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RESEARCH ARTICLE

From farms to fuel tanks: Stakeholder framing contests and entrepreneurship in the emergent U.S. biodiesel market

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***Research Summary*:** Although scholarship has demonstrated that market categories offer important signals to entrepreneurs about which goods and services are valued, little research has considered how entrepreneurs make sense of and exploit opportunities when contestation over category meaning persists. Using the emergent U.S. biodiesel market as a context, we present a framework to explain how the salience of different stakeholder frames shapes entrepreneurs' perceptions of market opportunities and influences their market-entry strategies. By showing how framing contests affect entrepreneurial outcomes, this study illuminates the underlying cognitive mechanisms that impact market meaning and offers important implications for the literatures on entrepreneurship, market-category evolution, framing contests, and grand challenges.

***Managerial Summary*:** Entrepreneurs entering new markets must consider how their products or services create value for customers. What customers value, however, is often shaped by competition between different stakeholders who seek to define problems and appropriate solutions. We argue and find that competing stakeholders influence what becomes valued in the market and shape the technologies and products developed by entrepreneurs. From the perspective of those promoting new markets, market growth requires a balancing act between maintaining control over market definitions and attracting new customers. In growing a new market, entrepreneurs and market pioneers may unintentionally attract other stakeholders who seek to alter or redefine market meanings, which can drive demand away from initial producers, foster the development and adoption of unforeseen technologies, and facilitate market entry of diverse organizations.

KEYWORDS
entrepreneurship, hybrid forms, industry emergence, nonmarket strategy, social movements, sustainability, technology re-emergence

1 | INTRODUCTION

> *"The use of vegetable oils for engine fuels may seem insignificant today, but such oils may become, in the course of time, as important as petroleum and the coal-tar products of the present time….Motor power can still be produced from the heat of the sun, always available, even when the natural stores of solid and liquid fuels are completely exhausted"*—Rudolf Diesel, 1913.

Market categories represent social agreements about meanings, expectations, and roles for market actors (Porac, Thomas, Wilson, Paton, & Kanfer, 1995; Zuckerman, 1999). Although early research focused largely on the elements of stability and conformity associated with categories, recent studies underscore the dynamic nature of categories, including category emergence and change as well as the implications of these dynamics for organizations (Bingham & Kahl, 2013; Lounsbury & Rao, 2004; Navis & Glynn, 2010; Wry, Lounsbury, & Jennings, 2014). According to these studies, market categories form when actors agree on shared cognitive understandings that define the category (Kennedy & Fiss, 2013). Although this literature emphasizes shared understandings as a critical component of bringing order to markets, categories are often complex, contested arenas where multiple self-interested actors contend over meanings (Lee, Hiatt, & Lounsbury, 2017; Ozcan & Santos, 2015).

For the most part, however, prior research has focused on the contentious processes that lead to a truce or settlement resulting in agreement about meanings (Hardy & Maguire, 2010; Helms, Oliver, & Webb, 2012), and these studies assume that establishing consistent meanings is a necessary precondition for entrepreneurial entry and market growth (Khaire & Wadhwani, 2010). This emphasis on settlement overlooks important questions about how entrepreneurs respond to market opportunities when agreement does not exist and category meanings remain contested (Kahl, Kim, & Phillips, 2010; Kaplan & Tripsas, 2008; Vergne & Swain, 2017).

We address this issue by incorporating insights from theories on framing contests and entrepreneurship, to create a theoretical framework that explains how entrepreneurs interpret and respond to competing market frames (Benford & Snow, 2000; Kaplan, 2008). Framing contests capture the dynamics among various stakeholders promoting different frames; by defining central elements and expectations that shape market activities, these frames represent the cognitive building blocks of categories (Navis & Glynn, 2011; Rosa, Porac, Runser-Spanjol, & Saxon, 1999). Our theoretical framework distinguishes three potential conditions whereby market stakeholders either promote similar frames that represent consensus over category meanings or advance competing frames that may or may not be compatible.

We apply this framework to empirically examine variation in the types of ventures that entered the U.S. biodiesel market. In this context, different market stakeholders introduced three primary

frames over time. Initially, farm associations promoted agrarian frames to define the biodiesel category as centered on agricultural resources, to benefit farmer constituents and rural communities. As the category grew, industry stakeholders introduced frames focused on increased biofuel consumption with little concern for specific types of production inputs. Finally, the growth of the market catalyzed opposition by environmentalists who promulgated frames that supported the environmental benefits of biodiesel produced from recycled material but opposed the use of crops for fuel because of their potential environmental harm (see Figure 1). Through an analysis of local news media, we capture the varying salience of these different frames and explore how they differentially influenced the types of technologies that entrepreneurs adopted upon entering the market.

This study provides new insights into research on market categories and entrepreneurship. First, it illuminates how persistent struggles over category meaning influence entrepreneurial activity. Prior research has generally emphasized the shared cognitive meanings of categories and their opportunity-signaling effect on entrepreneurs' interpretations of markets, including which goods and services are valued (Khaire & Wadhwani, 2010; Weber, Heinze, & DeSoucey, 2008). In contrast, we seek to understand how entrepreneurs respond when shared understandings do not exist and when multiple stakeholders sustain framing contests over the defining elements of a category. In this way, we respond to research that questions prevailing assumptions about the necessity of congruent meanings for market growth (Vergne & Swain, 2017) and answer scholarly calls to study temporal aspects of categories, including the effects of ongoing debates over category meaning on entrepreneurial activity in new markets (Durand, Granqvist, & Tyllström, 2017; Kahl et al., 2010; York & Lenox, 2014; Zhao, Ishihara, Jennings, & Lounsbury, 2018).

Second, this study extends research on category evolution by offering deeper insights into the underlying mechanisms of category change. Although a productive line of research explains how

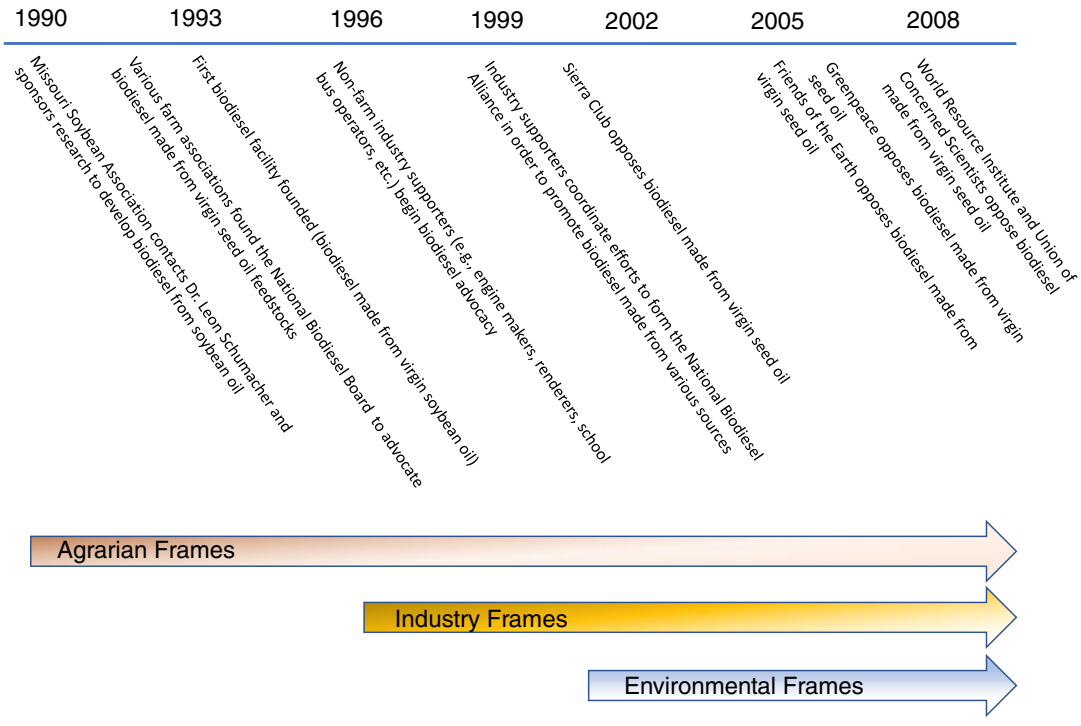


FIGURE 1 Biodiesel market timeline

actors can instigate changes to market-category meanings through collective action (Hiatt, Sine, & Tolbert, 2009; Rao, Monin, & Durand, 2003), these studies generally emphasize the conflict between oppositional pairs and overlook the more complex dynamics among multiple stakeholders engaged in framing contests over market meaning. Building on theories of social movements and framing contests, we examine how the compatibility and salience of multiple stakeholder frames shape entrepreneurs' interpretive process and, ultimately, their market-entry strategies (Davis, Morrill, Rao, & Soule, 2008; Kaplan & Tripsas, 2008). In doing so, we respond to recent calls for research to "move beyond the single cooperation-competition dichotomy that is present in most studies of framing struggles" (Cornelissen & Werner, 2014, p. 211) and to consider the "interplay of multiple discourses" (Lawrence & Phillips, 2004, p. 708).

2 | THEORY

Research on market categories has generally emphasized the importance of reaching consensus about market meaning (Durand et al., 2017). For instance, scholars have defined categories as "collectively understood organizational taxonomies and classifications" (Porac, Wade, & Pollock, 1999, p. 112) or as "economic exchange structure[s] among producers and consumers that [are] labeled with meaning agreed upon by actors and audiences who use [them]" (Navis & Glynn, 2010, p. 442). Others have similarly highlighted the notion that categories represent shared cognitive understandings of "which traits are common to which categorical identity and organize. .. expectations and evaluations of how well members of the set perform along these dimensions" (Durand & Paolella, 2013, p. 1104).

Scholarship acknowledges that "market categories are created and evolved through negotiations and contestations between diverse market participants" (Grodal & Kahl, 2017, p. 153) and has explored how stakeholders compete with others who promulgate different frames reflecting their respective motives (Granqvist, Grodal, & Woolley, 2013; Grodal, 2018; McDonald & Eisenhardt, 2018). Nevertheless, these studies emphasize the importance of reaching agreement on shared category meanings and suggest that category settlement facilitates entrepreneurship by reducing uncertainty about what market actors expect (Harmon & Rhee, 2018; Rhee, Lo, Kennedy, & Fiss, 2016) and what is valued in the market (Khaire & Wadhwani, 2010). However, in some cases agreement does not exist and category meanings remain contested (Kaplan & Tripsas, 2008), leaving unanswered the question of how entrepreneurs make sense of market opportunities (Vergne & Swain, 2017).

