vested interests (Hiatt and Park, 2013). Thus regulatory support for a new industry category may further depend on the structure of rival established interests.

Although ex post explanations of industrial policy can appear straightforward, they are often apparent only in retrospect. It is not obvious that industries receiving policy support were so predestined (cf. Denrell and Kovacs, 2008: 127). Our knowledge of how industry affects policy has come almost exclusively from studies of mature industries—in which firms are quite powerful, interests settled, and motivations unambiguous—and rests on arguments of direct political influence or even regulatory capture (Stigler, 1971; Greenwood and Suddaby, 2006; Baldwin, Cave, and Lodge, 2012; see Scott, 2013: 31, for a discussion). But firms in new industries are limited in number, they have little power compared with established sectors, and often their success might endanger powerful enemies. New industries need to acquire "the right to be taken for granted" (Aldrich and Fiol, 1994: 653) before they are seen as "justified and integrated into the prevalent institutional order" (Rao and Singh, 2001: 264). Therefore state endorsement of a new industry has often been treated as exogenous to the industry itself (Swaminathan, 1995; Dobbin and Dowd, 1997; Russo, 2001; Sine and Lee, 2009; York and Lenox, 2014). And although scholars have long recognized this limitation (Wholey and Sanchez, 1991; Aldrich and Fiol, 1994), studies that incorporate endogenous dynamics in empirical analyses have paid little attention to the composition of the emerging industry (Madsen, 2008; Pacheco, York, and Hargrave, 2014). This oversight is important because the mere fact that the number of producers has grown does not guarantee that a recognizable industry has emerged (McKendrick et al., 2003). In this study, we draw on market category research and theorize the conditions under which the nature of an emerging industry category affects state policy.

Category Research at the Industry Level

Category research is a useful lens to study how social and political actors react to new market propositions. At the product and organizational levels of analysis (Durand and Paolella, 2013; Vergne and Wry, 2014), it has established that (1) audiences sanction deviance from expectations in terms of perception, identification, and evaluation (Hannan, Pólos, and Carroll, 2007; Hsu, Hannan, and Koçak, 2009); (2) greater heterogeneity in the combination of features is more negatively sanctioned (Negro, Hannan, and Rao, 2011); and (3) evaluations are less negative when the category system is nascent (Ruef and Paterson, 2009), conventional attributes are magnified (Kim and Jensen, 2011), and the combination of features is congruent with an audience's theory of value (Wry, Lounsbury, and Jennings, 2014; Paolella and Durand, 2016).

The focus of this research stream to date has been on how audiences sanction individual organizations for deviating from expectations. In one paper that considered the industry level, Sharkey (2014) explored the role of industry category status in how severely analysts respond to a firm's announcement of negative news and found that a higher industry status tempers the impact of bad news on a firm's market value. In that paper, however, as in traditional category research, the outcome studied is at the firm level, the industry pre-exists, and the status of industry categories is already established (see Durand and Khaire, 2017, for a critique). In our case, the industry category is emerging, complicating the ability of audiences—including states—to evaluate the category.

Studying emergence at the industry level, Navis and Glynn (2010) documented how satellite radio firms initially united their efforts to create a category and then strove to differentiate themselves from each other. But because there were only two firms in that industry, and they eventually merged, it is difficult to assess the effect of industry structure on market outcomes and to generalize to other sectors. What is more, the authors' account suggested that the satellite industry itself emerged ''due to a regulatory act'' (Navis and Glynn, 2010: 441). Though it is true that government policy can initiate the formation of new categories (Haveman, Russo, and Meyer, 2001; King, Clemens, and Fry, 2011), one can also expect that governments discount emerging industries for not qualifying as a recognizable category in the first place. It is thus unclear what makes a government respond to industry category emergence.

Prior research has provided evidence of regulatory changes being enabled by social movement organizations that foster the cognitive acceptance of nascent industry categories by shaping their salience, proclaiming their normative value, and decreasing uncertainty regarding their conceptual boundaries (Sine, Haveman, and Tolbert, 2005; Weber, Heinze, and DeSoucey, 2008; Durand and Georgallis, 2018). Along these lines, Pacheco, York, and Hargrave (2014) studied how state incentives relate to social movement activism that fuels industry growth. Yet Pacheco and colleagues did not consider industry composition (their model views industry as monolithic) and the structure of incumbent industries, factors that likely also matter for an emerging industry's potential to receive regulatory support. Moreover, they noted that ''although public awareness may influence emerging industry growth, the effect of mandatory rules and market incentives takes precedence'' (Pacheco, York, and Hargrave, 2014: 1628). Yet it is unlikely that regulations will be ''devised to deal with types of organizations that have never existed'' (Ranger-Moore, Banaszak-Holl, and Hannan, 1991: 63). Therefore, accounting for social movement support, it is crucial to examine the emergence of the industry category itself as an antecedent of regulatory support.

Direct Effects of Industry Category Density and Coherence

As new industry categories emerge, they initially comprise few members and are not immediately taken for granted as ''natural'' or ''valid'' fields of economic activity (Navis and Glynn, 2010; Fiol and Romanelli, 2012). Firms in these fields need to ''carve out a new market, raise capital from skeptical sources, recruit untrained employees,'' and ''build a reputation of the new industry as a reality'' (Aldrich and Fiol, 1994: 645, 657). Until these firms manage to prove their products' technical feasibility and demonstrate the new industry's market promise, its social and economic validity is largely questioned (Kennedy, 2008; Durand and Khaire, 2017). Moreover, as opposed to firms in mature industries, firms in emerging industries have not yet defined stable relationships, coalitions, and perhaps common interests that would allow them to promote their sector as a distinct category of organizations (Santos and Eisenhardt, 2009; Ozcan and Santos, 2015).

As more firms participate in a new category, the cognitive acceptance of both the firms and the category is enhanced (Hannan, Pólos, and Carroll, 2007). The growing density of firms in a region and the associated visibility and spread of knowledge about the category function as evidence or social proof of the industry category's viability, and the industry becomes more recognizable to audiences, including governments (Kennedy, 2008; Durand and Khaire, 2017). In addition, these firms are likely to come together and seek to shape their environment and access societal resources by engaging in collective action with similar others (Hargrave and Van de Ven, 2006; Navis and Glynn, 2010; Lee, Struben, and Bingham, 2018). The more numerous they are, the more they are able to establish supportive networks, mobilize adherents, and cultivate social ties (Ozcan and Santos, 2015) to induce the government to incorporate their requests into policy schemes. Relatedly, policy makers are more likely to endorse an industry if it has already shown signs of being accepted as a meaningful and viable sphere of economic activity. Thus we expect that the probability of government policy support for an emergent industry is influenced by the density of industry category members it is set up to support:

Hypothesis 1 (H1): The likelihood of government policy support of an emerging industry category increases with the number of category members operating in the government's jurisdiction.

A simple count of firms in the emerging industry may be an insufficient metric of the degree to which the industry will come to be recognized and accepted. Audiences are more likely to recognize members of a nascent industry as a new category and confer the attendant legitimacy on the industry if the organizations forming it are more similar and coherent (Fiol and Romanelli, 2012). Like other audiences, governments are sensitive to categorical distinctions (Funk and Hirschman, 2014; Ozcan and Gurses, 2017), and thus they are likely affected by the degree of "similarity, salience, and coherence" exhibited by the entrants (Fiol and Romanelli, 2012: 598).

Industry categories are socially constructed groups that bind some producers together while separating them from others through "categorical imperatives" (Zuckerman, 2017). Thus a key task among new entrants in many settings is to segregate the emerging industry's identity from that of existing industries (Kennedy, 2008; David, Sine, and Haveman, 2013; Wry, Lounsbury, and Jennings, 2014). This is problematic when the industry is composed of atypical or potentially "impure" entrants, such as when some of its firms have entered from settings that have identities highly inconsistent with that of the new industry. To illustrate, as more environmentally friendly cleaning products have proliferated in recent years, companies entering these markets from traditional chemical industries have faced strong opposition from stakeholders who perceive them as "greenwashers" (see, e.g., Hollender, 2010). Similarly, as oil companies such as BP or Shell entered the solar PV industry, their moves were seen by audiences as inconsistent with their core businesses (Matejek and Gossling, 2014). Though the entry of existing firms can bring attention to the nascent industry, such entries can also be viewed with skepticism because it is "difficult for organizations with established identities to present themselves as entirely different kinds of organizations" (Haveman and David, 2008: 578).

More importantly, such moves may have a negative influence on the nascent industry as a whole. The legitimacy that these organizations have in their original industries does not necessarily translate to the new setting (Jourdan, Durand, and Thornton, 2017), and their presence may impede the acceptance of the new industry, as they do not foster "internally consistent stories" (Aldrich and Fiol, 1994) about what a new activity is and what industry category members should look like. A congregation of incoherent agents blurs the industry's boundaries and hampers its recognition as a distinct category (Negro, Hannan, and Rao, 2011; Durand and Khaire, 2017; Lee, Hiatt, and Lounsbury, 2017), deterring governments from acting favorably on its behalf. Thus we expect the presence of producers from industries with contrasting identities to taint the categorical purity of a new industry and make it appear incoherent.

For governments considering instituting policy support for a nascent industry category, the more coherent the industry, the more palatable it will be to offer policy support. Government support for a nascent industry explicitly endorses that category, and such endorsement is less likely to be forthcoming if the participants cannot appear as a well-formed, coherent industry. Industrial policy for a new industry requires that there be a new industry to be protected; while density offers one signal of its emergence, the entrants also have to appear coherent if they are to be viewed by governments as forming a new distinct industry (McKendrick et al., 2003). The entry of firms from highly inconsistent industries also makes it harder for category members to coalesce, perceive common interests, and represent themselves to governments as forming a distinct industry. This may lead to failure to cohere into a distinct category, as in the disk array industry (McKendrick et al., 2003), or even to failed attempts at industry emergence, as in the online grocery category and the market for mobile payments (Navis et al., 2012; Ozcan and Santos, 2015). Thus cognitive and political accounts of category emergence converge to suggest that a nascent industry category is less likely to be recognized as truly "one" industry and as a valid recipient of government policy support when its members come from industries with contrasting identities. Industry coherence may be a critical factor that fosters recognition and political support of the new industry:

Hypothesis 2 (H2): The likelihood of government policy support of an emerging industry category increases with industry coherence.

Industry Category Characteristics, Rival Interests, and State Policy

Nascent industry categories emerge to compete with, or substitute for, existing industries. The political recognition of a new industry, and sometimes even its very nature, cannot be understood without attending to the wider competitive context in which the new industry emerges (Scott, 2013). Government actions that promote a new industry are often controversial (Grossman, 1989). Should states intervene or let market forces play freely? [2] Some have argued

[2] See for instance President George H. W. Bush's famous declaration that unlike the free market, the government is unfit to pick winners and losers in the economy: http://www.presidency.ucsb.edu/ws/?pid=19546.

that the defining difference between states and businesses is the degree of goal ambiguity of the former (Chun and Rainey, 2005), as governments must attend to multiple constituents. The government may have several objectives to consider, balancing economic efficiency against other goals such as environmental or social progress, and balancing the development of new industries against the maintenance of traditional sectors.

Established industries that the new industry category is meant to displace also compete for a government's attention, so the structure of these industries likely conditions the direct effects of density and coherence hypothesized above. We focus here on sector concentration: the degree to which the market is monopolized by one industry (high concentration) or shared equitably among the industries comprising the sector (low concentration). Even though high concentration can bestow great power on the dominant industry and has typically been associated with regulatory capture (Braithwaite, 2006), concentrated sectors are also characterized by greater resource space, which invites entrepreneurial activity and the formation of new distinct niches (Carroll and Swaminathan, 2000; Soule and King, 2008; Markard, Raven, and Truffer, 2012). Similarly, we expect that under some conditions, concentration will confer opportunities to the emergent industry to achieve recognition and policy support. When the rival sector is highly concentrated, it may be easier for governments to balance constituents' demands because fostering the new industry is not expected to significantly endanger the powerful incumbents' interests. For example, in the early 1990s when the German government pioneered feed-in tariffs for solar PV, it faced limited political opposition; the incumbent energy sector was highly concentrated, with the coal industry taking a very high share of the market, and thus had little to fear from the emergent PV industry (Jacobsson and Lauber, 2006). The government could assist or "protect" PV without jeopardizing the fate of the dominant industry. In contrast, when the rival sector is fragmented, policy makers need to attend to multiple industries and cannot as easily favor the emerging category while simultaneously preserving established interests.