Contestation over market meaning often involves strategic framing (Benford & Snow, 2000; Meyer & Höllerer, 2010), in which stakeholders deploy frames to shape public discourse in ways that align with their respective goals and objectives (Grodal & Kahl, 2017). Market frames emphasize elements and features that help audiences make sense of market activities, recognize actors as part of a coherent market category, and understand participant roles and expectations (Bajpai & Weber, 2017; Lounsbury, Ventresca, & Hirsch, 2003; Navis & Glynn, 2011). Frames also define the goods and services that are valued (Kennedy & Fiss, 2013; Sine & Lee, 2009; Weber et al., 2008). For example, in their study of the nascent Indian art category, Khaire and Wadhwani (2010) found that stakeholders' framing activities significantly shaped market actors' shared perception of how Indian art was defined and appraised. Although category research has considered contexts in which shared cognitive meanings may be ambiguous or fuzzy (Fleischer, 2009; Pontikes, 2012; Ruef & Patterson, 2009), this work provides little guidance for how entrepreneurs understand and respond to categories characterized by persistent meaning contestation.

We address this limitation by proposing a theoretical framework of competing market frames and entrepreneurship that addresses not only how these dynamics influence the types of new ventures that enter the market but also how markets can evolve amid ongoing framing contests. Our framework posits that various stakeholders' framing contests may shape entrepreneurs' cognitive understanding of markets in ways that may embody different expectations, roles, and guidelines for market activity. We propose that market frames can be conceptualized as three types: frames that are similar, frames that are dissimilar and compatible, and frames that are dissimilar and incompatible. Next, we suggest that the salience of these different frames enhances the resonance of frame elements (Weber & Mayer, 2014) and provides different signals of market opportunities that shape entrepreneurial market-entry strategies (Kennedy, Lo, & Lounsbury, 2010). In the next section, we explain this framework and its implications for entrepreneurial activity within an emerging market category.

2.1 | Competing frames and market meaning

Similar frames. Frames that are similar represent cognitively congruent elements and contain features that resemble one another but are not identical. Similar frames are comparable or complementary, do not conflict in any meaningful way, and may thus overlap in cognitive terms (Weber & Mayer, 2014). Accordingly, similar frames lead to perceived consensus about meaning, which reduces ambiguity and generates more-focused attention on common market attributes by clarifying to market actors which elements are valued and the expectations of actors in the market. Although differences may exist among similar frames promoted by different stakeholders, similar frames may result in shared category meanings. For example, a coalition of animal breeding experts, environmentalists, and food critics used similar frames to promote the market for grass-fed beef (Weber et al., 2008). Despite the different stakeholders' inclusion of unique elements, the similarity of their respective frames resulted in consensus on the nutritional and health benefits, for humans and animals, associated with the grass-fed approach.

Dissimilar and compatible frames. Frames vary along a continuum of similarity, and we identify more-dissimilar frames as containing elements that are less connected in cognitive terms and unlikely to overlap. However, if the frames are compatible, meaning they do not contradict one another, they can exist in the same cognitive space (Besharov & Smith, 2014). Salient dissimilar and compatible frames can lead to perceptions of an inclusive category characterized by frame plurality in which market stakeholders "manag[e] or tolerat[e] multiple meanings" (Gray, Purdy, & Ansari, 2015, p. 130) and various frame elements in the market. For example, Pacheco and colleagues (2014) illustrate how environmental and technology-focused social-movement organizations emphasized dissimilar yet compatible elements of sustainability. While specialized groups such as Colorado Clean Energy Cluster promoted the development and adoption of specific energy-production technologies, groups such as Environment Colorado focused on ecological issues such as air and water quality. Although both groups emphasized distinct elements, their frames were compatible, leading to perceptions of a broader category of renewable energy that included both the technical and ecological elements promoted by these different stakeholders. Accordingly, we suggest that when competing frames are dissimilar and compatible, elements of these frames may coexist in a state of pluralism that broadens the perceived underlying cognitive definitions of the market category.

Dissimilar and incompatible frames. Dissimilar frames that are incompatible contain cognitive elements that are irreconcilable and explicitly opposed to one another (Weber & Mayer, 2014). Because an incompatible frame contains elements defined in opposition to those of a competing frame, the frames cannot coexist in the same cognitive space and may cause stakeholders to perceive the realization of other frames as a threat to the fulfillment of their own (Pache & Santos, 2010).

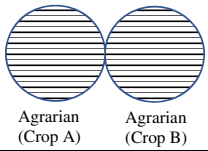
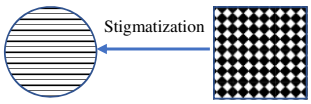
Frames	Mechanisms	Entrepreneurial Actions
Similar Frames (Frame Bridging) 	1) Frame bridging increases attention to opportunities surrounding (oilseed) biodiesel 2) Increased cognitive legitimacy reduces market uncertainty	Increase foundings of specialist firms that incorporate technologies aligned with the similar frames
Dissimilar Compatible Frames (Frame Extension) 	1) Frame extension expands market meaning to include additional elements (oilseed + tallow + WVO) 2) Broadens opportunity structure and enhances attractiveness of hybrid forms	Increase foundings of combination or hybrid firms that incorporate multiple technologies of the compatible frames that appeal to broader audiences
Dissimilar Incompatible Frames (Frame Transformation) 	1) Frame transformation restricts opportunity by excluding certain frame elements (oilseed) and promoting others (WVO) 2) Redefines opportunity 3) Increases perceived risk of adopting stigmatized elements	Decrease foundings of specialist firms using stigmatized technologies Increase foundings of specialist firms using promoted technologies

FIGURE 2 Competing frames and entrepreneurial response

Consequently, stakeholders may assert their own objectives "as unique and incommensurable with" the elements underlying other stakeholders' frames (Besharov & Smith, 2014, p. 368) and may emphasize the distinctiveness of their frame compared to elements of the frame they oppose. This reaction can manifest as stigmatization, whereby stakeholders depict opponents' frames as morally wrong or fundamentally flawed in some way (Durand & Vergne, 2015; Hampel & Tracey, 2017; Tracey & Phillips, 2016).[1] For example, competing dissimilar and incompatible frames occurred between American brewers and temperance activists during the late nineteenth and early twentieth centuries. Temperance activists framed alcohol products as harmful by arguing that the consumption of beer would "slowly change the muscles of the heart into fat," foster "weak minds," and cause "sudden death" (Hiatt et al., 2009, p.642). These frames contrasted with those of brewers who characterized beer as a "wholesome and nutritious beverage" and not "deleterious or in any way objectionable" (United States Brewers' Association, 1911, p.67). Accordingly, we propose that the salience of dissimilar and incompatible frames can lead to a perceived exclusivity indicating that the market values only nonstigmatized frame elements.

As Figure 2 illustrates, we propose that when similar frames allow a perceived consensus on market meanings to emerge, entrepreneurs will identify and exploit market opportunities by entering with technologies and practices reflecting elements of those meanings. When multiple stakeholders promote dissimilar but compatible frames, we anticipate that entrepreneurs will interpret these frames as an opportunity to combine technologies, practices, and features associated with the compatible elements of the different frames. Finally, we expect that when framing contests involve dissimilar and incompatible frames, entrepreneurs will more likely interpret the frames' promoted elements as signals of value and the frames' stigmatized elements as signals of risk, leading them to establish

[1]We acknowledge that additional permutations of framing contests between stakeholders promoting dissimilar and incompatible frames may exist. Although we confine our study to the dynamics observed in our empirical setting, we highlight the need for future research to consider these other dynamics.

ventures using technologies and practices that reflect these interpretations. Overall, our framework suggests that different types of framing contests differentially shape entrepreneurs' cognitive perceptions of market opportunities and strategies (Kaplan & Tripsas, 2008). In the next section, we briefly describe our empirical context and how we use it to further develop our theoretical framework.

3 | EMPIRICAL CONTEXT: U.S. BIODIESEL SECTOR

The biodiesel sector presents an ideal context for studying the effect of stakeholder framing contests on entrepreneurial activity, due to ongoing contestation over the types of inputs that should be used to produce this fuel. Biodiesel is fuel derived from various organic sources for use in compression-ignition (diesel) engines. Typical feedstock oil includes soybean, sunflower, and corn oils, beef and pork tallow, poultry fats, and waste vegetable oil (WVO) from restaurants. Once oil is extracted from oilseed plants, rendered from animal carcasses, or siphoned from restaurant grease traps, it undergoes a transesterification process in a biodiesel production facility where, through a chemical and technological process individualized for each kind of extracted oil, glycerol is removed from triacylglycerol (triglyceride), leaving alkyl esters and resulting in a liquid compound with properties similar to petroleum distillates used to power diesel engines. The use of vegetable oil as an engine fuel is not new; it began with Rudolf Diesel's invention of the world's first "heat" engine that ran without a spark in 1897. Although the first diesel engine prototypes ran mostly on petroleum distillates, Diesel spent the latter part of his life tweaking successive models to run on pure vegetable oils. With Diesel's untimely death in 1913 and the growing abundance of cheap petroleum fuel, research on vegetable-oil fuels nearly ended.

In the late twentieth century, interest in organic-oil transportation fuels reemerged, with farm associations in the United States taking the lead in its development. To increase commodity prices for local farmers, U.S. farm associations sponsored research at universities to develop technologies to transform virgin seed oils into fuels for diesel engines. The first sponsorship began in 1990, when the Missouri Soybean Association began funding Dr. Leon Schumacher's research on virgin soybean oil at the University of Missouri. When the technology was proven viable, state soybean associations and other oilseed crop farm associations, such as the Illinois Soybean Association and the Iowa Corn Association, defined and promoted "biodiesel" as a renewable energy product made from virgin-oilseed feedstocks (e.g., soybean, canola, corn, cottonseed, and sunflower oil). Although farmer associations spurred the emergence of this market, industry groups helped to grow it by attracting biodiesel support from broader audiences. The market's growth, however, raised new concerns among environmental groups leery of the negative ecological implications of growing crops for fuel. In the sections below, we explain the dynamics among these different stakeholders as we develop our theoretical expectations of how different types of framing contests shape entrepreneurial activity.

3.1 | Entrepreneurial response to competing frames

Similar frames (frame bridging). We propose that multiple stakeholders' promotion of similar market frames represents a form of frame bridging that links "two or more ideologically congruent but structurally unconnected frames regarding a particular issue" (Snow, Rochford, Worden, & Benford, 1986 p. 467). Structurally connecting similar elements helps to create perceptions of a cohesive market meaning that signals demand for products embodying the featured elements of these frames (Navis & Glynn, 2010). When frame elements are similar, they attract more-focused attention to entrepreneurial opportunities and create shared understandings and expectations of how market exchange is

structured and how products and services are valued (Georgallis, Dowell, & Durand, 2018; Weber et al., 2008). Focused attention on opportunities embedded in similar frames increases the cognitive legitimacy of these opportunities and generates a perceived reality of the nascent market, thereby augmenting the market's "status as a credible site for business" (Sine, Haveman, & Tolbert, 2005, p. 212) and reducing uncertainty (Pollock & Rindova, 2003; Kennedy, 2008). As the elements from similar frames gain attention and legitimacy, entrepreneurs will view such opportunities as more attractive and less risky and will be more likely to establish new ventures reflecting the consistent features embodied in the market frames (Sine & Lee, 2009; York & Lenox, 2014).

In the U.S. biodiesel industry, farm associations representing soybean, sunflower, canola, corn, peanut, and cottonseed growers conducted outreach and diffused information to shape stakeholders' cognitive understanding of the market category; this understanding, in turn, defined the initial market category as one based on the use of oilseed feedstocks. Although farm associations each promoted a particular oilseed crop as a feedstock, their frames were linked by similar emphasis of the economic benefits to rural economies and patriotism in the form of renewable energy and energy independence. The farm associations began working together to promote these elements in contexts where they would resonate, such as agriculture conferences, county fairs, and community parades. Other tactics included demonstrations in which they fueled buses, tractors, and trucks with biodiesel made from oilseed crops and drove the vehicles, plastered with biodiesel signs, thousands of miles across rural county roads, to garner attention and shape the public discourse. Farm associations also sought out celebrities to promote the agrarian market focus. For instance, at concerts and public appearances, country-western singer and farmer champion Willie Nelson promoted biodiesel produced from oilseed crops as a way to benefit "family farmers":

> When I heard about biodiesel, a light came on, and I said, "Hey, here's the future for the farmers"…. It seems like that's good for the whole world if we can start growing our own fuel instead of starting wars over it (Hakim, 2006).

Through newspaper articles and interviews with biodiesel entrepreneurs, we observed how farm associations' framing efforts to emphasize similar agrarian elements of the market shaped entrepreneurs' perceptions of market opportunity. For example, one entrepreneur described how the agricultural frame influenced his founding decisions: "The oil companies we were going to sell to basically told us that they thought their customers would want biodiesel made from soybeans." Another founder celebrated his company's alignment with the prevalent agrarian frame: "Our mission has always been to promote the success of local farmers, and this facility creates a new market for soybeans grown within a 35- to 50-mile radius of DeWitt" (Wagnon, 2008). One entrepreneur said he considered producing biodiesel via different technologies but ultimately established a venture using oilseed feedstocks because the agrarian frames shaped consumer preferences so that "there was really no interest [in non-oilseed biodiesel]. You know, I mean people don't like it from the recycled material." Another entrepreneur echoed this sentiment, describing how farm associations' emphasis on agrarian features in their framing efforts became largely taken for granted as the standard for biodiesel production:

> Most people think of biodiesel as something that comes from soybeans, and this is largely because the forces of Big Soy have promoted the product. The preponderance of soy in the biodiesel industry means that alternative feedstocks commonly are overlooked and unknown (Estill, 2005, pp. 75–76).

As these statements illustrate, various farm associations' promotion of similar agrarian frames directed attention to and generated legitimacy for biodiesel made from oilseed crops. In this way, these agrarian frames shaped market understanding to solidify attention to the agrarian meaning and to generate demand for biodiesel made from oilseed crops. We therefore expect that as similar frames coalesce around a common set of category elements, entrepreneurs will be more likely to identify and exploit these opportunities by establishing ventures with technologies, practices, and feedstocks that reflect the elements of those frames.

Hypothesis (H1): *Greater salience of agrarian frames will result in increased foundings of ventures using oilseed feedstocks.*

Dissimilar, compatible frames (frame extension). In order to grow, markets often must expand their boundaries to attract a broader set of stakeholders (Lee et al., 2017). However, different interests, goals, or objectives beyond those instantiated in existing market frames may motivate new stakeholders to promulgate frames with dissimilar elements. To the extent that these dissimilar elements are compatible, they represent a form of frame extension. Frame extension involves expanding "the boundaries of [the] primary framework so as to encompass interests or points of view that are incidental to its primary objectives but of considerable salience to potential adherents" (Snow et al., 1986, p. 472). For example, members of the U.S. women's suffrage movement attracted broader support by extending their core frame to encompass educational, professional, and family issues that were broader than women's right to vote (McCammon, Granberg, Campbell, & Mowery, 2001). Accordingly, we expect that when market stakeholders advance dissimilar but compatible frames, a perception can emerge of an inclusive meaning that broadens the market category and allows multiple elements associated with the extended frame to coexist. We argue that for prospective entrepreneurs, frame extension broadens the opportunity structure and signals the value of combining multiple elements associated with the expanded frame, to appeal to multiple audiences and diversify operations (Battilana & Lee, 2014; Kim & Jensen, 2011).

The maturation of the U.S. biodiesel market illustrates this pattern, whereby farm associations sought to grow the market by sponsoring the establishment of the National Biodiesel Alliance (NBA) and inviting prominent individuals and businesses to join. Anyone who supported the biodiesel market was encouraged to join the alliance, which included fuel distributors, customers, machinery suppliers, engine manufacturers, nonprofit organizations, government agencies, animal renderers, and various other businesses committed to supporting the biodiesel market. In contrast to farm associations, the NBA members focused on increasing consumption of biodiesel and were motivated by reasons beyond promoting any specific feedstock. A survey of all NBA members illustrates these interests, indicating that only 25% of members pledged support because of the benefits to farmers and rural economies, whereas nearly 75% supported biodiesel for other reasons such as health and environmental benefits and local economic development (National Biodiesel Board, 2008). The actor Morgan Freeman exemplifies how individuals motivated by issues such as air quality supported the biodiesel market. Willie Nelson invited Freeman to use his "celebrity to further the biodiesel cause" (Stevens, 2005). Freeman accepted the invitation, saying, "I'm sort of one of those green people at heart" (Stevens, 2005). "I think we should be developing every kind of alternative fuel that is available to us. That includes hydrogen to soybeans, from solar to wind. Whatever we can find that is going to help us clean up the environment we should be working really hard on developing… [because] people are literally dying from the air" (Spangler, 2007).

As this quotation indicates, biodiesel alliance members' industry frames were not incompatible with farm associations' agrarian frames, and farm associations did not oppose the industry frames.

The industry frames, however, did not advocate any specific feedstock. Instead, they extended agrarian frame elements to include environmental and health benefits and various other feedstocks, such as animal tallow and waste vegetable oil, for use in biodiesel production. For instance, one NBA member stated,

> One of the huge selling points for biodiesel is that it is a much more air quality-friendly fuel compared with petroleum-based fuel….B100, pure biodiesel, reduces the amount of unburned hydrocarbons in the air by 67%, carbon monoxide by 48% and particulate matter by 47% (Schmitz, 2004).

Another member explained that "biodiesel itself produces fewer pollutants than petroleum-based diesel" and is made from "soybeans and chicken fat but can come from almost any fatty plant or animal substance" (*The Macon Telegraph*, 2006).

The salience of industry frames created broader opportunities for entrepreneurs to expand and diversify their feedstock sources to those that met other stakeholder goals. In response, many entrepreneurs established ventures with technologies that could process multiple feedstocks such as waste vegetable oil and animal tallow. One biodiesel producer described the appeal of using technologies that could process multiple feedstocks:

> From the very beginning our market analysis showed that if we wanted to stay in this business, we were going to have to be a true multi-feedstock facility. Our chemical process and our continuous plant will handle any one of eight feedstocks simultaneously without having to change the chemistry or the processes or segregate the feedstocks.

In sum, we propose that the presence of dissimilar, compatible frames (agrarian and industry) shifted entrepreneurs' perceptions of the meaning of biodiesel from an exclusive focus on oilseed crops to a broader opportunity structure that permitted the combination of multiple feedstocks. This change in meaning created demand for biodiesel produced from various feedstocks, not just from oilseed crops, and motivated entrepreneurs to develop and adopt technologies that combined multiple feedstocks. We therefore argue that increased salience of industry frames that are different but compatible with agrarian frames will lead to greater market entry of ventures using a combination of feedstocks (such as oilseed, animal tallow, and waste vegetable oil) to produce biodiesel.

Hypothesis (H2): *Greater salience of industry frames will result in increased foundings of ventures using a combination of feedstocks (oilseed, animal fats, WVO).*

Dissimilar, incompatible frames (frame transformation). As market categories grow and affect more stakeholders, some stakeholders may disagree with prior frames and promulgate frames that are dissimilar and incompatible (Carlos, Sine, Lee, & Haveman, 2018). This can lead to frame transformation whereby elements of the competing frames do "not resonate with, and on occasion may even appear antithetical to…extant interpretive frames. When such is the case, new values may have to be planted and nurtured, old meanings or understandings jettisoned, and erroneous beliefs…reframed" (Snow et al., 1986 p. 473). In contrast to frame extension, frame transformation leads to a restriction of market-category elements due to their incompatibility. Consequently, dissimilar and incompatible frames are likely to redefine entrepreneurial perceptions of market opportunities by prioritizing certain elements and stigmatizing others. Stigmatizing certain frame elements involves labeling them as fundamentally flawed, and organizations that reflect those elements risk negative social evaluations,

including economic sanctions (Helms & Patterson, 2014; Tracey & Phillips, 2016). Entrepreneurs are thus likely to avoid adopting stigmatized elements that could limit their ability to acquire support and resources necessary for survival (Vergne, 2012). In contrast, entrepreneurs are likely to view nonstigmatized frame elements as less risky, leading to greater adoption of technologies and practices that align with the nonstigmatized elements.

As the U.S. biodiesel industry expanded the framing efforts of farm association and industry supporters, it caught the attention of environmental activists who had significant concerns about the negative ecological impacts of using traditional food sources (i.e., oilseed crops) for transportation fuel. Prioritizing environmental elements related to issues such as global warming, land conservation, soil pollution, and food production, this frame argued that recycled waste vegetable oil represented the only sustainable option for biodiesel. Accordingly, the activists sought to reframe the definition of biodiesel by excluding elements associated with oilseed feedstocks and advancing recycled waste vegetable oil as the only acceptable feedstock. To do this, they actively sought to discredit and stigmatize the agrarian elements in the following ways. First, environmental movement organizations such as the Sierra Club, Greenpeace, and the Union of Concerned Scientists sponsored academic research to draw attention to the negative environmental effects of producing biofuels from agricultural products, such as groundwater and river pollution; depletion of biodiversity and nutrients from soils; rising food prices; and increased use of forests, wetlands, and rangeland for agriculture (Fargione, Hill, Tilman, Polasky, & Hawthorne, 2008).

Second, environmentalists issued press releases, announced policy suggestions, wrote to lawmakers to publicly criticize the use of oilseed crops, issued anti-oilseed biodiesel narratives to journalists, and associated oilseed feedstock technologies with derogatory terms such as "fuel farming." The Sierra Club's (1999) official energy policy, for instance, describes "agriculture as raising plants and animals for food and fiber" and states that "raising plants specifically for energy production is a departure from the historical use of plant fiber to produce food and goods." "The conversion of agricultural lands and native forests to biofuel crops has caused serious impacts on food supplies and prices, as well as on wildlife and their habitat." The Union of Concerned Scientists (2015) argued that biodiesel is a poor energy option "because it expands the global market for vegetable oil…diverting vegetable oils from food market and other uses," thereby creating "a supply gap in food markets." Environmentalists also directly attacked farm associations' renewable energy arguments and celebrity spokesmen, as this newspaper quote from Daniel Becker, the Sierra Club's "top global-warming expert," illustrates:

> In order to grow soybeans, you need multiple passes over the field with diesel tractors, you need a lot of fertilizer that's energy intensive to produce and, at the end of the day, you have a product that is no boon for the environment…. If you really want to listen to Willie Nelson, go buy one of his records and play it in a hybrid (Hakim, 2006).