The concentration of incumbent interests can also act as a source of meaning for the new industry. Members often describe the purpose of a new industry by referring to a problem that its emergence is meant to remedy (cf. Benford and Snow, 2000). The more concentrated the rival sector, the easier it would be for producers to point to a common enemy that will facilitate such theorization attempts. Concentration offers opportunities to identify the source of the problem—the culpable agent that helps establish blame and the need for a solution (Benford and Snow, 2000). For instance, the historically highly concentrated French energy sector has conferred great political and economic power on the dominant player, the nuclear power industry, but has at the same time led to nuclear power being portrayed as the enemy of the solar PV industry. As one PV professional noted:

> If you ask me as an engineer, I think the opposition doesn't do any good because PV is not against [conventional energy]. PV is to play together and the goal should be to find a good mix that economically makes sense, but . . . the opposition to conventional [energy] has pushed PV tremendously. . . . At some point, you need an enemy to push an idea forward, and I think nuclear [energy] served as an enemy. . . . You need a good cause to develop something else.

Such opportunities for opposition framing are available precisely because the rival sector is concentrated. When the incumbent energy sector is fragmented, it can be difficult to identify an antagonist and build a narrative to strengthen the industry's boundaries by opposing incumbents. For instance, in countries like the UK, where large shares of the market are served by coal, nuclear energy, and natural gas but none of them dominates, there is no salient enemy that will help push the idea of the solar PV industry forward. Relatedly, as another solar advocate explained, if the emergent industry is to gain significant attention, the solution that it represents must go ''hand in hand'' with a clear representation of what it is meant to displace:

> Just promoting a solution without highlighting the problem doesn't really work. You only look for a solution if you have a problem. . . . [We] need to tell the public why we want to have solar or wind in the market and not nuclear or coal. We need to highlight the problem in order to promote the solution. It goes hand in hand.

The above arguments suggest that the concentration of rivals allows a new industry to be seen as a niche that is unthreatening to the status quo *and* to present itself as a real alternative. We thus expect that governments are more likely to attend to the emerging industry when there is greater concentration (lower fragmentation) of adjacent rival interests for two reasons: rival sector concentration enables more focused attention to the emerging category and reduces the tradeoffs of supporting it, and such concentration enables the new industry to make a compelling case by framing the opposition between an existing powerful industry as the enemy and the emerging industry as the solution. Thus:

> **Hypothesis 3 (H3):** The positive relationship between the number of category members and the likelihood of government policy support of an emerging industry category will be stronger under a greater concentration of rival interests.

Yet not all emergent industries are equally well-positioned to benefit from opportunities offered by the concentration of rival interests. A higher number (density) of category members is beneficial under high rival sector concentration not only because concentration helps point to the cause of the problem but also because high density reflects that there is a possible solution. But the solution (the new industry) cannot be accepted as an alternative if it is incoherent. Thus the effect hypothesized above will be further complicated by the nature of the emergent industry category's members, and in particular by the degree of coherence they exhibit.

When the emerging industry is coherent, its promotion as a separate category is straightforward because such composition enables the ''dramatization of a glaring contradiction'' (McAdam, 1996: 25) between the powerful incumbents and the industry as an alternative. When the rival sector is fragmented, it is hard to make that contradiction concrete. And when the emergent industry is too small, the solution is not compelling. What happens, however, when the assemblage of the new industry's members appears incoherent, consisting of organizations whose identity directly contrasts with the new industry's identity? In such cases, the theorization of the new category as a solution breaks down, as industry participants will have great difficulty creating a convincing story that presents the industry to government as a sensible solution. Illustrating this problem, Hermann Scheer, a Social Democrat member of the German parliament and prominent supporter of the solar PV industry, wrote in *The Solar Manifesto*, ''It is impossible for those who create the threats in the first place to . . . act as suitable instigators of a new alternative'' (Scheer, 2001: 2). The government lacks clear justification when there is no coherent industry to support as a viable alternative. Thus the effect hypothesized with H3 is contingent on the composition of the emergent industry such that as density grows, it is harder for an incoherent industry to take advantage of the opportunities afforded by increased concentration of rival interests:

Hypothesis 4 (H4): The positive interaction between the number of category members and the concentration of rival interests on the likelihood of government policy support will be stronger when the emergent industry appears coherent.

METHOD

To test our hypotheses we studied the solar PV industry for the period 1987 to 2012 for the 28 countries that currently constitute the European Union.[3] Our empirical analysis was grounded in knowledge gained though qualitative means, including interviews with industry insiders and other stakeholders that were conducted between January 2012 and February 2013; participation in PV conferences; and the study of industry reports, industry public documents, and documents from the Greenpeace International archive. This immersion into the setting offered key insights into the industry's evolution.

History of Solar PV Technology

Although the discovery of the photoelectric effect by French physicist Edmond Becquerel dates back to 1839, the invention of what is considered to be the first practical solar PV cell came in 1954, when Bell Laboratories invented a cell based on silicon (Si), the element that remains the most common material used in PV manufacturing. This discovery was emphatically celebrated—the *New York Times* wrote that the silicon solar cell ''may mark the beginning of a new era, leading eventually to the realization of one of mankind's most cherished dreams—the harnessing of the almost limitless energy of the sun'' (Perlin, 2013: 31)—but the technology was extremely expensive and applied almost exclusively to space applications. The energy crisis of the 1970s sparked the first real interest in terrestrial solar PV, with (mostly U.S.) energy companies joining (mostly Japanese) electronics manufacturers in their interest to explore the technology. Still, despite growing R&D efforts, there was little in the way of commercial development. Even worse for the industry, not long after the crisis ''the [oil] prices went down and everybody went home,'' as put by one of our interviewees.

[3] These are Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the UK. Countries were included from 1987 or from the year they became independent (whichever was later). A control variable accounts for each country's entry into the EU.

FITs and the Emergence of a New Industry

The situation slowly changed in the decades that followed. Occurring at the time when concerns about global warming were surfacing, the Chernobyl accident of 1986 acted as an environmental jolt, a ''suddenly imposed grievance of international scope'' (Kriesi et al., 1995: xxv) that precipitated European governments' reconsideration of their energy policy and the mobilization of the environmental social movement around energy issues (Duyvendak and Koopmans, 1995). During the 1990s and especially the 2000s, several European governments offered policy support for solar PV, and production grew at a rapid pace, consistently exhibiting yearly growth rates in the double digits. Thus the European solar PV industry is considered a setting in which rapid industrial development was highly dependent on regulatory support (Hoppmann et al., 2013).

While such support can take many forms, feed-in tariff (FIT) policies were the instrument predominantly used by European states to support the solar PV industry. FITs were intended to reduce the cost gap between clean and conventional energy and thus create market space that would enable the PV industry to flourish. As other policies were less common in Europe and did little to stimulate the domestic industry, FITs are widely considered the most important policy scheme for the promotion of solar PV in the European context (World Future Council, 2007; Flamos et al., 2009; Georgallis and Durand, 2017).

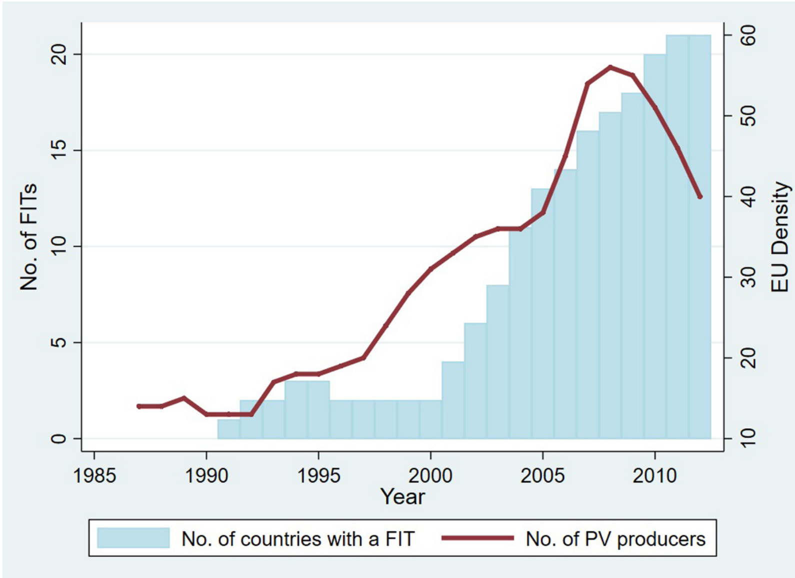
The first country-level FIT for solar PV came into effect in Germany in 1991. Aside from inducing demand for solar PV, the German FIT was ''instrumental in creating a world-beating industry . . . almost from scratch'' (World Future Council, 2007: 5), with Germany later becoming the largest producing country and a dominant player in the solar PV industry landscape for several years (Teske and Hoffmann, 2006; Peters et al., 2012). Surprisingly, although FITs did not favor the incumbent energy industries such as coal or nuclear power, passing the policy ''did not require a large political effort,'' as ''a few hundred [megawatts] . . . was hardly a serious matter'' for incumbents at the time (Jacobsson and Lauber, 2006: 264).

Soon after, Italy and Spain also introduced FITs for solar PV to contribute to ''environmental protection, industrial policy, and employment creation'' (Del Rio and Mir-Artigues, 2014). FIT policies proliferated in the following years and eventually became the most common regulatory support measure for the promotion of renewable energy in the world (REN21, 2012). Considering the political power of incumbent energy industries, these policies faced limited opposition during the bulk of our observation period. Despite the success of FITs in helping the PV industry take off, the industry was still seen as too small to constitute a considerable threat to these interests.[4]

During our period of analysis, 22 of the 28 EU member states used a feed-in tariff in their efforts to endorse the sector. Figure 1 depicts the historical evolution of the number of countries that had FIT policies for solar PV in the 28 European countries that compose our sample, juxtaposed against the number of solar PV industry players. As the figure implies, the proliferation of these policies coincided with the boom in the European solar PV industry. FITs were also promoted as

[4] Despite rapid growth rates, the industry was still marginal (Pinkse and van den Buuse, 2012). For instance, even midway through our observation period (year 2000), the total installed capacity of solar PV in Europe was less than 1/1000th of that of the non-renewable sector (EWEA, 2012).

Figure 1. Evolution of categorical density and FITs for solar PV in Europe.

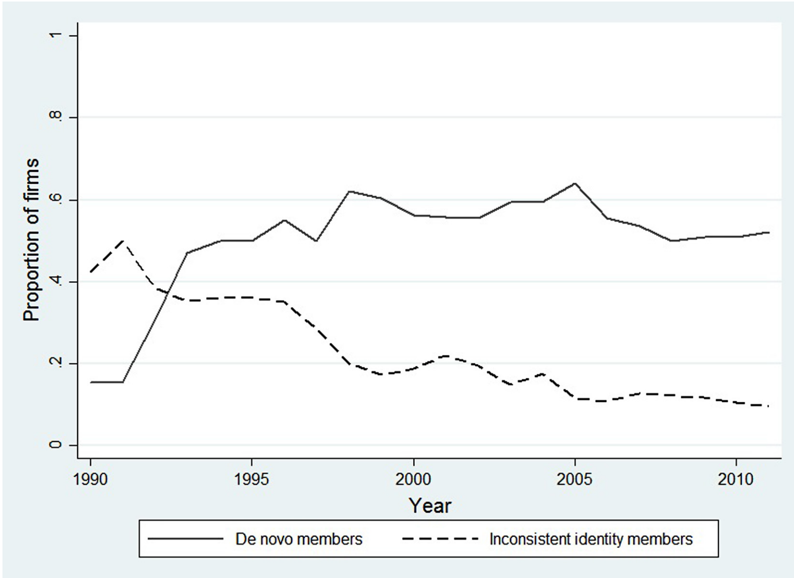


the most effective regulatory scheme by industry participants and supportive environmental organizations (e.g., EPIA and Greenpeace, 2011). Although many analysts consider FITs to be the reason behind the emergence of the European PV industry, less attention has been paid to the fact that in many countries the industry existed—even in its infancy— before FITs, leaving open the possibility that state support was not entirely exogenous to the PV industry.