The environmentalists' counter-framing efforts garnered media attention that reflected their negative stance towards oilseed-based biodiesel. As one producer lamented,

> Everyone used to think that just because you're in biodiesel, it meant you were sustainable, [that] you were making a positive impact on greenhouse gas emissions, for instance. *The New York Times* and *The Wall Street Journal* have been bashing biofuels…[They] are putting out word that biofuels are worse than petroleum (Interview with the authors).

Although farm associations held information sessions and issued press releases to refute environmentalists' claims, these actions failed to stop the stigmatization effect of the environmental frames.[2]

The salience of the environmental frames appeared to have a negative impact on consumers' consumption of biodiesel made from oilseed crops. For instance, in 2008 the city of Seattle stopped purchasing biodiesel made from virgin soy and canola oils. Their rationale for this change reflected the local salience of the environmental frame, as city representatives explained that biodiesel "was more harmful to the environment than regular diesel" because of the "amount of land needed to grow crops and greenhouse gas emissions" (Grygiel, 2009).

Qualitative evidence suggests that in areas where environmental frames were prevalent, entrepreneurs' perceptions of the meaning of biodiesel shifted from emphasizing agrarian and industry elements to environmental elements. Although the environmental frame was defined in direct opposition to the use of oilseed feedstocks emphasized by the agrarian frame, it was also incompatible with the industry frame because of the latter's allowance of oilseed feedstocks. Our interviews indicated that entrepreneurs interpreted environmental frames as a signal that oilseed-based biodiesel was risky and that they should prioritize feedstocks aligned with the new environmental frame. For example, one entrepreneur who established a production facility centered on using waste vegetable oil feedstocks stated,

> I'm really into sustainability. You can make biodiesel out of any oil or fat and it could be made out of virgin soybean oil, which is what they do so much of, which is something I'm actually against because it's not sustainable. You're taking away from the food supply; it's not a good crop to use because of the amount of oil you get per acre, et cetera (Interview with authors).

In sum, environmental groups' efforts to redefine the biodiesel category appeared to change entrepreneurs' perceptions of market meaning, from the idea that agrarian and environmental features could coexist to an exclusive definition that accepted only recycled material feedstocks.[3] Because stigmatized elements carry the risk of social disapproval, which can damage new ventures' ability to acquire market resources and support (Hampel & Tracey, 2017; Vergne, 2012), entrepreneurs will likely found ventures with technologies and practices that reflect the noncontested elements and avoid ventures that reflect the stigmatized elements. We therefore expect that increased salience of the environmental frames, which are dissimilar to and incompatible with agrarian and industry frames, will lead to greater market entry of ventures that use waste vegetable oil feedstocks and decreased market entry of ventures that use oilseed feedstocks.

Hypothesis (H3A): *Greater salience of the environmental frames will result in increased foundings of ventures using WVO feedstocks.*

Hypothesis (H3B): *Greater salience of the environmental frames will result in decreased foundings of ventures using oilseed feedstocks.*

[2]Some information sessions included pump tours, as this newspaper excerpt illustrates: "Soybean Association will host pump tours in Hamburg, Farragut, Riverton and Clarinda throughout March. 'Pump tours are a way to let people know this organization is in the area. It also serves as a way to promote corn and soybean production and their uses,' said member Julie Robertson. 'There's a lot of misinformation about ethanol and biodiesel in the media. This is a way we can clear that up'" (Nelson, 2008).

[3]Qualitative evidence from interviews with biodiesel producers and agrarian stakeholders indicates that these actors attempted to defend the agrarian elements but did not engage in tactics to attack or discredit the environmental frames. For example, analysis of all newspaper articles related to biodiesel revealed that 24% of all articles with an environmental frame included stigmatizing language directed at agrarian elements; however, none of the articles with an agrarian frame included stigmatizing language associated with environmental elements.

4 | METHODS

Our study explores venture entry into the biodiesel market in the United States, from 1990, when farm associations began promoting the market, to 2008, when the economic recession and accompanying drop in fuel prices nearly halted entry into the market. To understand the context and to guide our theory development, we collected qualitative data from archival sources, such as news media and publications by industry associations and environmental organizations. We also conducted extensive interviews with 32 biodiesel founders and 26 representatives of farm associations and environmental organizations. The interview data, news articles, and archival material grounded our choice of measures, informed our understanding of the hypothesized relationships, and offered further evidence relevant to our hypotheses (Vergne, 2012).

4.1 | Data description

During our study's target period, 265 total biodiesel production plants were founded across 48 states, and the first occurred in 1993. Of these, 127 entered using virgin-oilseed feedstocks exclusively; 101 entered using various combinations of waste vegetable, animal tallow fats, and virgin-oilseed feedstocks; and 37 entered using only waste vegetable oil feedstocks. To address whether ventures were closely tied to market stakeholders, we reviewed all founding-team information in detail and removed 18 instances in which the founders were also members of a farm association. After we removed these 18 cases, our final sample included 109 oilseed entrants, 97 combination entrants, and 37 WVO entrants.[4] We organized the data set in state-year panels covering all 50 states and the District of Columbia and included data on all firms founded during this period. Data on biodiesel producers came from quarterly reports generated by the National Biodiesel Board, the U.S. Department of Energy, and from the archival reports of individual biodiesel producers. To verify our data, we also contacted every biodiesel producer to ascertain its feedstock use.

4.2 | Dependent variables

Oilseed entrants. We defined oilseed entrants as organizations that entered the market and used technologies that produced biodiesel only from oilseed feedstocks, as promoted by farm associations.[5]

Combination entrants. We defined combination entrants as firms that entered the market and used technologies that produced biodiesel from a combination of oilseed, animal tallow, and WVO feedstocks.

WVO entrants. We defined WVO entrants as organizations that entered the market and used technologies that produced biodiesel only from waste vegetable oil feedstocks, which was the only feedstock deemed acceptable by environmental organizations.

4.3 | Predictor variable

Media attention to frames. To measure the salience of the different market frames, we constructed a measure of media attention to three types of frames in the biodiesel industry: farm associations'

[4]In models not reported here, the inclusion of farmer-founded ventures revealed results similar to those presented in Table 2.

[5]State farm associations that represented sunflower, canola, soybean, corn, peanuts, and cottonseed farmers all engaged in framing activities to promote these feedstocks.

agrarian frames, the National Biodiesel Alliance's *industry frames,* and environmental[6] activists' *environmental frames.* Media attention serves as an appropriate measure of frame salience, given that a category frame "…only exists to the extent that it is recognized as a salient unit of analysis by a sufficient number of member organizations and external audiences (e.g., critics, the media, or regulatory bodies)" (Vergne & Wry, 2014, p. 68). Prior research has demonstrated that market discourse that is more visible, coherent (focused on message), and positive in valence (degree of positive appeal) is more likely to capture audience attention (Bermiss, Zajac, & King, 2014; Fiss & Zajac, 2006; Kennedy et al., 2010) and that continual exposure to frames enhances the perceived favorability of those elements (Weber & Mayer, 2014). Accordingly, we followed prior studies and created a media-attention measure comprising total news articles weighted by coherence and valence, to capture the relative influence of stakeholders' competing frames on entrepreneurial entry (Bermiss et al., 2014). The formula for calculating the measure is $media\ attention_{ijk} = \sum (article\ count_{ijk} \times coherence_{ijk} \times valence_{ijk})$, where $_i$ is state, $_j$ is year, and $_k$ is the type of stakeholder frame (agrarian, industrial, environmental).

To do this, we followed an inductive process grounded in qualitative data comprising interviews with industry stakeholders, trade publications, newspaper articles, and books chronicling the history of the biodiesel industry. Through analysis of these materials, we discovered that the primary differentiation among the frames promoted by different stakeholders centered on the type of feedstocks used to produce biodiesel. We provide example excerpts of each frame in Table 1. In addition, we systematically collected articles on the biodiesel market from local newspapers, using the Access World News database, a digital archive of news articles from hundreds of local and national American newspapers in all states and the District of Columbia. We identified and downloaded a total of 3,159 articles from 1991 to 2008; we coded each article by state and stakeholder group (agrarian, industry, or environmental). We summed the number of articles associated with each stakeholder group by state and year (*article count*).

To construct the *coherence* weight, we further analyzed these articles to identify word groupings distinct to each frame and compared qualitative identification of keywords with quantitative analysis of the articles; we also developed finer-grained categorization of the keywords, following prior research (Helms et al., 2012). This enabled us to identify numerous unique keywords and keyword combinations that best reflected the perspective of each stakeholder frame and to create a search dictionary specific to each frame.[7] Supporting Information Table A2 in the Appendix S1 lists the terms included in each dictionary and indicates which word stems (with wildcard searches) or co-occurring word pairs we used in the search. Using these dictionaries, our full-text searches generated an overall coherence score for each article for each of the three frames, represented as the frequency of words from each dictionary per 1,000 words in the article. We averaged these scores across all articles by state and year for each of the three stakeholder groups.

To assess the positive *valence* of the articles, we conducted a full-text analysis of the same set of articles, using the Linguistic Inquiry Word Count (LIWC) content-analysis program and its dictionary of positive and negative emotion category words developed by Pennebaker, Booth, and Francis

[6]To develop our measure of the environmental stakeholders that advanced dissimilar and incompatible market frames, we conducted a deep qualitative review of press releases, media accounts, and letters submitted to the congressional Energy and Commerce Committee by environmental organizations. This helped us to ascertain which organizations were actively opposed to virgin oilseed-based biodiesel production. From these efforts, we identified six such organizations: The Sierra Club, the Union of Concerned Scientists, Friends of the Earth, Greenpeace, the World Resources Institute, and the Nature Conservancy.

[7]Although some words could be included in multiple frames (such as "environment*" and "air" in industry and environmental frames), we analyzed terms to identify which primary frame it was associated with by considering the percentage of articles that mentioned the term in isolation with a given frame, compared with co-occurrences of the term with terms associated with other frames.