Period of Analysis

We began our quantitative analysis in 1987, the year after the Chernobyl accident, when the PV industry was still in its infancy. We ended the analysis in 2012 because our theory is about emerging industries, and by then the industry started to show signs of maturity, as indicated by the stabilization of density and of the European PV market (PVPS, 2013; Kapoor and Furr, 2015). Though solar PV was, for a long time, not a well-recognized category (Vergne and Wry, 2014: 72), field evidence supports the idea of solar PV emerging as an industry category during this period. In 1987, the president of Mobil Solar Energy—one of the first entrants in the industry—was asked about the company's exit from solar PV and implied in his comments that there was no real industry: ''[We] realigned our resources so that we can be a major force in this industry, when it is an industry'' (*PV News*, 1987). This changed over time, with industry professionals suggesting at the end of our observation period that ''PV has become a real industry'' or that ''Now you do have the market. . . . It's quite interesting to see the change from the old days, where there was no business, no market like in the '90s.'' Relatedly, patterns of growth for the PV industry were characterized by an early increase and later stabilization of the number of pure solar players, accompanied by a decrease in the share of producers that came from inconsistent categories. Figure 2 shows this trend, which implies

Figure 2. The emergence of an industry category.



the emergence of a producer group with increasingly clear boundaries: an industry category. We are thus confident that our period of observation captures the transition of solar PV industry from nascence to a recognized industry.

Dependent Variable

We focused on the presence of a feed-in tariff scheme for solar photovoltaics as the dependent variable and collected the data for this variable from the International Energy Agency (IEA) Photovoltaic Power Systems Program Reports, the IEA "Policies & Measures" section (http://www.iea.org/policies andmeasures/renewableenergy/), and reports by PV-ERANET, a European consortium of PV industry and government stakeholders. As these sources were available only after the mid-1990s, we collected information for the earlier years from other sources such as the industry newsletter *PV News* by searching for the terms "feed" and "tariffs." Lastly, when possible (mostly for recent years), we corroborated the information for the presence of FITs for solar PV using the Res-legal website, which features legal text for renewable energy sources in the EU, providing summaries as well as direct access to countries' renewable energy regulations (http://www.res-legal.eu/). Based on these sources, we created a dummy variable, updated annually at the country level, to capture whether there was a FIT scheme in each country for all years up to 2012.

Independent Variables

The first independent variable, *categorical density*, is the yearly number of solar PV cell producers for each country in our dataset. This is based on counts of producers that resulted from triangulation of the most comprehensive sources of information on this industry: the lists of solar PV producers published annually by *PV News* and *Photon International* (Kapoor and Furr, 2015). The high agreement between these sources and the fact that they both include small producers that had limited lifetimes allow us to conclude that virtually all producers are included in our database (cf. Tushman and Anderson, 1986: 447).

To create the second independent variable, *industry coherence*, we relied on our theory and on characteristics of the setting. Theoretically, we argued that coherence is reduced by the presence of producers with contrasting identities, i.e., producers coming from industries whose identities are most likely to contrast with the PV sector. The greater the share of these producers, the more incoherent the new industry category appears. Thus we constructed the variable *industry coherence* as one minus the ratio of the number of producers with a contrasting identity over the total number of producers. As a result, the variable takes values from zero to one, with higher values indicating greater coherence: *industry coherence* is zero when all producers have contrasting identity and one when the industry has no producers with a contrasting identity.

The operationalization of contrasting identity was based on whether a company had its origins in the incumbent energy sector, for two reasons.[5] First, the electricity sector and the predominantly oil-based transport sector are by far the most emitting sectors in the EU, together accounting for close to half of the greenhouse gas emissions in this region.[6] Companies whose core business is in these areas are seen as inconsistent with solar PV, an industry that justifies its existence based on its potential to reduce such harmful emissions. Second, qualitative evidence corroborated that the industries from which these firms originated appeared incompatible with the identity of the new industry. Despite the involvement of oil and gas producers in the solar PV industry (Pinkse and van den Buuse, 2012), these companies have always been considered flagship examples of the incumbent fossil fuel energy system (Yergin, 2008) and thus inconsistent with the very idea of green energy. For instance, "take BP in the early 2000s. They had the solar capacity, they were producers, they were all of this but they were also part of what they called the global climate coalition, the bad guys" (interview with solar PV professional). Incumbent utilities were also considered misfits. For example, the presence of energy giant E.ON's CEO at a solar PV factory opening that marked the company's entrance into PV was seen as "something of a culture shock for veteran observers of the industry" (*Photon International*, 2009). Because of their association with conventional "brown" energy, these firms were viewed as inconsistent with the nature of the solar PV industry.

A challenge with this variable was that *coherent industry* is meaningful only for observations with non-zero density. Thus we used the adjustment variable technique, which is common for dealing with missing data and more efficient than listwise deletion (Allison, 2001). We created a dummy variable D (*adjustment variable*) that takes the value of 1 when the independent variable X is missing and 0 otherwise. A second variable X^* was also created and takes the

[5] For our data, this includes all companies with primary industry (NAICS) code 21 "Mining, Quarrying, and Oil and Gas Extraction" or 22 "Utilities." It also includes oil/gas companies that were reported in "Petroleum and Coal Products Manufacturing" (NAICS code 324), which is listed under "Manufacturing" (NAICS code 32). We coded these firms separately from manufacturing because, as we argue, audiences view incumbent energy companies differently.

[6] See http://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer.

value $X^* = X$ (when data are not missing) or $X^* = C$ (for missing data). C is a constant: the unconditional variable mean. In the regression, X^* is used in lieu of X, and D is also added to the model. While this technique is inappropriate when data are truly missing, it produces optimal estimates (Allison, 2001: 9, 87) when the value has no meaning for the focal observations, as is true here: when there is no industry, the industry's coherence has no meaning.

Finally, to test H3 and H4, we created *rival sector concentration.* We considered rival industries as the conventional non-renewable energy sources that solar PV shares a market with. Using data from the World Bank Database, we captured the concentration of the non-renewable energy industries sector in a country and for a given year using the Herfindal Index (sum of the squared market shares) of the following energy sources: nuclear, coal, oil, and natural gas. A higher value indicates greater concentration.

Control Variables

We divided our control variables into two broad categories: variables that relate to the political and social environment and those that relate to industrial and economic factors that might influence regulatory support. Starting from the socio-political environment, we accounted first for transnational influences. Not all countries in our sample were members of the EU from the beginning of our observation period, so to account for the potential influence of the EU on member states—and to avoid sample selection issues—we added *country in the EU*, a dummy variable capturing whether the country was an EU member at a given point in time (1) or not (0). Moreover, we included *number of FITs* in the EU, the number of countries that had a feed-in tariff policy prior to the focal year, because horizontal EU influence was potentially important, with contagion leading to policy diffusion across countries (Dobbin, Simmons, and Garrett, 2007). We added a variable to account for the fact that policy makers can choose different types of policy support to achieve the same goals. Though other-than-FIT policies were more scarcely used in the EU, we controlled for them with *other policy*, a variable that takes the value of one if a country had any of the following policies in place: quota obligations (with or without green certificate schemes), tender systems, tax incentives, and direct financial subsidies. We also added as a control variable the *POLCON III Index*, which captures country- and temporal-level heterogeneity in the feasibility of policy change based on the number of veto players across the different independent branches of government, adjusted by the level of political alignment across these branches (see Henisz, 2000, for details).

Regulatory support likely depends on the degree to which the industry fits with prevalent normative values and beliefs in the particular country. One indicator of the normative fit or appeal of the industry is voting behavior. Because center and left-wing individuals tend to be more supportive of environmentally benign industries than right-wing voters are, the share of such voters may influence policy makers' assessments of the industry as congruent with social preferences (Olofsson and Öhman, 2006; Lyon and Yin, 2010). We controlled for this with *center–left party votes*, the share of votes for center and left parties in the last election in the country (Armingeon et al., 2013).

The presence of a supportive social movement may also function as evidence of an industry's normative appeal, because social movements visibly express public preferences (Georgallis, 2017); as such, industries may be more likely to receive political support when backed by a strong social movement. We thus controlled for *Greenpeace membership*, the number of paying Greenpeace supporters per 100 people. Membership in social movement organizations is frequently used as a proxy for the regional strength of social movements, including the environmental movement (e.g., Hiatt, Sine, and Tolbert, 2009; Sine and Lee, 2009; Durand and Georgallis, 2018). Interviews with environmentalists and solar industry professionals suggested that, despite its often being depicted as a radical activist group focused on confrontational action, Greenpeace has been active in campaigning to promote solar PV in Europe for a long time (Jacobsson and Lauber, 2006; Durand and Georgallis, 2018); see Online Appendix A (http://journals.sagepub.com/doi/suppl/10.1177/0001839218771550) for a timeline of Greenpeace's involvement. In addition, cross-national patterns of Greenpeace membership reflect the external validity of this proxy, as they are consistent with differences observed in prior research on the strength of the environmental movement across European countries (e.g., Rootes, 1999; Rucht, 1999). We collected longitudinal data for this variable from the Greenpeace International archive, a prior study by Von Stein (2008), and annual reports from national Greenpeace branches and Greenpeace International. The few values that were still missing after combining data from these sources were imputed using linear interpolation (Sine and Lee, 2009).

Economic or industry-related factors may also affect regulatory support. Countries with an already established renewable sector or with local sources of energy may not see a need to support solar PV. Therefore we controlled for *renewable energy market*, a country's electricity production from renewable sources excluding hydroelectricity, and *energy imports*, a country's energy use less production (both measured in oil equivalents) as a percentage of energy use. We also included countries' average annual *solar radiation*, a non-time-varying categorical variable that for EU countries takes values from 3 to 8; it reflects solar radiation in $kWh/m^2/day$, based on data from the U.S. National Renewable Energy Laboratory. We also added *GDP change* (per capita), as better economic conditions may offer fertile ground for the government to support a new industry. Finally, to ensure that our results do not merely reflect changes in the attractiveness of solar PV as a technological option, we added a control variable for *module price*, the average selling price (per watt) of solar PV modules across time. A lower price reflects technological advances that limit the marginal costs of subsidizing the industry.

Models

The EU context offers a ''natural laboratory'' of varying solar PV industrial density and coherence, with comparable cross-country data that enabled us to isolate how specific policies are affected by industry. That said, the context also created challenges for our econometric specification: the possibility of endogeneity due to unobserved heterogeneity, the threat of endogeneity because of simultaneous causality, and the serial correlation that arises from repeated observations of countries over time. Although econometric treatments exist to address these issues, given our dataset it was difficult to fully address all of them simultaneously.

As in most settings, one potential source of endogeneity could be unobserved heterogeneity, i.e., omitted variables correlated with both FITs and the research variables. A common way to deal with this problem in organizational research is the use of a fixed-effects estimator, which allows a static effect for each entity to be correlated with the error term. Aside from the requirement that unobserved heterogeneity must be stable over time, however, fixed effects have shortcomings that make them inappropriate for this study. One limitation is that fixed-effects estimators are biased in the case of nonlinear models, such as with binary dependent variables (Greene, 2004; Stata Corp., 2013: 3). A second and much less recognized limitation is that in a fixed-effects specification, any entity without variation on the dependent variable has to be dropped from the analysis, leaving a potentially distorted sample (Denrell and Kovacs, 2008: 123). Had we used fixed effects here, the excluded countries would be dropped precisely because they did not have FITs during the observation period, causing selection on the dependent variable. Finally, fixed-effects models are not fit for addressing the second and most likely source of endogeneity in this setting: simultaneous causality.

Simultaneous causality is possible because—in addition to the number of category members affecting FIT policies—such policies may also induce firms to enter the industry and therefore affect density. Given these challenges, we decided to fit the data using an instrumental variable (IV) model. IV models use instruments to partial out the portion of a research variable that is endogenously linked to the error term. They represent an appropriate solution for addressing endogeneity (Stock and Watson, 2007; Bascle, 2008; Angrist and Pischke, 2009) and the most appropriate solution when multiple sources of endogeneity might be present (Bascle, 2008: 287).[7]

We estimated a maximum likelihood two-stage IV model using the *ivprobit* command in Stata, which is relevant for binary regressors. The model automatically regresses the endogenous variable (density) on the instrumental variables and all independent and control variables in the first stage; in the second stage, the model uses the predicted value from the first regression and all other regressors to predict the dependent variable. The model is depicted below:

$$y_1{}^* = y_2\beta + \chi_1\gamma + u, \text{ with } y_2 = \chi_1\Pi_1 + \chi_2\Pi_2 + \upsilon$$

where y_2 represents the endogenous variable, χ_1 is a vector of independent and control variables, χ_2 represents the vector of instrumental variables, β and γ are vectors of structural parameters, Π_1 and Π_2 are matrices of reduced-form parameters, and u and υ are heteroscedasticity and auto-correlation (HAC) robust standard errors.

[7] Modeling FIT likelihood as an event (e.g., using survival analysis) would also alleviate reverse causality concerns, but such a choice would lead to biased estimates because there are too few events to analyze (22 countries with FIT policies). Simulation studies by Concato et al. (1995) and Peduzzi et al. (1995) showed that a low "events per variable" ratio (EPV) leads to severely biased results. For instance, for EPV values as low as 2, the bias in the coefficient estimate can be as large as 100 percent, and the variance can be underestimated or overestimated. They suggested as a rule of thumb that EPV must be at least 10 to maintain confidence in the results. Since then, other rules of thumb have been recommended for the EPV (ranging from 5 to 20; see Ogundimu, Altman, and Collins, 2016), none of which is close to what can be realistically achieved in this context, in which the number of events is approximated by the number of parameters.

We selected two instruments for the analysis: the number of patent applications and the number of scientific and technical journal articles in each country and year.[8] These variables are appropriate for two reasons: (a) because the production of solar PV cells is technologically intensive (Kapoor and Furr, 2015), more innovative countries should exhibit greater patterns of entry in the industry, yet (b) the variables are likely detached from public decision makers' control, given that differences in patenting propensity and technological proficiency are longstanding and not attached to the choice of subsidizing a particular industry. These assertions correspond to the two criteria of the IV estimator: the relevance and exclusion assumptions (Stock and Watson, 2007).

The exclusion assumption requires that instruments be exogenous conditional on the covariates, i.e., have no effect on the dependent variable through a path that does not go through the other independent or control variables. We tested the exclusion assumption with the difference-in-Sargan statistic (Hayashi, 2000), which failed to reject the null hypothesis that the instruments are exogenous ($p > .10$). The relevance assumption requires that, once covariates have been netted out, there is an association between the instruments and the endogenous regressor (Bascle, 2008). Although a weak correlation is sufficient for perfectly exogenous instruments, the IV model can be biased even under minor deviations from the exogeneity assumption when the fit between the endogenous regressor and the instruments is weak (Stock and Watson, 2007: 441). This has led to a more cautious imposition of the relevance assumption, one that requires strong (i.e., more relevant) instruments. Instrument strength is assessed using the first-stage F-statistic, with 10 being the most typical threshold to accept that a set of instruments is strong (Stock and Watson, 2007). We tested the relevance assumption and found that our instruments conform to this requirement, as the F-statistic was substantially higher than 10 ($F = 35.9$). Therefore, these two variables form a valid instrument pair for the effect of density on feed-in tariffs, as they satisfy the assumptions of the IV estimator. Finally, the Wald test of exogeneity confirmed our expectation that density is not exogenous to feed-in tariffs, verifying the need to use an instrumental variable approach.

A last modeling constraint was related to time. So far we have assumed that $\mathrm{corr}(u_{it}, u_{iT}) = 0$ for $t \neq T$. This is unlikely for time series data, as observations of the same country are likely to be serially correlated. We thus report clustered standard errors, which correct for within-country serial correlation of errors and heteroskedasticity. The idea is that "each cross-sectional unit is defined as a cluster of observations over time, and arbitrary correlation—serial correlation—and changing variances are allowed within each cluster" (Wooldridge, 2012: 483). An alternative approach to adjust for serial correlation is the use of a correction developed by Newey and West (Cameron and Trivedi, 2009: 84), but Newey–West standard errors are not available for the *ivprobit* command, so we report them in a robustness test for which we used a different model.

Time-varying factors shared across observations can also influence the results, so we added dummy variables that capture common influences on European countries across different periods. The first period reflects the early years of the industry, before the EU's first white paper on renewable energy

[8] Data were available from the World Bank; for a few countries there were missing values between some years, which we imputed using linear interpolation.

sources (COM(97)599)—the EU's first formal indication of support for renewable energy in 1997. The second is the period between 1997 and 2001, a benchmark year for the promotion of renewable energy in the EU because of the publication of the first directive on the promotion of electricity produced from renewable energy by the European Commission (2001/77/EC) and the ruling of the European Court of Justice that feed-in tariffs were in line with EC treaties on state aid (Marques, Fuinhas, and Manso, 2010). The third phase is the period between the first and the second EU directive, which was published in 2009 (2009/8/EC). The fourth is the period from 2009 onward. Thus we created four dummy variables, the first used as the baseline and the others included in the models.

To facilitate causal inference, we lagged the independent variables by one year. We ensured that outliers do not unduly influence the results by winsorizing the non-bounded research variables at their 2nd and 98th percentiles. Finally, we centered the continuous predictors to reduce nonessential collinearity.

RESULTS

In table 1 we report descriptive statistics and correlations for the variables used in the models. The results (second-stage results of the *ivprobit* model) are reported in table 2. Models 1 and 2 present the tests of the main effects (H1–H2), and the next models report tests of interaction effects (H3–H4). In models 5 and 6 we report sensitivity analyses, discussed below.

Table 1. Descriptive Statistics and Correlations*

Variable	Mean	S.D.	1	2	3	4	5	6	7	8
1. Feed-in tariff	.30	.46								
2. Country in the EU	.70	.46	.30							
3. Number of FITs	7.47	7.01	.56	.35						
4. Other policy	.30	.46	.29	.35	.58					
5. POLCON III Index	.46	.12	.04	.07	.04	.09				
6. Center–left party seats	.58	.37	.07	.08	–.09	–.04	.07			
7. Greenpeace membership	.47	.88	.01	.22	–.05	.09	.28	.26		
8. Renewable energy market	3.17	4.95	.18	.35	.46	.19	–.11	–.06	.11	
9. Energy imports	.54	.31	.14	.01	–.01	.08	.15	.14	–.13	–.19
10. Solar radiation	4.98	1.62	.18	–.10	–.01	–.07	–.27	.04	–.29	–.14
11. GDP change	1.13	2.53	.04	.16	.11	.13	.04	.02	.16	.08
12. Module price	4.87	2.30	–.45	–.22	–.78	–.50	–.06	.06	.08	–.38
13. Categorical density	1.16	3.41	.34	.19	.13	.03	–.02	.17	.02	.18
14. Industry coherence	.72	.22	.18	–.15	.09	–.01	–.32	–.01	–.42	.02
15. Rival sector concentration	40.95	25.98	–.09	–.10	–.02	–.01	–.12	–.10	–.10	–.30

Variable	9	10	11	12	13	14
10. Solar radiation	.49					
11. GDP change	.04	–.11				
12. Module price	.03	.02	.01			
13. Categorical density	.05	.01	.01	–.12		
14. Industry coherence	.03	.06	–.02	–.15	.13	
15. Rival sector concentration	.07	.16	.03	.02	–.10	–.05

* Absolute values above .11 are significant at the 1-percent level.

Table 2. Effects of Categorical Density and Coherence on the Likelihood of Feed-in Tariff (N = 624)*

	Main effects		Interaction effects		Model sensitivity	
Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Industry						
Categorical density (H1)	.685•••	.665•••	1.129•••	1.133•••	.156•••	.795•••
	(.168)	(.188)	(.228)	(.290)	(.034)	(.114)
Industry coherence (H2)		2.055••		.732	.140••	.863••
		(.655)		(.557)	(.045)	(.285)
Rival sector concentration			.020•	–.016	–.002	–.024••
			(.010)	(.013)	(.002)	(.008)
Interaction effects						
Categorical density ×				–.045	–.082•	.452+
Coherent industry				(.399)	(.033)	(.247)
Rival sector concentration ×				.045•	.006•	.051•••
Coherent industry				(.020)	(.003)	(.013)
Rival sector concentration ×			.041•••			
Categorical density (H3)			(.010)			
Interaction effects comparison (H4)						
Rival sector concentration ×				.046•••	.004••	.053•••
Categorical density ×				(.011)	(.001)	(.012)
Coherent industry						
Rival sector concentration ×				.003	.000	–.004
Categorical density ×				(.011)	(.002)	(.007)
Incoherent industry						
Control variables						
Country in the EU	.645+	1.237••	.099	.031	–.017	.326
	(.389)	(.418)	(.420)	(.514)	(.034)	(.313)
Number of FITs	.166•••	.183•••	.207•••	.242•••	.041•••	.248•••
	(.034)	(.032)	(.034)	(.037)	(.005)	(.033)
Other policy	–.982••	–.995•	–1.284•••	–1.484•••	–.168•••	–1.387•••
	(.367)	(.388)	(.381)	(.441)	(.042)	(.240)
POLCON III Index	1.515	3.429••	1.857	1.759	–.041	1.763
	(1.696)	(1.202)	(2.096)	(2.158)	(.132)	(1.132)
Center–left party votes	.040	–.094	.354	.017	.003	.060
	(.317)	(.297)	(.348)	(.366)	(.034)	(.273)
Greenpeace membership	.319••	.572•••	.371•••	.518•••	.061•••	.522•••
	(.120)	(.155)	(.096)	(.119)	(.016)	(.098)
Renewable energy market	–.076•	–.087••	–.073•	–.069•	–.011••	–.071•
	(.031)	(.032)	(.030)	(.031)	(.004)	(.029)
Energy imports	.180	.071	.750	1.311	.180•••	1.149••
	(.577)	(.630)	(.802)	(.847)	(.055)	(.422)
Solar radiation	.185	.271•	.350•	.339•	.043•••	.371•••
	(.125)	(.127)	(.151)	(.151)	(.011)	(.073)
Module price	–.277••	–.284••	–.286••	–.278•	–.009	–.286•••
	(.094)	(.108)	(.089)	(.115)	(.009)	(.077)
GDP change	–.017	–.027	–.003	–.014	–.003	–.024
	(.019)	(.020)	(.025)	(.031)	(.007)	(.036)
Period dummy: 1997–2001	–.817••	–1.092•••	–.668••	–.850+	.037	–1.074••
	(.257)	(.285)	(.236)	(.447)	(.050)	(.372)
Period dummy: 2002–2008	–.484	–.980•	–.129	–.107	.096	–.323
	(.421)	(.426)	(.463)	(.561)	(.067)	(.470)
Period dummy: 2009–	–.779	–1.184•	–.332	–.432	.112	–.725
	(.497)	(.550)	(.624)	(.847)	(.104)	(.655)
Constant	–1.745•••	–2.267•••	–1.391••	–1.527•	.286•••	–1.926•••
	(.395)	(.469)	(.441)	(.684)	(.046)	(.338)

(continued)

Table 2. (continued)

	Main effects		Interaction effects		Model sensitivity	
Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
$\chi 2$	197.39	525.56	305.03	1391.28	–	234.77
Log-pseudo-likelihood	–1185	–1068	–931	–620	–	–
R-squared	–	–	–	–	.542	–

+ $p < .10$; •$p < .05$; ••$p < .01$; •••$p < .001$.

* Models 1–4: Instrumental variable (IV) probit model estimates; model 5: IV GMM model estimates; model 6: Probit model estimates. Adjustment variable for *industry coherence* included in models with this variable but not shown. All continuous variables were centered prior to estimation. Heteroscedasticity and auto-correlation (HAC) robust standard errors are in parentheses.

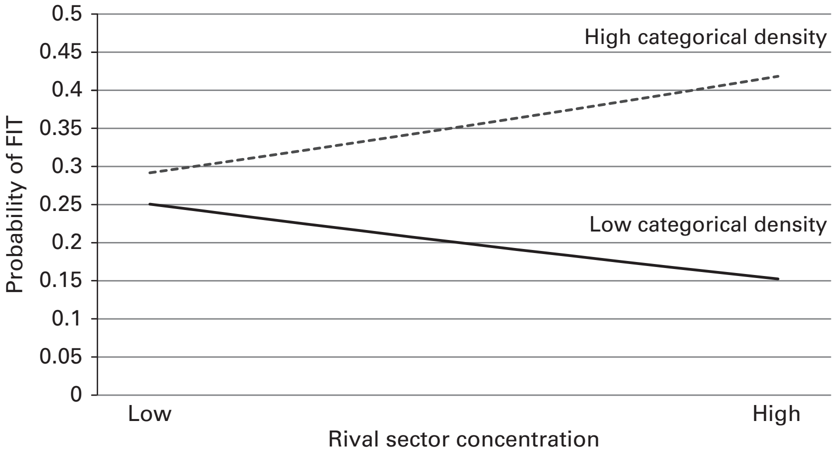
Model 1 includes all control variables and density. It shows that even after accounting for the endogeneity of *categorical density*, its effect on the likelihood of policy support is positive and significant, supporting H1. Because in nonlinear models the effect of a variable can vary over the sample, we also calculated the average marginal effect (AME), the mean of marginal effects evaluated at each observation, for each variable. The AME of density is .11 ($p <$ .01); this suggests that each additional producer increases the predicted probability of a feed-in tariff by 11 percent, on average. This is a sizeable effect, considering that it is substantially larger than the frequently studied impact of diffusion effects (AME $_{Number\ of\ FITs}$ = .03; $p < .01$).