TABLE 1 Article excerpts illustrating competing frames

Frames	Framing strategy	Quoted stakeholders	Evidence
Agrarian frames	Frame bridging	Farm association	As chairman of the Illinois Soybean Association, we recognize the importance of renewable fuels and support the expansion of biodiesel in the state. We use soy biodiesel because of the better lubricity, higher cetane content, and other engine performance benefits it provides.
		Farm association	Waiting in the wings is another plant-based product that's getting rave reviews for its potential as a clean-burning fuel additive from scientists, agriculture experts and central Illinois farmers: biodiesel fuel made from soybeans. "This is a new domestic use and we feel this is a positive growing market. It's a prime example of renewable resource use," said Judd Holting, domestic marketing manager for the Illinois Soybean Association in Peoria. "Illinois is No. 1 in soybean production. There's big potential."
		Farm association	Biodiesel is a mixture of vegetable oil and diesel fuel that reduces engine emissions. It will help in finding use for the glut of soybean oil presently on the market.
Industry frames	Frame extension	Trade association	According to the National Biodiesel Board, the term "biodiesel" refers to "a clean-burning alternative fuel produced from vegetable oils and animal fats through a chemical reaction"
		City mayor	The cleaner-burning fuel made from vegetable oil, animal fat or soy products and blended with petroleum diesel makes sense economically and environmentally.
		Fuel distributor	Biodiesel is a renewable source of fuel derived from vegetable oil and/or animal fats. It is primarily used as a blend in diesel fuel across the country.
Environmental frames	Frame transformation	Environmentalists	The use of vegetable oil as fuel...would be a boon to the state's farmers. Yet some environmental groups, like the Sierra Club, are skeptical of the method. "The very first step should be to make cars as efficient as they absolutely can be (rather) than to turn food into fuel," said Rich Ferguson, the Sierra Club energy committee chair in California.
		Environmentalists	Tom Larson of Jacksonville Beach, chairman of the Sierra Club Northeast Florida Group, said that...used vegetable oil…is a step in the right direction. "It's a very good thing," Larson said. "It's one of the better options for use of a bio source for fuel."
		Environmentalists	Large-volume biodiesel use could raise concerns about genetically modified crops, pesticide use and land-use impacts common to all plant-based fuels. Biodiesel might not be the fuel of the future because, as demand grows, the amount of land needed to produce the oils could become untenable. The huge amount of land required to grow biodiesel oil could crowd out food crops. Analyses said that in order to create low-carbon, renewable fuel such as biodiesel, natural ecosystems are often destroyed by burning or plowing under grasslands, peat bogs or rain forests. This process can release as much as 420 times more greenhouse gases than the fossil fuels they replace.

(2007). Multiple studies have deemed the LIWC dictionary to be a reliable method of identifying perspectives of market actors (Bednar, 2012; Bermiss et al., 2014; Helms et al., 2012; Pfarrer, Pollock, & Rindova, 2010). For each article, we calculated a separate positive valence and negative valence

score as the count of positive or negative terms per 1,000 words. We averaged these scores again across all articles by state, year, and stakeholder type.

4.4 | Control variables

We computed all control variables at the state-year level. Following previous studies, we controlled for macroeconomic indicators, using *gross state product* per capita and *state population,* which we obtained from the U.S. Department of Commerce and the U.S. Census Bureau, respectively. We also controlled for the total amount of locally available raw materials for the three types of biodiesel ventures (oilseed, combination, and WVO). For oilseed ventures, which used oilseed crops, the variable is the sum of plant oils produced annually in each state (*oilseed biodiesel feedstock availability*). For WVO ventures, which used recycled grease feedstocks, the variable is the sum of waste vegetable oil (yellow grease) produced annually in each state (*WVO biodiesel feedstock availability*). For combination ventures, which used a mixture of virgin seed oil, recycled grease, and rendered animal oils, the variable is the sum of plant oils, waste vegetable oil, and rendered animal fats produced annually in each state (*combination biodiesel feedstock availability*). We computed the amounts of plant oils by summing total bushels of sunflower, safflower, canola, rapeseed, soybean, corn, peanuts, cottonseed, and flaxseed harvested in a given state and by computing the average pounds of oil derived from each type of seed, as determined by the National Agricultural Statistical Service of the U.S. Department of Agriculture (USDA). The resulting data represent the annual amount of crops harvested and animals slaughtered and the commodity prices for each type of oil and fat by year. To measure the pounds of yellow grease produced by the states, we multiplied the total number of food-service establishments per state by 372 pounds per month, the average amount of waste vegetable oil discarded by a restaurant (Vernet, 2005). The number of food-service establishments comes from the U.S. Census Bureau's Economic Census. We calculated pounds of rendered animal fats by taking the number of pounds of pigs, cattle, and poultry slaughtered by state and by using the average percentage of rendered fat per animal, as determined by the National Renderers Association (Meeker, 2006).

We also controlled for the economic motivation to enter the market by using measures of oilseed combination and *environmental biodiesel profitability,* which we computed by taking the average price per gallon of retail petroleum-based diesel and subtracting the average production cost per gallon of biodiesel produced from virgin plant oils, waste vegetable oil, or animal fats (listed previously) in a given state, according to the type of venture's feedstocks.[8] We accounted for the influence of competition among producers by controlling for biodiesel-producer *density,* or the number of biodiesel producers of any type operating annually in a state (see Figure A1 in the Appendix S1), according to prior research (Marquis & Lounsbury, 2007). We also controlled for the potential size of the biodiesel market by measuring the *diesel fuel consumption* per capita, using data from the U.S. Department of Energy.[9]

To control for the regulatory environment related to biodiesel in each state, we included a dummy variable indicating the presence of favorable *state incentive policies* such as state tax credits for biodiesel production, state grants for construction of biodiesel refineries, biodiesel blender credits, and reduced excise taxes on biodiesel sales. We also included a binary variable indicating the presence of

[8]This figure includes the costs of labor, capital, and chemical transesterification of biodiesel raw materials per gallon. We obtained data on average retail diesel prices by state from the U.S. Department of Energy, information on the average cost of labor and capital from sector analysts' reports (Van Gerpen, Pruszko, Clements, & Shanks, 2006), and data on feedstock spot prices from the USDA's National Agricultural Statistical Service.

[9]In analyses not reported here, we also controlled for the number of active corn ethanol refineries by state-year, as they may provide a cognitive-legitimacy spillover to biodiesel producers. This variable had no significant impact on foundings.

producer and user *state biodiesel mandates.* These data came from the U.S. Department of Energy's Alternative Fuels and Advanced Vehicles Data Center and from state codebooks.

4.5 | Analysis

To test how the salience of different market frames can influence entrepreneurial market-entry strategies, we conducted a seemingly unrelated zero-inflated Poisson analysis (King, 1989; Winkelmann, 2000). This regression jointly estimates three sets of zero-inflated Poisson equations through a convolution structure that incorporates a common additive factor, producing a model with adjusted coefficients and standard errors for the three equations. We used a zero-inflated model because 85% of our state-year observations did not have a founding event (Marquis & Lounsbury, 2007).[10] In modeling the zeros, we chose as an inflator variable *technology transfer,* which is a binary measure of whether universities were researching and developing biodiesel production technology.[11] Early entrants in the biodiesel industry relied heavily on university technology transfer to design and execute their production systems. We created this variable by using information from archival sources from the National Biodiesel Board and academic peer-reviewed journals. All predictor variables in the models are lagged by 1 year.

Multivariate test statistics (Wilks's lambda, Pillai's test, Lawley–Hotelling trace, and Roy's largest root) indicated that all three equations in each model were statistically significant. Chow tests indicated that entries of oilseed, combination, and WVO entrants were significantly different in each model. Tests for multicollinearity in all regressions indicated that the maximum variance-inflation factor for individual variables was less than 1.6, indicating an acceptable level of multicollinearity (Afifi, Clark, & May, 2004).

5 | RESULTS

Table A1 in the Appendix S1 presents descriptive statistics and bivariate correlations. Table 2 shows the models predicting the foundings of oilseed, WVO, and combination entrants. In Table 2, the first model includes all the control variables, the second model adds agrarian frames, the third model includes industry frames, and the fourth model adds environmental frames. Turning to the control variables, we find that greater firm density, oilseed feedstock availability, diesel fuel consumption per capita, and state mandate policies were positively associated with foundings of oilseed-specialist ventures. Greater firm density, combination biodiesel profitability, combination feedstock availability, and state mandate policies were associated with greater combination (hybrid) venture foundings. Higher WVO biodiesel profitability was associated with greater WVO-specialist foundings.

In Hypothesis 1, we argued that oilseed ventures would be more likely to enter in states where similar agrarian frames were more salient. The coefficients in Model 2 of Table 2 offer quantitative support for Hypothesis 1. When all other variables are held constant, states with a one-standard-deviation increase in media attention of agrarian frames showed increased foundings of oilseed-specialist ventures by 11.9%.

[10]Foundings occurred in every state except Alaska and New Hampshire and the District of Columbia (see Figure A2 in the Appendix S1).

[11]Comparison of Akaike information criterion (AIC) indicated that a zero-inflated Poisson was a better fit for the data than zero-inflated negative binomial or hurdle models.

TABLE 2 Multivariate zero-inflated Poisson regression of biodiesel venture foundings

	Model 1			Model 2		
Variables	**Oilseed entrant**	**Combination entrant**	**WVO entrant**	**Oilseed entrant**	**Combination entrant**	**WVO entrant**
Agrarian frames				0.003***	−0.002	−0.009
				(0.000)	(0.002)	(0.008)
Industry frames						
Environmental frames						
Density	0.094**	0.125***	0.031	0.100**	0.126***	0.034
	(0.032)	(0.026)	(0.040)	(0.033)	(0.022)	(0.030)
Oilseed biodiesel profitability	0.006+			0.005+		
	(0.003)			(0.003)		
Oilseed biodiesel feedstock availability (logged)	15.904***			15.682***		
	(3.941)			(3.793)		
Combination biodiesel profitability		0.016***			0.016***	
		(0.003)			(0.003)	
Combination biodiesel feedstock availability (logged)		0.164*			0.178+	
		(0.075)			(0.092)	
WVO biodiesel profitability			0.023***			0.023***
			(0.004)			(0.003)
WVO biodiesel feedstock availability (logged)			2.528*			2.139
			(1.246)			(1.449)
Diesel fuel consumption per capita	0.086***	0.039	0.020	0.085***	0.038	0.018
	(0.025)	(0.045)	(0.038)	(0.025)	(0.045)	(0.037)
Gross state product per capita	−30.818	40.437	1.833	−32.601	42.111	3.671
	(27.529)	(25.445)	(9.198)	(28.573)	(26.432)	(9.699)
State incentive policies	0.408**	0.559*	0.095	0.312*	0.588*	0.178
	(0.141)	(0.260)	(0.479)	(0.144)	(0.229)	(0.439)
State population (logged)	0.416***	0.427*	0.153	0.285**	0.457*	0.259
	(0.120)	(0.206)	(0.230)	(0.100)	(0.224)	(0.242)
State mandate policies	0.734***	0.582***	−1.704	0.723***	0.563***	−1.330
	(0.154)	(0.161)	(1.299)	(0.151)	(0.154)	(1.492)
Technology transfer *(inflator)*	−12.034***	−0.455	12.314*	−1.594	−0.945	9.505
	(1.527)	(0.611)	(6.167)	(4.610)	(0.867)	(8.552)
Constant	−295.680***	−16.076***	−11.601*	−291.570***	−16.118***	−12.376*
	(69.353)	(3.707)	(4.832)	(66.778)	(3.453)	(5.149)
LR χ^2	212.14***	166.38***	83.02***	215.22***	166.64***	84.37***

	Model 3			Model 4		
Variables	**Oilseed entrant**	**Combination entrant**	**WVO entrant**	**Oilseed entrant**	**Combination entrant**	**WVO entrant**
Agrarian frames	0.005**	−0.001	−0.009	0.004*	−0.002+	−0.007
	(0.001)	(0.002)	(0.009)	(0.002)	(0.001)	(0.008)
Industry frames	0.035	0.045**	0.017	0.034	0.061**	0.009
	(0.029)	(0.017)	(0.016)	(0.033)	(0.019)	(0.019)
Environmental frames				−0.038*	−0.037+	0.034*
				(0.019)	(0.021)	(0.016)

TABLE 2 (Continued)

	Model 3			Model 4		
Variables	**Oilseed entrant**	**Combination entrant**	**WVO entrant**	**Oilseed entrant**	**Combination entrant**	**WVO entrant**
Density	0.098***	0.123***	0.021	0.111***	0.134***	−0.006
	(0.028)	(0.023)	(0.044)	(0.032)	(0.029)	(0.048)
Oilseed biodiesel profitability	0.003			0.003		
	(0.004)			(0.004)		
Oilseed biodiesel feedstock availability (logged)	14.550***			14.302***		
	(3.953)			(3.924)		
Combination biodiesel profitability		0.013***			0.012***	
		(0.003)			(0.003)	
Combination biodiesel feedstock availability (logged)		0.190*			0.164*	
		(0.089)			(0.080)	
WVO biodiesel profitability			0.022***			0.022***
			(0.003)			(0.003)
WVO biodiesel feedstock availability (logged)			1.792			1.671
			(1.528)			(1.510)
Diesel fuel consumption per capita	0.087***	0.048	0.020	0.086**	0.047	0.027
	(0.025)	(0.032)	(0.040)	(0.026)	(0.032)	(0.030)
Gross state product per capita	−32.705	42.115+	6.109	−28.700	40.499+	6.879
	(27.149)	(23.386)	(9.934)	(29.478)	(21.228)	(9.738)
State incentive policies	0.279	0.665**	0.165	0.278+	0.664*	0.180
	(0.176)	(0.221)	(0.577)	(0.163)	(0.281)	(0.503)
State population (logged)	−0.028	0.049	0.146	0.149	0.257	0.016
	(0.203)	(0.088)	(0.237)	(0.279)	(0.170)	(0.230)
State mandate policies	0.647***	0.447*	−1.019	0.682***	0.505**	−0.947
	(0.176)	(0.198)	(1.571)	(0.165)	(0.185)	(1.560)
Technology transfer *(inflator)*	−0.847	−0.795	1.004	−10.396*	−9.749	13.705***
	(1.351)	(0.788)	(5.639)	(5.100)	(26.803)	(3.800)
Constant	−270.404***	−14.804***	−12.660*	−266.681***	−15.137***	−12.395*
	(69.178)	(3.028)	(5.405)	(68.645)	(2.887)	(5.441)
LR χ^2	219.80***	174.08***	85.00***	222.55***	177.58***	87.82***

Note. Robust standard errors in parentheses; data are based on 918 observations from 1991 to 2008.
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$.

In Hypothesis 2, we proposed that combination-feedstock ventures would be more likely to enter in states where industry frames were more salient. Our analysis supports this hypothesis. As Model 3 shows, states with a one-standard-deviation increase in media attention to industry frames showed increased foundings of combination ventures by 33%, when all other variables are held constant.

We argued in Hypotheses (H3A) and (H3B) that in states where media attention highlighted the salience of environmental frames, WVO ventures would be more likely to enter and oilseed-specialist ventures would be less likely to enter. The results, shown in Model 4, support both of these arguments. When all other variables are held constant, states with a one-standard deviation increase in media attention to the environmental frames reflected a 13% increase in foundings of WVO-specialist ventures and a 12% decrease in foundings of oilseed-specialist ventures.

5.1 | Robustness tests

We conducted several robustness tests to address alternative explanations and organizational responses. To address whether prior capabilities influenced organizational foundings, we coded all entrants as either de novo (startup firms) or *de alio* (diversifying firms) and ran the analyses comparing these two types of ventures. Approximately 43% of oilseed, 29% of combination, and 11% of WVO entrants were *de alio* entrants. The results showed no significant difference between the two types of firms among oilseed, WVO, and combination entrants and were consistent with the primary models reported above.

To rule out the concern that prior venture foundings would influence the content of media, we ran the regressions controlling for foundings of each specific type of entrant (oilseed, WVO, and combination) from the previous year. Even after adding these controls, we found that the results of our regressions for all hypotheses did not change meaningfully. We also examined the impact of the three stakeholder frames on the first venture founded using a particular type of feedstock (oilseed, combination, and waste vegetable).[12] The results in this subsample analysis hold for all hypotheses except 3a ($p < 0.32$), for which it was not statistically significant. Given that most WVO foundings occur in only a few states, this nonsignificant outcome from a low N is not surprising. We believe that these tests demonstrate that these potential issues do not affect the study's results.

To further assess the influence of competing market frames on entrepreneurship, we also conducted a logit analysis of venture failure during this period (see Table A3 in the Appendix S1). We controlled for firm age and size in addition to the variables mentioned above. The results showed that when media attention highlighted the environmental frames promoted by environmental organizations, oilseed entrants were more likely to fail than were other types of entrants. Specifically, Model 4 illustrates that a one-standard-deviation increase in media attention to environmental frames increased the failure of oilseed ventures by 43% but had no significant performance effect on combination or WVO ventures. These findings provide further evidence that competing market frames may elicit a change in market meaning that impacts how actors value market products. Environmental frames, which are dissimilar to and incompatible with agrarian and industry frames, appear to have a penalizing effect on organizations that identified with the agrarian meaning and produced biodiesel from virgin oilseed sources. Thus, not only do competing frames influence entrepreneurial opportunities, but they also appear to influence incumbent firms' competitive advantage.

6 | DISCUSSION

Although market categories typically represent negotiated agreements that are believed to help structure market expectations and signal entrepreneurial opportunities (Pontikes & Barnett, 2017; Porac et al., 1995; Vergne & Wry, 2014), in some cases agreement on category elements is not achieved. Notwithstanding recent advances in category research that consider more-nuanced aspects of how shared meanings are constructed and modified, scholars know relatively little about how entrepreneurs respond to ongoing contestation over these meanings. We address this gap by examining how the salience of frames that varied by similarity and compatibility shaped entrepreneurs' perceptions of market opportunity and influenced the types of feedstocks and related production technologies that entrepreneurs adopted at founding.

[12]We did this by analyzing states that had no prior foundings of firms using one of these respective feedstocks—specifically, by examining the impact of agrarian framing on the first oilseed entrant in a given state, the effect of industry frames on the first "combination" or hybrid entrant in a given state, and the effect of environmental frames on the first WVO entrant in a given state.

Specifically, the results illustrate how the salience of category frames promoted by various stakeholders signals market opportunity differently. In states where agrarian frames promoted by farm associations were more salient, entrepreneurial entry was higher for specialized ventures using only oilseed feedstocks, which aligned with those frames. However, in states where industry frames garnered attention, we found evidence of combination-feedstock entry by entrepreneurs responding to the salience of the dissimilar but compatible frame elements. In these cases, it seems that entrepreneurs recognized opportunities to appeal to multiple audience segments by adopting hybrid organizational forms that incorporated core elements of both frames. The findings also showed that the salience of environmental frames that were dissimilar and incompatible with the agrarian frames led not only to more foundings of WVO-specialist firms but also to fewer foundings of oilseed-specialist firms. These results reflect the dynamics that played out in our particular context, in which environmentalists actively attacked and sought to stigmatize the agrarian frames. Moreover, our supplemental analyses showed that dissimilar and incompatible frames had a negative impact on the performance of ventures that adopted the incompatible elements: oilseed ventures were more likely to fail when media attention to environmental frames was high.[13] Taken together, our findings indicate that considering the compatibility and salience of different stakeholder frames may help to explain entrepreneurial responses to shifts in category meaning.

Although we observed in our empirical context a scenario whereby one stakeholder group sought to stigmatize and discredit elements associated with a dissimilar incompatible frame, we recognize that other contexts might not reflect this scenario. We anticipate that when incompatible frames compete and do not utilize stigmatizing tactics, overall market entry will likely be lower, for two reasons. First, entrepreneurs are unlikely to adopt an entry strategy that accommodates both frames because of the higher organizational costs associated with incorporating incompatible frame elements (Battilana & Dorado, 2010; Pache & Santos, 2013). Second, entrepreneurs are not likely to enter with elements of either incompatible frame because it may jeopardize their legitimacy in the eyes of prominent stakeholders (Besharov & Smith, 2014). Instead, entrepreneurs will likely wait until agreement on common frame elements is established and then are likely to enter the market using technologies, inputs, and practices that align with those features.

This study's findings extend current understandings of market-category research in several ways. First, compared with prior work that has considered how actors respond to cues from categories reflecting agreement on central defining elements (Rao & Kenney, 2008), our study considers entrepreneurial responses to situations in which shared understandings do not exist and multiple stakeholders engage in ongoing framing struggles (Ansari, Wijen, & Gray, 2013; Dunn & Jones, 2010; Kaplan & Tripsas, 2008; Smith & Tracey, 2016). By incorporating insights from the literature on framing contests, we also extend research on market categories "that stands to benefit from a stronger focus on communication" (Cornelissen, Durand, Fiss, Lammers, & Vaara, 2015, p. 22) by illuminating the cognitive mechanisms underlying the process of categorization (Durand & Khaire, 2017; Glynn & Navis, 2013; Vergne & Wry, 2014). Although our framework specifically incorporates dimensions of frame salience and compatibility, we acknowledge that other factors, such as those related to stakeholder power or the institutional environment, may also influence how ongoing framing contests affect organizational outcomes. These other factors also represent a promising avenue for future research.

[13]We also investigated whether oilseed-specialist ventures sought to dilute the effects of stigma by changing their feedstocks (Durand & Vergne, 2015). Due to the large capital costs associated with changing technologies to process different feedstocks, it was uncommon for producers to change their processing technologies after founding (in our context, only 14 oilseed ventures after founding made investments to allow for processing of WVO and animal tallow).

Second, this study contributes to research on category evolution by providing insights into market discourse and the underlying mechanisms that influence market meaning. Although scholars have speculated that producers and trade associations can "broaden the scope of interactions within discourse" by "increase[ing] the diversity of groups participating in the dialogue" (Kahl, 2018, p. 14), few studies have explored how increasing the variety of market stakeholders and their respective framing effects may influence market-category evolution. We address this limitation and show that entrepreneurs interpret market cues from stakeholder discourse by founding ventures that conform to the cognitive elements of market frames, depending on their compatibility and salience. In our empirical context, the changing salience of competing frames appeared to cause many entrepreneurs' perceptions of the meaning of biodiesel to change over time and geography; these perceptions started with a singular agrarian definition, broadened to a meaning that incorporated both agrarian and nonagrarian elements, and then shifted to a singular environmental-focused definition, as evidenced by the types of firms that entered these markets. Market evolution thereby can result from the types of firms that enter the market and reflect the meanings associated with the frames that are salient at the firms' foundings. Accordingly, these findings contribute to recent studies indicating the need for deeper understanding of how struggles over central category meanings shape entrepreneurial action, technology and industry reemergence, and market evolution (Grodal & Kahl, 2017; Raffaelli, 2018; Vergne & Swain, 2017).