In model 2 we added *industry coherence* and found support for H2, as the coefficient is positive and significant. A more coherent industry positively affects the likelihood of FIT policy in the country. The AME of this variable is .32 ($p < .10$), suggesting that a completely pure solar PV industry—one with no producers coming from industries with a contrasting identity—will be 32 percent more likely to receive FIT support than a fully incoherent industry at the same level of density.

Next, we tested the interaction effects. We predicted that *rival sector concentration* will increase the impact of density on feed-in tariffs. The results appear consistent with this prediction as the interaction of *rival sector concentration* with *categorical density* is positive and significant (model 3). Because interpreting interaction term coefficients in nonlinear models is not straightforward, the best way to assess such effects is by use of graphs (Hoetker, 2007); we thus graphed the probability of FIT across representative values of the interacting variables. Figure 3 confirms model 3's support for H3: in countries with low density, the probability of FITs decreases by about 10 percent when moving from low to high concentration, but in countries with high density the probability increases with concentration by roughly 13 percent.

We then tested our last hypothesis. H4 posits that the interaction effect conveyed by H3 will be stronger for industries that are more coherent than for industries that are incoherent. As three-way interactions can be difficult to interpret, an appropriate approach to test this prediction is the so-called partition (or reference) approach, which offers an intuitive way to assess differences in coefficients (Yip and Tsang, 2007; Buis, 2012). We first defined industries as

Figure 3. Estimated probability of FIT across different values of rival sector concentration and categorical density.*



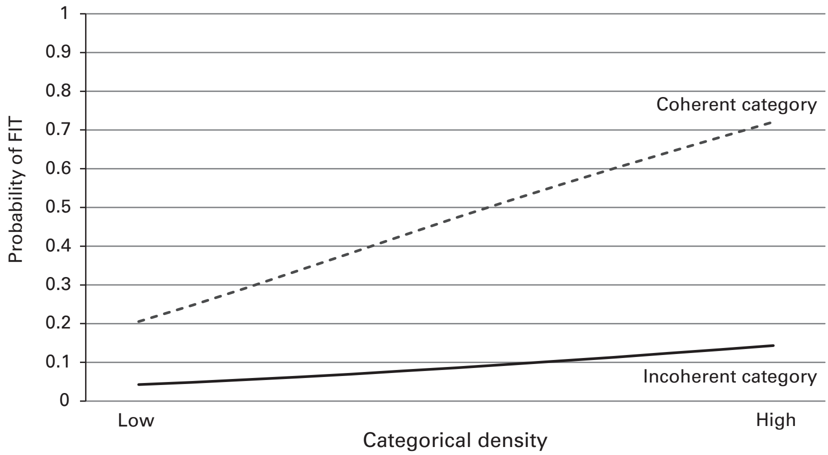
* The solid and dotted lines correspond to different values of categorical density (low = 20th percentile, high = 80th percentile).

coherent (those with above-average coherence) versus incoherent (those with below-average coherence) and then fit separate intercepts for *categorical density*, *rival sector concentration*, and *Categorical density* $\times$ *Rival sector concentration* by the two levels of industry coherence (Mitchell, 2012). This approach partitions the effect of the interaction on the dependent variable based on the values of a third variable, and it allows us to formally test the difference in the interaction coefficients for coherent versus incoherent industries. We also used graphical representation to further probe the hypothesized differences.

Results are displayed in model 4 of table 2.[9] The positive interaction between *categorical density* and *rival sector concentration* is stronger for coherent industries than for incoherent industries, and it is significant only for coherent industries. Further, a Wald chi-squared test suggests that the difference in coefficients is significant ($\chi^2 = 5.54$; $p < .05$). More specifically, we argued that for high levels of *rival sector concentration*, the effect of density will be weaker if the industry is incoherent. Figure 4 supports this argument, as it shows that for high levels of *rival sector concentration*, density increases the probability of FITs more when the industry is coherent (by about 52 percent) than when it is incoherent (by about 10 percent). Detailed inspection of marginal effects (available from the authors) reveals that this effect is significant at the 5-percent level across most observed values when the industry is coherent but insignificant when it is incoherent. This finding indicates that the concentration of rival interests provides opportunities for the PV industry, but only when

[9] The common guideline of including lower-order terms when testing for higher-order interactions (e.g., Aiken, West, and Reno, 1991) has been occasionally criticized as overly stringent or sometimes unnecessary (see Allison, 1977: 149–150 for details). Thus we also assessed H4 without the lower-order terms and found similar results. Further, it is generally agreed that in the presence of a higher-order interaction the lower-order terms cannot be meaningfully interpreted (Aiken, West, and Reno, 1991; Mitchell, 2012), so we included but do not discuss them.

Figure 4. Estimated probability of FIT across different values of categorical density and industry coherence, for high levels of rival sector concentration.*



* Solid and dotted lines mark a coherent and incoherent industry category, respectively (low = 20th percentile, high = 80th percentile).

the PV industry category is coherent. Taken together, the above results offer strong support for the last two hypotheses.

As discussed above, given data considerations, we selected an instrumental variable probit model as the most appropriate method. Nevertheless, we performed additional tests to assess model sensitivity. First, to ensure that the results are not overly reliant on the assumptions of the probit estimator, we used an instrumental variable generalized methods of moment (GMM) model instead. Contrary to the traditional IV/2SLS estimator, which is inappropriate for nonlinear models, the GMM estimator allows for violations of distributional assumptions and independent and identically distributed errors. Second, to ensure that the results are not overly reliant on the choice of the instrumental variable method, we estimated a non-IV probit model. In both cases, we used Newey–West's method to correct for heteroskedastic and auto-correlated standard errors (Baum, Schaffer, and Stillman, 2007). The results from these two models—reported in the last two columns of table 2—corroborate the central findings discussed above.

Alternative Explanations and Field Research Evidence

Although not our main focus, the control variables helped us rule out some alternative explanations. We found a significant effect of contagious diffusion, with a feed-in tariff being more likely when more EU countries have already adopted them. Other policies appear to substitute for FITs, and solar radiation has a positive effect that is significant in most models. As predicted, countries that already have a large renewable energy market are less likely to support the solar PV industry. Improvements in PV technology are also associated with FITs; as the prices of solar PV modules drop, FITs are more likely. We also found support for one measure of the normative value of the industry, with Greenpeace membership having a positive effect on FIT likelihood. Finally, we found that FITs were less likely between 1997 and 2001. All other period dummies are insignificant, indicating that the other variables associated with time-varying effects

Table 3. Robustness Tests (N = 624)*

Variable	Model R1	Model R2	Model R3	Model R4
Categorical density	.678••	.801•••	.669•••	1.111•••
	(.212)	(.226)	(.185)	(.286)
Local firms	.059			
	(.520)			
Largest firms		–1.846••		
		(.605)		
De alio, incoherent			–2.165••	
			(.738)	
De alio, other			–.109	
			(.730)	
Diversity (Simpson's Index)				–4.355•••
				(1.293)
Constant	–2.118•••	–2.321•••	–2.268•••	–2.908•••
	(.517)	(.464)	(.446)	(.498)
$\chi 2$	278.9	227.1	278.0	206.8
Log-pseudo-likelihood	–1065	–1069	–1062	–977

• $p < .05$; ••$p < .01$; •••$p < .001$.

* Instrumental variable (IV) probit model estimates. Adjustment variables included but not shown. All continuous variables were centered prior to estimation. Heteroscedasticity and auto-correlation (HAC) robust standard errors are in parentheses. All other controls, as well as period dummies, are included in all models.

adequately capture the relevant circumstances across different points in time. This was corroborated by an unreported test in which we added a running clock variable capturing industry age instead of period dummies, as this variable was insignificant. Because its inclusion did not affect the results but led to substantially higher variance inflation factors, the use of period dummies is preferable.

One alternative explanation for our main effects could be that it is not the categorical features of the industry that matter, but the political connections and lobbying power of its members. But this explanation does not withstand scrutiny. First, producers owned by local firms are presumably more likely than those owned by foreign firms to enjoy political connections that offer influence over policy making, but a variable capturing the share of local firms in the industry did not significantly affect the outcome (see table 3, model R1). Second, larger companies should have more power to influence policy, but we found that the presence of very large companies in the PV industry has a negative effect on FITs (model R2).[10] Presumably, this is because all these large companies are de alio entrants into PV and increase incoherence because they do not resemble typical members of the category. In an additional test, we found that de alio members have a generally negative effect on FIT policy, which is significant only for de alio members coming from inconsistent industries, i.e., for the companies that create more confusion concerning the coherence of the industry category (model R3). Finally, we considered another alternative explanation for the finding behind H2: it could be that governments perceive there is less need to support a new industry that has established entrants. This account, however, does not fit the general pattern of results. A need-based explanation

[10] We did not have complete data on the size of all firms, so we used the share of firms that were listed in the *Fortune* Global list of largest companies in the world.

would also suggest that as the density of the industry grows, the need to support it is lower (smaller industries need support more than large ones), but this is inconsistent with the observed effects of density. Moreover, the above-mentioned account would suggest that the presence of de alio firms reduces the likelihood of FIT but cannot explain why the origins of de alio firms matter. A final robustness test (model R4) yields results inconsistent with this explanation: we captured coherence differently and found that the diversity of industry members lowers the likelihood of policy support.[11] This finding offers corroborative evidence that industry coherence is driving the observed results.

One would reasonably ask why concentrated rivals would not exert power to quash policy support for solar PV. Our field research suggested that although PV producers were increasingly recognized as forming a distinct industry, this industry was not seen as a serious threat to incumbents. As late as 2012, when asked if solar PV was a threat to the core business of utilities, one manager responded, ''Solar is so small. Today even if it has a positive growth rate it's still not a large enough contributor to electricity production as well so there are no real reasons for utilities to fear solar today. That's not a relevant question.'' Another energy business executive said, ''We are not considering this industry as a threat to our business. . . . It's only a new business to be added to our core.'' And answering an unrelated question about the difficulties of promoting solar PV, an environmental activist noted that ''solar PV is very often not taken seriously because they think it's so small and just to power a few light bulbs, that's it, and so they don't really take it seriously.'' While these insights set a critical boundary condition for our study, which we discuss later, they also add to our knowledge of how small and powerless industries that operate in seemingly hostile environments can attain valuable state endorsement.

Finally, governments may have several goals or constraints to balance when considering support for nascent industries such as solar PV, which we considered in separate robustness tests. We constructed a measure that captures EU-sourced pressures and included it in the analysis. Moreover, we accounted for additional control variables that capture demographic conditions, fiscal constraints, and competition from outside the EU. We also examined whether firms anticipating policy could affect our results and found that this is unlikely to be the case. These and other tests did not significantly add to the prediction, and the main findings were not substantively altered in any of them. We discuss these tests in Online Appendix B.

DISCUSSION

State endorsement can be an important catalyst for nurturing nascent industries. Policies have been credited with fostering entry in a wide variety of settings, including railroads (Dobbin and Dowd, 1997), farm wineries (Swaminathan, 1995), green buildings (York and Lenox, 2014), responsible

[11] Industries with members of diverse origins are likely seen as incoherent. Thus we used the Simpson's Index of diversity, which is used in ecology research to measure the diversity of species. This index takes the value of $1 - \frac{\Sigma n(n-1)}{N(N-1)}$; n = number of de alio firms from a particular industry; N = number of de alio firms from all industries. Higher values indicate greater diversity; lower values indicate greater coherence.

investment (Yan and Ferraro, 2016), and renewable energy (Russo, 2001). Yet, despite the recognition of the co-evolutionary relationship between government institutions and industry (Pacheco, York, and Hargrave, 2014), the impact of industry emergence on regulatory institutions has received much less attention than the impact of policy on industry emergence (Madsen, 2008; see Scott, 2013: 114, for a discussion). We respond to this gap by considering how regulatory support for solar PV has been simultaneously influenced by the industry category itself and by the inter-industry structure of adjacent rival industries. Our results suggest that feed-in tariffs (FITs) for solar PV are more likely to be present when more solar producers are already operating in the focal country but less likely when the members of this industry category come from industries with contrasting identities, as such organizations reduce the industry's coherence. Further, these effects are moderated, in complex and previously unconsidered ways, by the structure of entrenched interests: a concentrated rival sector enhances the new industry's chances to receive policy support, but only when the industry is coherent. Our study contributes to existing research on regulation and industry emergence and to research on categories.

Regulation and Industry Emergence

Our findings suggest that regulatory support is more likely to emerge for a new industry when the participants can be recognized as forming a distinct and coherent industry and when this industry emerges in the presence of a concentrated incumbent sector. In treating policy support as emergent and influenced by characteristics of the nascent population and incumbents, we offer an explanation for regulatory action that complements accounts of such support that have emphasized the role of power on the part of the industry receiving the support (Stigler, 1971; Dal Bó, 2006; Baldwin, Cave, and Lodge, 2012), focused on social movements that frame the industry as a solution to a problem (Pacheco, York, and Hargrave, 2014), or painted regulators as acting exogenously to intervene and create industries (Haveman, Russo, and Meyer, 2001; Hoppmann et al., 2013). Though we do not deny that these processes can occur, our findings suggest that it is beneficial to view the government as an audience for which the density and coherence of the nascent industry provide vital signs that the industry is worthy of support.

We do not argue that power, and even regulatory capture, cannot play a role in spurring policy support, but these are unlikely to be primary drivers of such support when the focal industry is nascent and has relatively little leverage over government actors. Our robustness tests indicate that lobbying is not the primary mechanism driving the results and thus tell a different story from what a "capture" explanation—common in studies of established sectors—would predict. The findings are more consistent with a story of resource partitioning (Carroll and Swaminathan, 2000), in which concentrated rival sectors represent incubation environments (Hoogma at al., 2002; Markard, Raven, and Truffer, 2012) that offer viable niches sheltering the new industry from competitive pressures and allowing for the recognition and positioning of its distinct (and coherent) interests against those of an identifiable, salient enemy. Our findings also complement research on industry protection that suggests that governments sometimes exogenously pick an industry to support because it is consistent with their goals (Grossman and Horn, 1988; Chang, 2003; DeVaughn and

Leary, 2016). Similar to this line of work, we do not see policy as determined by powerful interests "capturing" the state but rather as a top-down decision by government to endorse a nascent sector. Yet we depart from this approach by suggesting that supportive policies are not exogenously determined; rather, as organizations begin to create market space by offering a new product or service, an industry category emerges. And as the industry grows in salience and coherence, governments come to recognize the reality of a new industry and face the need to respond with legislative action. Thus a bottom-up gradual change elicits top-down state action, as governments "react to rather than elicit category emergence" (Durand and Khaire, 2017: 94). Further, as policy makers need to strike a balance between the emergence of new industries and the maintenance of the status quo (Zysman and Tyson, 1984), support is more likely when the rival sector is concentrated, offering opportunities for the new industry to grow without jeopardizing dominant vested interests.

We thus contribute to policy studies by suggesting that categorical cues, and not power per se, may be a critical factor in influencing regulation that affects nascent industries. Attending to power alone fails to account for the multiple, sometimes conflicting constituents that governments frequently attempt to satisfy (Chun and Rainey, 2005) and for the positioning of new industries in reference to existing sectors. Categorical density and the coherence of a new organizational population critically influence policy and are more likely to lead to policy support when the competitive environment is conducive to the industry category's theorization attempts, easing audiences' ability to perceive the new industry's distinct identity.

Research on Categories

Research on categories in markets has emphasized category spanning and its evaluation by various audiences (producers, clients, and third parties), largely ignoring the role of the state or assuming that political intervention predates category emergence (Haveman, Russo, and Meyer, 2001; King, Clemens, and Fry, 2011). This study provides new evidence that categories act as a fundamental component of institutions (Durand, Granqvist, and Tyllström, 2017): the density and coherence of an industry category influence policy even after accounting for the industry's normative appeal. These characteristics constitute cognitive cues that enable emerging industry categories to become part of social reality and receive support from a political audience.

Our study also contributes to a debate in category research that seeks to articulate the main mechanisms that make an audience react to entities that do or do not correspond well to a categorical system. One side of the debate argues that the main mechanism underpinning identification and behavior (sanction or support) is familiarity with memorized prototypes and perceived similarity among a category's members (Hsu, Hannan, and Koçak, 2009; Negro, Hannan, and Rao, 2011). The other side stipulates that, in business situations, category evaluation resembles a satisfaction principle by which an audience looks for elements offered by the entities that best fit its needs (Paolella and Durand, 2016; Zuckerman, 2017). Consistent with the former account, we find that regulatory support is significantly less likely when members' identities do not accord with the industry category's identity, rendering the category incoherent. Consistent with the latter, our results show that policy makers are more likely to acknowledge an industry when it allows them to maintain a balance of power with incumbent industries. By highlighting the importance of both the features of the industry and the position of the audience, we contribute to a more holistic understanding of how industry categories come to be accepted and supported. And by focusing on the precise origins of de alio entrants to a nascent industry, we move beyond the study of incompatibilities to address how oppositions between rival industry categories factor into an audience's decision. The commonly accepted classification of entrants into pure players (de novo) and category spanners (de alio) may need to be reconsidered on the basis of our findings. Our theory and results (model 2 and model R3) imply that this classification masks another salient distinction that influences audiences' attention: the presence of organizations that do not just span but that contradict categorical expectations.

These findings also call attention to the mechanisms that lead to support or sanction at the level of the category itself. Prior studies have emphasized how organizations and their products fare in the case of categorical spanning but have said less about how spanning at the organizational level affects outcomes at the industry level. We suggest that this omission is consequential, as findings cannot be directly extrapolated across levels of analysis. Ruef and Patterson (2009: 486) found that category spanning ''need not be problematic [for the deviating organizations] when classification systems themselves are emergent.'' But precisely because the emergent category is not established, the consequences of spanning can be substantial for the category itself: we find that regulatory support is significantly less likely when the industry comprises members whose identity renders the category incoherent. By raising the level of analysis to the industry and studying state policy, this study expands the domain of the categories research stream.

More generally, by drawing connections among categories research, industrial policy making, and resource partitioning, we are able to reach conclusions that would not be derived by any of these research fields in isolation. Exploring the cognitive underpinnings of market arenas, researchers studying categories have addressed the composition of industry categories but have rarely considered how the structure of existing sectors affects opportunities for political intervention. By contrast, theories of regulation and resource partitioning have paid attention to the structure of existing sectors but not to how a nascent industry can interact with and present itself in relation to rival sectors. Studies from these theoretical traditions might benefit from considering not only how the existing industry structure invites entry by leaving niches open but also that the composition of the emergent industry determines how much the incumbent sector's structure matters. By drawing on these ostensibly unrelated theoretical ideas, we have been able to signify novel relationships between cognitive and structural conditions and present a theoretical framework that yields considerable insights into the determinants of policy support for emerging industries.

Generalizability, Limitations, and Future Research

The importance of solar PV in tackling climate change, one of the grand challenges of our times (Howard-Grenville et al., 2014), makes it an interesting case on its own. Yet it is important to consider how and under what conditions our theory might generalize to other contexts.

Regulatory support, which could include preferential regulations more generally (e.g., subsidies, licenses granted to some organizations but not others), has been common for many industries in many countries (Cimoli, Dosi, and Stiglitz, 2009). The motivations leading governments to endorse a nascent industry can be as disparate as to protect a normatively valued industry (York and Lenox, 2014), develop military applications (Rao and Singh, 2001), or create employment opportunities (Del Rio and Mir-Artigues, 2014). Yet the visibility associated with growing categorical density and the (lack of) distinctiveness associated with (in)coherence are fundamental properties of organizational groupings that generalize to multiple settings. Similarly, discrediting the status quo is critical for new industries to justify their being, as has been shown in fields as diverse as French gastronomy (Rao, Monin, and Durand, 2005), management consulting (David, Sine, and Haveman, 2013), and high definition television (Dowell, Swaminathan, and Wade, 2002). Thus the concentration of rival interests may open up possibilities to influence policy for organizations in other emergent industries.

The empirical setting for this study involves a nascent industry that had potential environmental benefits for the countries that considered supportive policies, creating a ''positive valence'' (Hsu and Grodal, 2015). Our arguments, however, apply to other situations in which such valence is neutral or potentially negative, but the policy outcome itself may differ. Industries that are populated by distinct and coherent actors are more likely to elicit regulatory responses. For example, some U.S. jurisdictions have enacted regulations to curtail payday loans, but one of the reasons that more states have not acted may be the fractured nature of the industry (Stegman, 2007), which includes both traditional banks and standalone payday loan operations. In general, we expect that regulatory responses are influenced by characteristics of the nascent industry, the incumbent interests that it rivals most closely, and where applicable, the degree of social movement support or opposition to the industry.

An important boundary condition arises from the fact that the industry was still emerging. As discussed above, our results rest on the fact that the industry was seen as too small to be a threat to the established energy apparatus. Unlike large threats that often trigger a response, small threats can fly under the radar. It is likely that the relevance of lobbying power and categorization in determining state policy vary over an industry's lifecycle. Future research can attempt to uncover whether there is a critical threshold after which power relations overwhelm categorical cues as industries transition to maturity.

Another interesting research direction is to explore how intermediaries foster or hinder an industry category's chances of receiving policy support. A recent line of inquiry has demonstrated that social movements can significantly influence industry development (e.g., Lounsbury, 2001; York and Lenox, 2014; Durand and Georgallis, 2018). But this research has also generated findings yet to be reconciled. Sine and Lee (2009) found a positive effect of the Sierra Club, a generalist social movement organization, on regulation in the wind power industry. In a study of the same industry at a later point in time by Pacheco, York, and Hargrave (2014: 1626), however, there was no significant effect of generalist social movement organizations on state incentives. One potential reason for this discrepancy is that social movements' effectiveness at influencing policy depends on factors that vary over time, such as the coherence of industry players, or on how the new industry compares with existing rival industries. We hope future research will take up the challenge of jointly considering the impact of industry members, rival industries, and social movements in processes of emergence. Configurational comparative methods (Rihoux and Ragin, 2008) can help address such issues of conjunctural causation, as well as the open question of whether a coherent industry or the presence of a supportive movement is sufficient for market emergence (cf. Weber, Heinze, and DeSoucey, 2008).

In terms of research design, we supplemented our quantitative analysis with field research evidence and several additional tests that probed the underlying mechanisms. But directly capturing policy makers' cognition and the microprocesses that affect their decisions is beyond the scope of this study of the PV industry in 28 countries over 25 years. Detailed case studies and experimental research are needed to gain more fine-grained insights into these dynamics. Finally, generalization attempts should take into account that solar PV manufacturing has high barriers to entry and is thus undertaken by relatively few producers. This allows us to track all producers and their origins, but it also implies that our results may be less applicable to new sectors with low barriers to entry. Despite this limitation, by focusing on a relatively small industry that diffused in some countries but not in others, we partially correct analysts' tendency to study groups of organizations that have become important and numerous—a tendency that Denrell and Kovacs (2008: 136) found can lead to biased results due to the nonrandom selection of industries. Denrell and Kovaks called for studies that compare an industry's trajectory across countries as one way to mitigate this problem. Our study of European countries' solar PV industry directly heeds this call.

Conclusion

Nascent industries, and the firms that populate them, are vulnerable. Lacking cognitive acceptance from stakeholders, and sometimes founded in direct opposition to entrenched industries, they struggle to establish and maintain a presence. Favorable regulatory environments can help them to take root, but little is known about how such environments come into effect. We argue here that such environments do not emerge independently of the entrepreneurial activity they support. Rather, the newly formed ventures can benefit from their distinctiveness and exploit the structure of opposing forces to catalyze the institutional change that cements the industry's legitimacy and allows it to grow further.

Acknowledgments

The paper is based on the first author's doctoral dissertation, which was partially supported by the Society and Organizations (SnO) Center at HEC Paris, the Strategy Research Foundation, and the HEC Paris Leadership Center. The authors are grateful to Associate Editor Devereaux Jennings and three anonymous reviewers for their helpful guidance and to Linda Johanson and Joan Friedman for their editorial assistance. We also thank Eric Brousseau, Juan Alberto Aragon-Correa, Brayden King, Andrew Hoffman, Jocelyn Leitzinger, Ben Lewis, Chris Marquis, Bertrand Quelin, Todd

Schifeling, Tatiana Sokolova, Sid Vedula, Frank Wijen, and Jeff York for their comments on earlier versions of this work. Seminar participants at the University of Michigan, the University of Amsterdam, the Ivey Business School, Tilburg University, the London Business School, ETH Zurich, the University of Cyprus, HEC Paris, Erasmus University, EM Lyon, EM Grenoble, and the University of Surrey provided helpful comments.