This study also contributes to research on framing contests. Much of the literature on framing contests portrays frames as paradoxical—widely disparate and incompatible (Hahn, Preuss, Pinkse, & Figge, 2014; Kaplan, 2008; Smith & Besharov, 2018). As our framework describes, framing contests are not simply dichotomous meanings advanced by oppositional pairs (Rao et al., 2003) but represent a spectrum of meanings that vary along dimensions of similarity and compatibility. Considering these more-nuanced dimensions not only provides greater insights into these mechanisms but also goes beyond prior studies that have focused primarily on proponent–opponent dynamics (Cornelissen & Werner, 2014). Indeed, most framing-contest studies "deal with only one type of actor and rarely examine how framing contests occur and the frames of different parties coevolve" (Gurses & Ozcan, 2015, p. 1713). In this way, we depart from prior literature by emphasizing the need to consider not only the different actors involved in framing contests but also the content of their various frames. This study therefore answers calls for greater theorization and empirical examination of the impact of contestation on categorization (Bajpai & Weber, 2017; Cornelissen et al., 2015) and the consequences of these dynamics when multiple stakeholders advance various cognitive elements (Durand & Boulongne, 2017).

Moreover, this study enhances our understanding of how organizations respond to the "political motivations and interests between individuals, groups, and organizations" promoting competing frames (Cornelissen & Werner, 2014, p. 210). We suggest that hybridization may be one way for organizations to negotiate contested spaces. As our theoretical framework and results indicate, hybridity may be a viable option when competing frames are dissimilar and compatible.[14] By identifying the conditions under which framing contests may lead to hybrid organizational identities, we address the discrepancy in prior research that has argued either for or against hybridization as a resolution for competing frames (Litrico & David, 2017; York, Hargrave, & Pacheco, 2016), and we enlighten scholarly understanding of the conditions under which forms of compromise, including the

[14]Although hybridity may not be an attractive founding strategy when stakeholders advance frames that are dissimilar and incompatible, supplemental analyses showed that such frames did not negatively influence hybrid-venture survival, suggesting that hybridity may provide performance benefits to entrepreneurs in the midst of competing, incompatible framing contests.

market entry of hybrid organizations, may be possible (Battilana & Lee, 2014; Lee, Ramus, & Vaccaro, 2018).

In two ways, our findings also speak to research at the intersection of entrepreneurship and social movements (Durand & Georgallis, 2018; Hiatt et al., 2009; Sine & Lee, 2009). Although recent scholarship offers examples of movements facilitating entrepreneurial opportunities and exploitation, these studies largely evoke a "hero" image of a powerful stakeholder championing a new organizational form, technology, or practice, when the institutional environment typically reflects many types of stakeholders promoting and attacking competing practices and technologies (Briscoe & Gupta, 2016; Eesley, Decelles, & Lenox, 2016; Vasi & King, 2012). Moreover, pluralistic pressures exerted by multiple actors may greatly affect entrepreneurial decision-making in emerging markets where technologies are unproven and category meanings are unsettled (Eesley, Eberhart, Skousen, & Cheng, 2018). By exploring competing frames from three stakeholder groups, we answer scholarly calls to take a "more agency-motivated approach" to category research (Durand & Khaire, 2017, p. 89) and begin to identify the underlying mechanisms whereby multiple stakeholders can influence new market emergence and evolution. In related terms, the findings extend research on strategic framing (Harmon, 2018; McDonald & Gao, 2018; Raffaelli, 2018). Although prior studies have emphasized the dynamics between movement frames and changing political opportunity structures (Benford & Snow, 2000), we theorize and examine how stakeholder frames can alter entrepreneurial opportunity structures and, hence, the choices surrounding market entry and technology adoption, and we call for future studies on this phenomenon.

This paper offers important practical implications for new markets. Our findings indicate that market proponents such as producers, activists, and trade associations should carefully consider potential unintended consequences that may result from their actions to grow a market—including inviting diverse economic actors to engage in commerce with producers who can alter the power dynamics among stakeholders (Dorobantu & Odziemkowska, 2017; Heinze, Soderstrom, & Heinze, 2016; Kahl, 2018). Although market success is often perceived as growth in terms of customers, investors, and suppliers, attracting a broader group of stakeholders risks altering category meanings and inspiring new grievances that galvanize opponents (Carlos et al., 2018; Grodal, 2018; Vasi, Walker, Johnson, & Tan, 2015; Zietsma & Lawrence, 2010). Empirical evidence in other emerging markets suggests that this is a critical issue facing market proponents. For instance, organic food activists initially sought to establish rigid categorical boundaries that emphasized the use of natural growing practices and ideologies. Later, in their quest to grow the market among retailers, they lost their ability to dictate the certification and verification processes for growing organic food. This allowed the category meaning to change in ways that were inconsistent with the meaning promoted by initial market evangelists and enabled producers that did not share those initial ideologies to enter the market (Lee et al., 2017).

Consequently, market pioneers face a dilemma in seeking to expand a new category versus seeking to maintain control of its meaning. To sustain and grow the market, they must attract new stakeholders, who may hold different or even conflicting category understandings. In so doing, market pioneers may unintentionally enable the category's meaning to change, driving demand away from the initial producers and leading to the adoption of unforeseen technologies and entry of diverse organizations. Organizational leaders involved in market-building activities should consider how their actions may unintentionally attract other stakeholders that may seek to alter or redefine category meanings.

Finally, these findings spark new questions regarding the complex social dynamics that play out in markets where multiple stakeholders espouse pluralistic goals and interests. Because markets

represent contested arenas in which multiple stakeholders compete over definitions that enhance their own value propositions, it is critical to understand how these dynamics shape organizational behavior. Competition over category meaning goes beyond technology battles or standards wars and involves the central and defining elements that shape the category and influence its future trajectory.

These ramifications are important not only for scholars of management and entrepreneurship but also for academics and practitioners addressing social and environmental grand challenges (Delmas & Burbano, 2011; Hoffman & Bansal, 2012; Hiatt & Park, 2013; Hiatt, Grandy, & Lee, 2015; Cobb, Wry, & Zhao, 2016; Vakili & McGahan, 2016). As policymakers, firms, NGOs, and entrepreneurs seek solutions through innovation, it is imperative to understand how the dynamics among stakeholders shape and reshape the definitions of social responsibility and environmental sustainability. These definitions often become the foundations for organizational regulations, incentives, standards, certifications, rankings, and awards, and thereby play an outsized role in shaping technological development, firm strategies, and societal outcomes (Carlos & Lewis, 2018; Gehman & Grimes, 2017; Hawn & Ioannou, 2016; Lyon et al., 2018). Accordingly, we believe that developing deeper insights into these issues is an important step in addressing some of the wicked problems facing society. We encourage future studies to further disentangle the complex relationships among competing stakeholders and the implications of these dynamics for institutional, organizational, and market outcomes.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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APPENDIX

Table A1. Descriptive Statistics and Bivariate Correlations

	Variable	Mean	Std. Dev.	1	2	3	4	5	6	7	8
1	Oilseed entrant	0.112	0.451	1							
2	Combination entrant	0.100	0.458	0.407	1						
3	WVO entrant	0.038	0.212	0.199	0.383	1					
4	Agrarian frames	5.073	23.07	0.295	0.166	0.008	1				
5	Industry frames	1.433	4.880	0.395	0.353	0.350	0.215	1			
6	Environmental frames	0.575	2.929	0.145	0.268	0.347	0.085	0.410	1		
7	Density	0.436	1.374	0.482	0.578	0.211	0.241	0.410	0.425	1	
8	Oilseed biodiesel profitability	-82.72	40.03	0.241	0.189	0.196	0.125	0.316	0.174	0.264	1
9	Oilseed biodiesel feedstock availability (logged)	17.69	0.147	0.273	0.233	0.171	0.190	0.318	0.171	0.290	0.401
10	Combination biodiesel profitability	-36.68	44.22	0.315	0.250	0.233	0.188	0.397	0.208	0.324	0.939*
11	Combination biodiesel feedstock availability (logged)	18.28	5.143	0.127	0.100	-0.004	0.167	0.048	0.023	0.103	-0.098
12	WVO biodiesel profitability	37.52	47.15	0.356	0.286	0.253	0.214	0.440	0.223	0.356	0.835
13	WVO biodiesel feedstock availability (logged)	12.58	0.964	0.181	0.207	0.179	0.105	0.236	0.214	0.217	-0.030
14	Diesel fuel consumption per capita	6.690	6.135	-0.026	-0.063	-0.067	-0.038	-0.093	-0.097	-0.071	0.044
15	Gross state product per capita	0.033	0.014	0.064	0.055	0.081	0.065	0.110	0.056	0.052	0.156
16	State incentive policies	0.136	0.343	0.255	0.216	0.135	0.341	0.358	0.213	0.280	0.214
17	State mandate policies	0.052	0.221	0.268	0.260	0.218	0.365	0.457	0.314	0.362	0.259
18	State population (logged)	15.01	1.033	0.184	0.208	0.157	0.113	0.209	0.197	0.212	-0.033
19	Technology transfer	0.077	0.267	0.060	0.033	-0.039	0.230	-0.031	0.007	0.125	0.041

	9	10	11	12	13	14	15	16	17	18
9	1									
10	0.474	1								
11	0.006	-0.091	1							
12	0.573	0.959*	-0.088	1						
13	0.045	-0.025	0.424	-0.022	1					
14	0.069	0.054	-0.209	0.060	-0.570	1				
15	0.346	0.217	-0.498	0.259	-0.082	-0.046	1			
16	0.298	0.283	0.162	0.324	0.207	-0.056	0.050	1		
17	0.232	0.317	0.091	0.343	0.142	-0.063	0.077	0.338	1	
18	0.043	-0.020	0.481	-0.014	0.981	-0.575	-0.147	0.203	0.138	1
19	0.061	0.046	0.099	0.046	-0.124	0.062	-0.101	0.069	0.032	-0.114

*Although correlated, these feedstock-related variables are never included in the same model. They are included as control measures in models where the type of biodiesel entrant (i.e., dependent variable) uses the corresponding biodiesel feedstock.