Supplemental Material

Supplemental material for this article can be found in the Online Appendix at http://journals.sagepub.com/doi/suppl/10.1177/0001839218771550.

ORCID iDs

Panayiotis (Panikos) Georgallis https://orcid.org/0000-0001-9898-5220
Glen Dowell https://orcid.org/0000-0003-3829-7404

REFERENCES

Aiken, L. S., S. G. West, and R. R. Reno
1991 Multiple Regression: Testing and Interpreting Interactions. Thousand Oaks, CA: Sage.

Aldrich, H. E., and C. M. Fiol
1994 ‘‘Fools rush in? The institutional context of industry creation.’’ Academy of Management Review, 19: 645–670.

Allison, P.
1977 ‘‘Testing for interaction in multiple regression.’’ American Journal of Sociology, 83: 144–153.

Allison, P.
2001 Missing Data. Thousand Oaks, CA: Sage.

Angrist, J. D., and J. S. Pischke
2009 Mostly Harmless Econometrics: An Empiricist's Companion. Princeton, NJ: Princeton University Press.

Armingeon, K., R. Careja, L. Knöpfel, D. Weisstanner, S. Engler, P. Potolidis, and M. Gerber
2013 ‘‘Comparative Political Data Set III 1990–2011.’’ Institute of Political Science, University of Bern.

Baldwin, R., M. Cave, and M. Lodge
2012 Understanding Regulation: Theory, Strategy, and Practice. Oxford: Oxford University Press.

Bascle, G.
2008 ‘‘Controlling for endogeneity with instrumental variables in strategic management research.’’ Strategic Organization, 6: 285–327.

Baum, C. F., M. E. Schaffer, and S. Stillman
2007 ‘‘Enhanced routines for instrumental variables/GMM estimation and testing.’’ Stata Journal, 7: 465–506.

Benford, R. D., and D. A. Snow
2000 ‘‘Framing processes and social movements: An overview and assessment.’’ Annual Review of Sociology, 26: 611–639.

Braithwaite, J.
2006 ‘‘The regulatory state?’’ In S. A. Binder, R. A. W. Rhodes, and B. A. Rockman (eds.), The Oxford Handbook of Political Institutions: 407–430. Oxford: Oxford University Press.

Buis, M. L.
2012 ‘‘Stata tip 106: With or without reference.’’ Stata Journal, 12: 162.

Cameron, A. C., and P. K. Trivedi
2009 Microeconometrics with STATA. College Station, TX: StataCorp LP.
Carroll, G. R., and A. Swaminathan
2000 ''Why the microbrewery movement? Organizational dynamics of resource partitioning in the U.S. brewing industry.'' American Journal of Sociology, 106: 715–762.
Chang, H. J.
2003 ''Kicking away the ladder: Infant industry promotion in historical perspective.'' Oxford Development Studies, 31: 21–32.
Chun, Y. H., and H. G. Rainey
2005 ''Goal ambiguity and organizational performance in U.S. federal agencies.'' Journal of Public Administration Research and Theory, 15: 529–557.
Cimoli, M., G. Dosi, and J. Stiglitz
2009 Industrial Policy and Development: The Political Economy of Capabilities Accumulation. Oxford: Oxford University Press.
Concato, J., P. Peduzzi, T. R. Holford, and A. R. Feinstein
1995 ''Importance of events per independent variable in proportional hazards analysis I. Background, goals, and general strategy.'' Journal of Clinical Epidemiology, 48: 1495–1501.
Dal Bó, E.
2006 ''Regulatory capture: A review.'' Oxford Review of Economic Policy, 22: 203–225.
David, R. J., W. D. Sine, and H. A. Haveman
2013 ''Seizing opportunity in emerging fields: How institutional entrepreneurs legitimated the professional form of management consulting.'' Organization Science, 24: 356–377.
Del Río, P., and P. Mir-Artigues
2014 ''Spain's solar PV investment bubble.'' International Institute for Sustainable Development. Retrieved March 14, 2018, from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.441.9052&rep=rep1&type=pdf.
Denrell, J., and B. Kovács
2008 ''Selective sampling of empirical settings in organizational studies.'' Administrative Science Quarterly, 53: 109–144.
DeVaughn, M. L., and M. M. Leary
2016 ''Learn by doing or learn by failing? The paradoxical effect of public policy in averting the liability of newness.'' Group and Organization Management, published online ahead of print. DOI: 10.1177/1059601116674826.
Dobbin, F., and T. J. Dowd
1997 ''How policy shapes competition: Early railroad foundings in Massachusetts.'' Administrative Science Quarterly, 42: 501–529.
Dobbin, F., B. Simmons, and G. Garrett
2007 ''The global diffusion of public policies: Social construction, coercion, competition, or learning?'' Annual Review of Sociology, 33: 449–472.
Dowell, G., A. Swaminathan, and J. B. Wade
2002 ''Pretty pictures and ugly scenes: Political and technological maneuvers in high definition television.'' In P. Ingram and B. S. Silverman (eds.), Advances in Strategic Management, 19: 97–134. Bingley, UK: Emerald Insight.
Durand, R., and P. Georgallis
2018 ''Differential firm commitment to industries supported by social movement organizations.'' Organization Science, 29: 154–171.
Durand, R., N. Granqvist, and A. Tyllström
2017 ''From categories to categorization: A social perspective on market categorization.'' In R. Durand, N. Granqvist, and A. Tyllström (eds.), Research in the Sociology of Organizations, 51: 3–30. Bingley, UK: Emerald Insight.

Durand, R., and M. Khaire
2017 "Where do market categories come from and how? Distinguishing category creation from category emergence." Journal of Management, 43: 87–110.
Durand, R., and L. Paolella
2013 "Category stretching: Reorienting research on categories in strategy, entrepreneurship, and organization theory." Journal of Management Studies, 50: 1100–1123.
Duyvendak, J. W., and R. Koopmans
1995 "The political construction of the nuclear energy issue." In H. Kriesi, R. Koopmans, J. W. Duyvendak, and M. G. Giugni (eds.), New Social Movements in Western Europe: A Comparative Analysis, 5: 145–164. Minneapolis: University of Minnesota Press.
EPIA (European Photovoltaic Industry Association) and Greenpeace
2011 Solar Generation 6: Solar Photovoltaic Electricity Empowering the World. Retrieved March 14, 2018, from http://pvtrin.eu/assets/media/PDF/Publications/Other%20Publications/36.SolarGeneration6__2011.pdf.
EWEA (European Wind Energy Association)
2012 Wind in Power: 2011 European Statistics. Retrieved March 14, 2018, from http://www.ewea.org/fileadmin/files/library/publications/statistics/Wind_in_power_2011_European_statistics.pdf.
Fiol, C. M., and E. Romanelli
2012 "Before identity: The emergence of new organizational forms." Organization Science, 23: 597–611.
Flamos, A., P. Georgallis, H. Doukas, and J. Psarras
2009 "Policy oriented review for photovoltaics introduction in the EU." International Journal of Renewable Energy Technology, 1: 64–80.
Funk, R. J., and D. Hirschman
2014 "Derivatives and deregulation: Financial innovation and the demise of Glass–Steagall." Administrative Science Quarterly, 59: 669–704.
Georgallis, P.
2017 "The link between social movements and corporate social initiatives: Toward a multi-level theory." Journal of Business Ethics, 142: 735–751.
Georgallis, P., and R. Durand
2017 "Achieving high growth in policy-dependent industries: Differences between startups and corporate-backed ventures." Long Range Planning, 50: 487–500.
Greene, W.
2004 "The behaviour of the maximum likelihood estimator of limited dependent variable models in the presence of fixed effects." Econometrics Journal, 7: 98–119.
Greenwood, R., and R. Suddaby
2006 "Institutional entrepreneurship in mature fields: The Big Five accounting firms." Academy of Management Journal, 49: 27–48.
Grossman, G. M.
1989 Promoting New Industrial Activities: A Survey of Recent Arguments and Evidence. Princeton, NJ: Princeton University Press.
Grossman, G. M., and H. Horn
1988 "Infant-industry protection reconsidered: The case of informational barriers to entry." Quarterly Journal of Economics, 103: 767–787.
Hannan, M. T., L. Pólos, and G. R. Carroll
2007 Logics of Organization Theory: Audiences, Codes, and Ecologies. Princeton, NJ: Princeton University Press.
Hargrave, T. J., and A. H. Van de Ven
2006 "A collective action model of institutional innovation." Academy of Management Review, 31: 864–888.

Haveman, H. A., and R. J. David
2008 ''Ecologists and institutionalists: Friends or foes.'' In R. Greenwood, C. Oliver, K. Sahlin, and R. Suddaby (eds.), The SAGE Handbook of Organizational Institutionalism: 573–595. Thousand Oaks, CA: Sage.
Haveman, H. A., M. V. Russo, and A. D. Meyer
2001 ''Organizational environments in flux: The impact of regulatory punctuations on organizational domains, CEO succession, and performance.'' Organization Science, 12: 253–273.
Hayashi, F.
2000 Econometrics. Princeton, NJ: Princeton University Press.
Henisz, W. J.
2000 ''The institutional environment for economic growth.'' Economics and Politics, 12: 1–31.
Hiatt, S. R., and S. Park
2013 ''Lords of the harvest: Third-party influence and regulatory approval of genetically modified organisms.'' Academy of Management Journal, 56: 923–944.
Hiatt, S. R., W. D. Sine, and P. S. Tolbert
2009 ''From Pabst to Pepsi: The deinstitutionalization of social practices and the creation of entrepreneurial opportunities.'' Administrative Science Quarterly, 54: 635–667.
Hoetker, G.
2007 ''The use of logit and probit models in strategic management research: Critical issues.'' Strategic Management Journal, 28: 331–343.
Hollender, J.
2010 ''Greenwashing is only getting worse.'' GreenBiz, March 23. Retrieved August 20, 2017, from https://www.greenbiz.com/blog/2010/03/23/greenwashing-only-getting-worse.
Hoogma, R., R. Kemp, J. W. Schot, and B. Truffer
2002 Experimenting for Sustainable Transport: The Approach of Strategic Niche Management. London: Spon Press.
Hoppmann, J. H., M. Peters, M. Schneider, and V. H. Hoffmann
2013 ''The two faces of market support—How deployment policies affect technological exploration and exploitation in the solar photovoltaic industry.'' Research Policy, 42: 989–1003.
Howard-Grenville, J., S. J. Buckle, B. J. Hoskins, and G. George
2014 ''Climate change and management.'' Academy of Management Journal, 57: 615–623.
Hsu, G., and S. Grodal
2015 ''Category taken-for-grantedness as a strategic opportunity: The case of light cigarettes, 1964 to 1993.'' American Sociological Review, 80: 28–62.
Hsu, G., M. T. Hannan, and Ö. Koçak
2009 ''Multiple category memberships in markets: An integrative theory and two empirical tests.'' American Sociological Review, 74: 150–169.
Jacobsson, S., and V. Lauber
2006 ''The politics and policy of energy system transformation—explaining the German diffusion of renewable energy technology.'' Energy Policy, 34: 256–276.
Jourdan, J., R. Durand, and P. H. Thornton
2017 ''The price of admission: Organizational deference as strategic behavior.'' American Journal of Sociology, 123: 232–275.
Kapoor, R., and N. R. Furr
2015 ''Complementarities and competition: Unpacking the drivers of entrants' technology choices in the solar photovoltaic industry.'' Strategic Management Journal, 36: 416–436.

Kennedy, M. T.
2008 "Getting counted: Markets, media, and reality." American Sociological Review, 73: 270–295.
Kim, B. K., and M. Jensen
2011 "How product order affects market identity: Repertoire ordering in the U.S. opera market." Administrative Science Quarterly, 56: 238–256.
King, B. G., E. S. Clemens, and M. Fry
2011 "Identity realization and organizational forms: Differentiation and consolidation of identities among Arizona's charter schools." Organization Science, 22: 554–572.
Kriesi, H., R. Koopmans, J. W. Duyvendak, and M. G. Giugni (eds.)
1995 New Social Movements in Western Europe: A Comparative Analysis, vol. 5. Minneapolis: University of Minnesota Press.
Lee, B., S. Hiatt, and M. Lounsbury
2017 "Market mediators and the trade-offs of legitimacy—Seeking behaviors in a nascent category." Organization Science, 28: 447–470.
Lee, B., J. Struben, and C. Bingham
2018 "Collective action and market formation: An integrative framework." Strategic Management Journal, 39: 242–266.
Lounsbury, M.
2001 "Institutional sources of practice variation: Staffing college and university recycling programs." Administrative Science Quarterly, 46: 29–56.
Lyon, T. P., and H. Yin
2010 "Why do states adopt renewable portfolio standards? An empirical investigation." Energy Journal, 31: 133–157.
Madsen, P. M.
2008 "The endogeneity of public policy in the dynamics of organizational populations." Academy of Management Proceedings, 1: 1–6.
Markard, J., R. Raven, and B. Truffer
2012 "Sustainability transitions: An emerging field of research and its prospects." Research Policy, 41: 955–967.
Marques, A. C., J. A. Fuinhas, and J. P. Manso
2010 "Motivations driving renewable energy in European countries: A panel data approach." Energy Policy, 38: 6877–6885.
Matejek, S., and T. Gössling
2014 "Beyond legitimacy: A case study in BP's 'green lashing'." Journal of Business Ethics, 120: 571–584.
McAdam, D.
1996 "Conceptual origins, current problems, future directions." In D. McAdam, J. D. McCarthy, and M. N. Zald (eds.), Comparative Perspectives on Social Movements: Political Opportunities, Mobilizing Structures, and Cultural Framings: 23–40. Cambridge: Cambridge University Press.
McKendrick, D. G., J. Jaffee, G. R. Carroll, and O. M. Khessina
2003 "In the bud? Disk array producers as a (possibly) emergent organizational form." Administrative Science Quarterly, 48: 60–93.
Mitchell, M. N.
2012 Interpreting and Visualizing Regression Models Using Stata. College Station, TX: Stata Press.
Navis, C., G. Fisher, R. Raffaelli, M. A. Glynn, and L. Watkiss
2012 "The market that wasn't: The non-emergence of the online grocery category." In Proceedings of the New Frontiers in Management and Organizational Cognition Conference.

Navis, C., and M. A. Glynn
2010 ''How new market categories emerge: Temporal dynamics of legitimacy, identity, and entrepreneurship in satellite radio, 1990–2005.'' Administrative Science Quarterly, 55: 439–471.
Negro, G., M. T. Hannan, and H. Rao
2011 ''Category reinterpretation and defection: Modernism and tradition in Italian winemaking.'' Organization Science, 22: 1449–1463.
Ogundimu, E. O., D. G. Altman, and G. S. Collins
2016 ''Adequate sample size for developing prediction models is not simply related to events per variable.'' Journal of Clinical Epidemiology, 76: 175–182.
Olofsson, A., and S. Öhman
2006 ''General beliefs and environmental concern: Transatlantic comparisons.'' Environment and Behavior, 38: 768–790.
Ozcan, P., and K. Gurses
2017 ''Playing cat and mouse: Contests over regulatory categorization of dietary supplements in the U.S.'' Academy of Management Journal, published online ahead of print. DOI: 10.5465/amj.2015.1221.
Ozcan, P., and F. M. Santos
2015 ''The market that never was: Turf wars and failed alliances in mobile payments.'' Strategic Management Journal, 36: 1486–1512.
Pacheco, D. F., J. G. York, and T. Hargrave
2014 ''The coevolution of industries, social movements, and institutions: Wind power in the United States.'' Organization Science, 25: 1609–1632.
Paolella, L., and R. Durand
2016 ''Category spanning, evaluation, and performance: Revised theory and test on the corporate law market.'' Academy of Management Journal, 59: 330–351.
Peduzzi, P., J. Concato, A. R. Feinstein, and T. R. Holford
1995 ''Importance of events per independent variable in proportional hazards regression analysis II. Accuracy and precision of regression estimates.'' Journal of Clinical Epidemiology, 48: 1503–1510.
Perlin, J.
2013 Let It Shine: The 6,000-year Story of Solar Energy. Novato, CA: New World Library.
Peters, M., M. Schneider, T. Griesshaber, and V. H. Hoffmann
2012 ''The impact of technology-push and demand-pull policies on technical change—Does the locus of policies matter?'' Research Policy, 41: 1296–1308.
Photon International
2009 ''Magdeburg greets Malibu.'' July.
Pinkse, J., and D. van den Buuse
2012 ''The development and commercialization of solar PV technology in the oil industry.'' Energy Policy, 40: 11–20.
Porac, J. F., J. B. Wade, and T. G. Pollock
1999 ''Industry categories and the politics of the comparable firm in CEO compensation.'' Administrative Science Quarterly, 44: 112–144.
PV News
1987 ''We get letters.'' April.
PVPS
2013 ''PVPS report—A snapshot of global PV: 1992–2012.'' Report IEA-PVPS T1-22.
Ranger-Moore, J., J. Banaszak-Holl, and M. T. Hannan
1991 ''Density-dependent dynamics in regulated industries: Founding rates of banks and life insurance companies.'' Administrative Science Quarterly, 36: 36–65.
Rao, H., P. Monin, and R. Durand
2005 ''Border crossing: Bricolage and the erosion of categorical boundaries in French gastronomy.'' American Sociological Review, 70: 968–991.

Rao, H., and J. V. Singh
2001 ''The construction of new paths: Institution building activity in the early automobile and biotechnology industries.'' In R. Garud and P. Karnoe (eds.), Path Dependence and Creation: 243–267. Mahwah, NJ: Lawrence Erlbaum.
REN21
2012 Renewables 2012 Global Status Report. Paris: REN21 Secretariat.
Rihoux, B., and C. C. Ragin
2008 Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques, vol. 51. Thousand Oaks, CA: Sage.
Rootes, C.
1999 Environmental Movements: Local, National and Global. London: Frank Cass.
Rucht, D.
1999 ''The impact of environmental movements in Western societies.'' In M. Giugni, D. McAdam, and C. Tilly (eds.), How Social Movements Matter: 204–224. Minneapolis: University of Minnesota Press.
Ruef, M., and K. Patterson
2009 ''Credit and classification: The impact of industry boundaries in nineteenth-century America.'' Administrative Science Quarterly, 54: 486–520.
Russo, M. V.
2001 ''Institutions, exchange relations, and the emergence of new fields: Regulatory policies and independent power production in America, 1978–1992.'' Administrative Science Quarterly, 46: 57–86.
Santos, F. M., and K. M. Eisenhardt
2009 ''Constructing markets and shaping boundaries: Entrepreneurial power in nascent fields.'' Academy of Management Journal, 52: 643–671.
Scheer, H.
2001 A Solar Manifesto. London: James & James.
Scott, W. R.
2013 Institutions and Organizations: Ideas, Interests, and Identities. Thousand Oaks, CA: Sage.
Seidel, M.-D. L., and H. R. Greve
2017 ''Emergence: How novelty, growth, and formation shape organizations and ecosystems.'' In M.-D. L. Seidel and H. R. Greve (eds.), Research in the Sociology of Organizations, 50: 1–27. Bingley: Emerald Publishing.
Sharkey, A. J.
2014 ''Categories and organizational status: The role of industry status in the response to organizational deviance.'' American Journal of Sociology, 119: 1380–1433.
Sine, W. D., H. A. Haveman, and P. S. Tolbert
2005 ''Risky business? Entrepreneurship in the new independent-power sector.'' Administrative Science Quarterly, 50: 200–232.
Sine, W. D., and B. H. Lee
2009 ''Tilting at windmills? The environmental movement and the emergence of the U.S. wind energy sector.'' Administrative Science Quarterly, 54: 123–155.
Soule, S. A., and B. G. King
2008 ''Competition and resource partitioning in three social movement industries.'' American Journal of Sociology, 113: 1568–1610.
Stata Corp.
2013 ''xtprobit.'' Retrieved August 20, 2017, from http://www.stata.com/manuals13/xtxtprobit.pdf.
Stegman, M. A.
2007 ''Payday lending.'' Journal of Economic Perspectives, 21: 169–190.

Stigler, G. J.
1971 ''The theory of economic regulation.'' Bell Journal of Economics and Management Science, 2: 3–21.
Stock, J. H., and M. W. Watson
2007 Introduction to Econometrics, 2d ed. Boston: Addison Wesley.
Swaminathan, A.
1995 ''The proliferation of specialist organizations in the American wine industry, 1941–1990.'' Administrative Science Quarterly, 40: 653–680.
Teske, S., and V. Hoffmann
2006 ''A history of support for solar photovoltaics in Germany.'' In K. Mallon (ed.), Renewable Energy Policy and Politics: A Handbook for Decision-making: 229–240. London: Earthscan.
Tushman, M. L., and P. Anderson
1986 ''Technological discontinuities and organizational environments.'' Administrative Science Quarterly, 31: 439–465.
Tushman, M. L., and L. Rosenkopf
1992 ''Organizational determinants of technological change: Toward a sociology of technological evolution.'' In B. M. Staw and L. L. Cummings (eds.), Research in Organizational Behavior, 14: 311–347. Greenwich, CT: JAI Press.
Vergne, J. P., and T. Wry
2014 ''Categorizing categorization research: Review, integration, and future directions.'' Journal of Management Studies, 51: 56–94.
Von Stein, J.
2008 ''The international law and politics of climate change ratification of the United Nations framework convention and the Kyoto protocol.'' Journal of Conflict Resolution, 52: 243–268.
Weber, K., K. L. Heinze, and M. DeSoucey
2008 ''Forage for thought: Mobilizing codes in the movement for grass-fed meat and dairy products.'' Administrative Science Quarterly, 53: 529–567.
Wholey, D. R., and S. M. Sanchez
1991 ''The effects of regulatory tools on organizational populations.'' Academy of Management Review, 16: 743–767.
Wooldridge, J. M.
2012 Introductory Econometrics: A Modern Approach. Boston: Cengage Learning.
World Future Council
2007 ''Feed-in tariffs—Boosting energy for our future.'' World Future Council. Retrieved March 14, 2018, from http://www.hermannscheer.de/en/images/stories/pdf/WFC_Feed-in_Tariffs_jun07.pdf.
Wry, T., M. Lounsbury, and P. D. Jennings
2014 ''Hybrid vigor: Securing venture capital by spanning categories in nanotechnology.'' Academy of Management Journal, 57: 1309–1333.
Yan, S., and F. Ferraro
2016 ''State mediation in market emergence: Socially responsible investing in China.'' In J. Gehman, M. Lounsbury, and R. Greenwood (eds.), Research in the Sociology of Organizations, 48B: 173–206. Bingley: Emerald Insight.
Yergin, D.
2008 The Prize: The Epic Quest for Oil, Money and Power. New York: Free Press.
Yip, P. S., and E. W. Tsang
2007 ''Interpreting dummy variables and their interaction effects in strategy research.'' Strategic Organization, 5: 13–30.
York, J., and M. Lenox
2014 ''Exploring the sociocultural determinants of de novo versus de alio entry in emerging industries.'' Strategic Management Journal, 35: 1930–1951.

York, J., S. Vedula, and M. Lenox
2017 "It's not easy building green: The impact of public policy, private actors, and regional logics on voluntary standards adoption." Academy of Management Journal, published online ahead of print. DOI:10.5465/amj.2015.0769.
Zuckerman, E. W.
2017 "The categorical imperative revisited: Implications of categorization as a theoretical tool." In R. Durand, N. Granqvist, and A. Tyllström (eds.), Research in the Sociology of Organizations, 51: 31–68. Bingley: Emerald Insight.
Zysman, J., and L. Tyson
1984 American Industry in International Competition: Government Policies and Corporate Strategies. Ithaca, NY: Cornell University Press.

Authors' Biographies

Panayiotis (Panikos) Georgallis is an assistant professor of international strategy and management at the Amsterdam Business School, University of Amsterdam, Plantage Muidergracht 12, 1001 NL Amsterdam, the Netherlands (e-mail: p.georgallis@uva.nl). His research focuses on settings with strong links to sustainability and on the interaction among firms, social movements, and governments. He received his Ph.D. in strategic management from HEC Paris.

Glen Dowell is an associate professor of management and organizations at the S.C. Johnson College of Business, Cornell University, Ithaca, NY (e-mail: gwd39@cornell .edu). His research interests include business strategy for sustainability, firms' reactions to institutional pressures, and organizational change. He received his Ph.D. in strategic management from the University of Michigan.

Rodolphe Durand is the Foundation HEC Chaired Professor of Strategy and the founder and academic director of the SnO (Society and Organizations) Center at HEC Paris, 1 Rue de la Libération, 78350 Jouy-en-Josas, France (e-mail: durand@hec.fr). He graduated from HEC Paris, and his research interests concern the sources of competitive advantage and the interplay between cognitive and normative determinants of organizations' performance.