Figure A1: Biodiesel Foundings and Density by Year

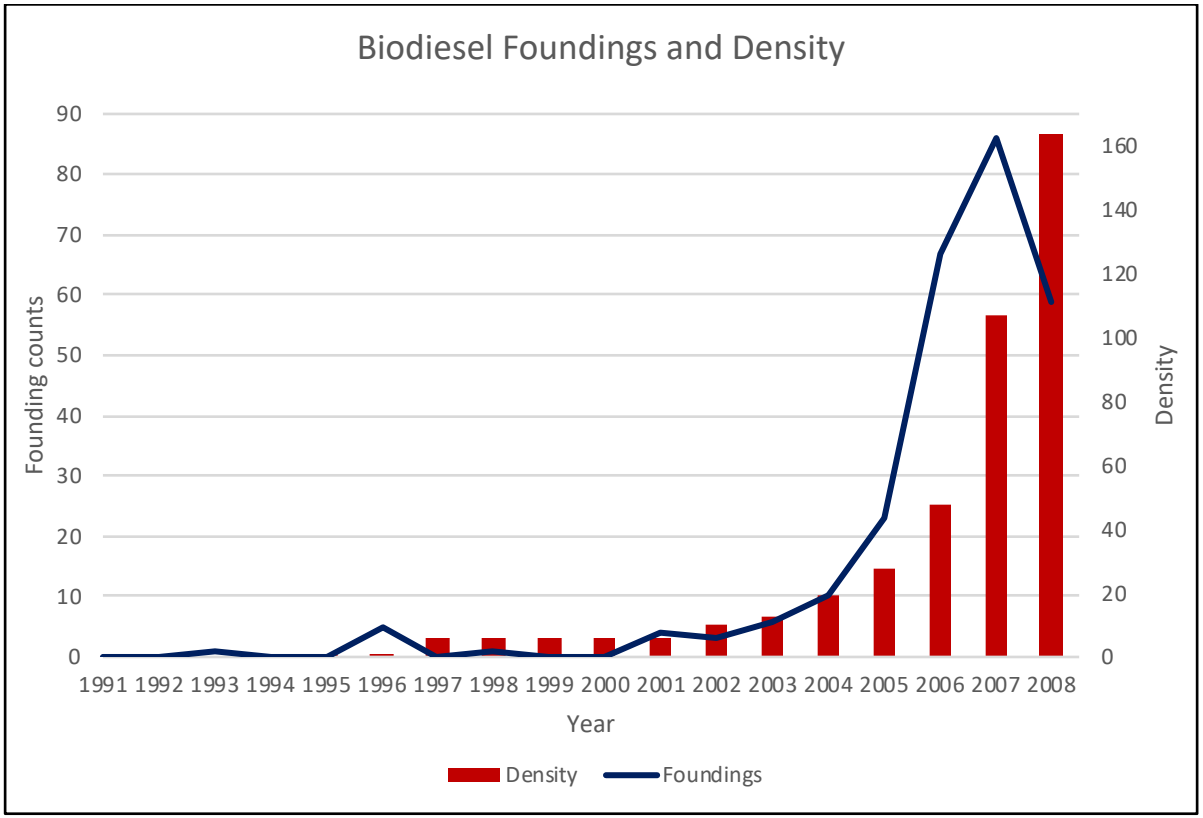

Figure A2: Cumulative Biodiesel Foundings by State (1990-2008)

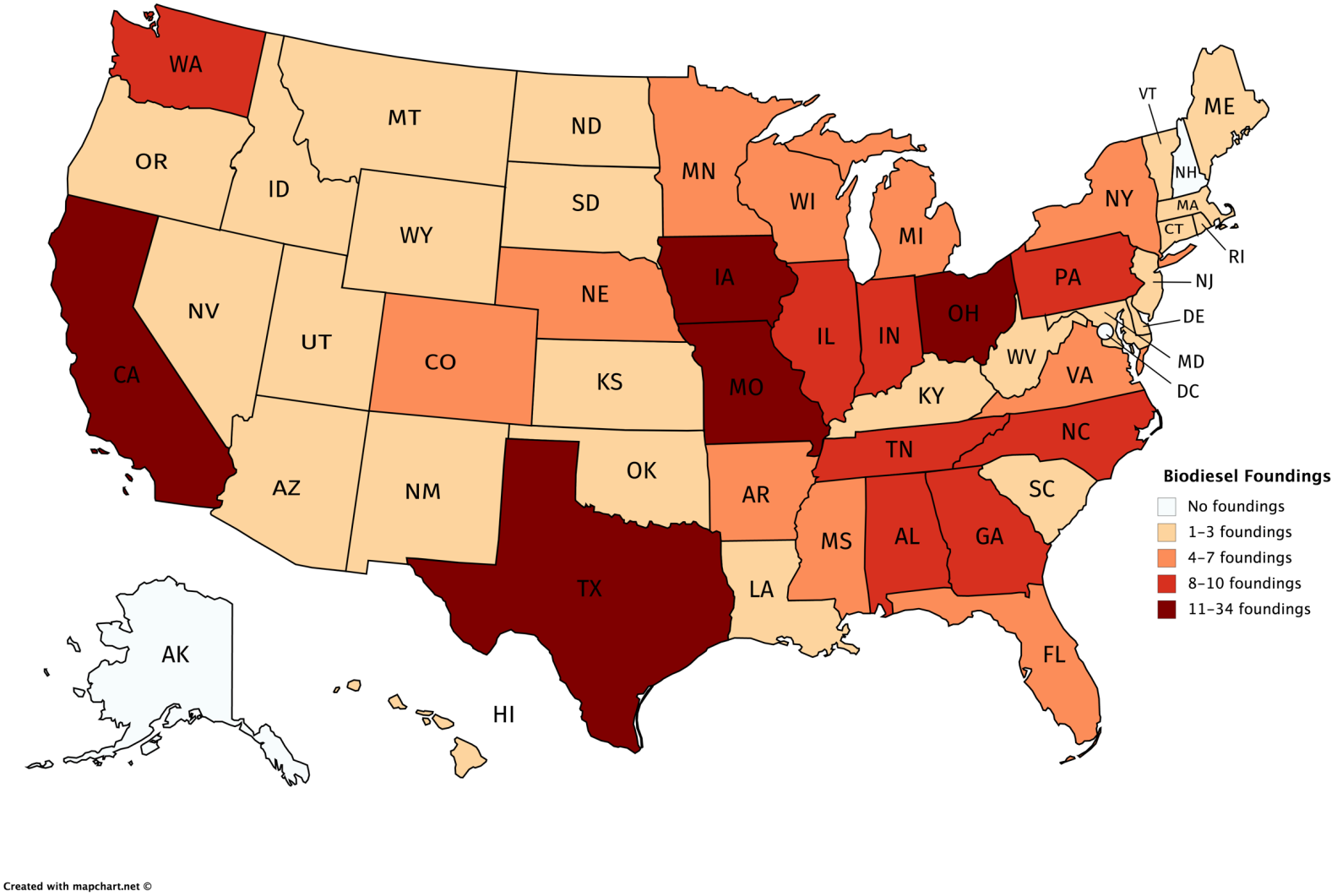

Table A2: Keywords for Three Types of Frames

Agrarian Search Terms

Term	Co-occurring Term
agricult*	
canola	
co-op*	
cooperativ*	
corn	
cotton	
crush*	
energy indep*	
farm*	
foreign	depend*
foreign oil	
patriot*	
peanut	
rural econ*	
safflower	
soy*	
sunflower	
suppl*	oil*
suppl*	energ*
war	

Environmental Search Terms

Term	Co-occurring Term
alga*	
carbon monoxide	
clean*	burn*
clean*	air
climate	
conserve*	
destroy*	
destruction	
dirty	
disaster	
environment*	
fuel	farm*
fuel	food
fuel	effic*
global warming	
mileage	
nitrogen	
palm	
particulat*	
pollut*	
recycle*	
reduce*	emission*
renewable*	
smog*	
sulfur	
sustaina*	
vegetable	

Industry Search Terms

Term	Co-occurring Term
alternative energy	
B100	
B20	
cost	effect*
cost-effect*	
fat*	
govern*	
heating oil	
hippie*	
hobby*	
lubric*	
regulat*	
tallow	
tax incent*	
tax polic*	

Table A3: Logit Analysis of Venture Failure

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Agrarian frames				-0.018	-0.011	-0.008
				(0.012)	(0.008)	(0.007)
Industry frames				0.022	-0.005	-0.012
				(0.035)	(0.034)	(0.032)
Environmental frames				-0.116**	-0.082*	-0.060+
				(0.044)	(0.040)	(0.036)
Agrarian frames X Focused Agrarian				0.009		
				(0.010)		
Industry frames X Focused Agrarian				-0.048		
				(0.035)		
Environmental frames X Focused Agrarian				0.102*		
				(0.047)		
Agrarian frames X Hybrid					0.004	
					(0.008)	
Industry frames X Hybrid					0.012	
					(0.039)	
Environmental frames X Hybrid					0.023	
					(0.050)	
Agrarian frames X Focused Environmental						-0.054
						(0.093)
Industry frames X Focused Environmental						0.025
						(0.051)
Environmental frames X Focused Environmental						-0.057
						(0.062)
Focused agrarian venture (binary, 1=yes)	0.916**			0.729		
	(0.347)			(0.569)		
Hybrid venture (binary, 1=yes)		-0.177			-0.563	
		(0.331)			(0.512)	
Focused environmental venture (binary, 1=yes)			-0.794			-0.429
			(0.496)			(0.813)
Firm age	0.417***	0.411***	0.431***	0.538***	0.468***	0.479***
	(0.098)	(0.098)	(0.099)	(0.113)	(0.105)	(0.105)
Firm size (production capacity, gallons per year)	-0.000+	-0.000	-0.000+	-0.000+	-0.000	-0.000+
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Density	-0.054	-0.092	-0.055	-0.039	-0.061	-0.037
	(0.091)	(0.096)	(0.089)	(0.102)	(0.105)	(0.099)
Agrarian Biodiesel profitability	0.015*			0.014+		
	(0.007)			(0.007)		
Agrarian Biodiesel feedstock availability (logged)	0.906			4.578		
	(8.055)			(8.547)		
Hybrid Biodiesel profitability		0.015**			0.016**	
		(0.005)			(0.006)	
Hybrid Biodiesel feedstock availability (logged)		-1.321			-0.780	
		(1.124)			(1.145)	

Environmental Biodiesel profitability			0.020**			0.019**
			(0.006)			(0.007)
Environmental Biodiesel feedstock availability (logged)			1.407			1.926
			(3.694)			(3.492)
Diesel fuel consumption per capita	-0.066	-0.138	-0.168	0.137	-0.061	-0.056
	(0.443)	(0.437)	(0.444)	(0.497)	(0.478)	(0.483)
Gross state product per capita	-24.729	-77.124	-101.530+	-73.747	-72.862	-111.644+
	(97.975)	(64.131)	(61.109)	(107.538)	(63.887)	(61.355)
State incentive policies	-0.176	-0.176	-0.246	-0.634	-0.460	-0.685
	(0.612)	(0.624)	(0.625)	(0.695)	(0.706)	(0.702)
State mandate policies	-0.159	-0.078	-0.197	0.373	0.429	0.427
	(0.582)	(0.577)	(0.581)	(0.621)	(0.597)	(0.598)
State population (logged)	12.137	12.271	1.077	13.209	16.539	5.583
	(17.528)	(16.427)	(16.933)	(16.914)	(16.469)	(17.219)
LR Chi squared	44.95***	39.62***	39.81***	62.24***	49.76***	50.88***

Standard errors in parentheses; data are based on 431 observations from 1993-2008
*** p<0.001, ** p<0.01, * p<0.05, + p<0.10