



Diffusion of food policy in the U.S.: The case of organic certification



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ABSTRACT

Organic food certification policy and programs are an interesting case to explore in terms of policy diffusion, as there has been interesting dynamics between the federal and state levels, and great diversity in the pace of diffusion across states. At the same time, this policy diffusion underlies a very dynamic marketplace that has relied on government-based certification policies and programs to stabilize and support growth of the organic food sector. The focus of this paper is a cross-section time series analysis of organic policy adoptions over the past several decades to explore the types of factors that have influenced diffusion across time and space. Although federal policy activity has been a key driver of this dynamic, there are several other state-specific factors that also help to explain the differential diffusion of policies in this realm.

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Introduction

The United States represents the single largest organic market globally. In 2013, U.S. organic sales reached \$35.1 billion approaching 5% of U.S. food sales (OTA, 2014; ERS, 2012; FiBL and IFOAM, 2013). The demand for organic food products in the U.S. primarily materialized in the 1960s and has grown steadily since, first in fresh produce and dairy product categories and gradually through innovations in value-added products, meats, beverages and snacks (Greene, 2013). There is evidence that demand for organic products is growing among a growing segment of consumers and is driven by a wide range of perceptions and beliefs (Lusk, 2011; Lusk and Briggeman, 2009; Onozaka et al., 2011).

In the broader food policy and industry sector, there are a number of salient advocacy groups that have spurred activity in the organic food sector including environmentalists, food phobics (i.e. food safety), healthy eaters, welfare enthusiasts, and hedonists (Bonti-Ankomah and Yiridoe, 2006; Davies et al., 1995; Hughner et al., 2007). Hatanaka et al. (2005) noted that a wide range of third-party certifications were becoming an alternative for conventional producers, and were a mechanism that also signals to consumers about the nature of food's production practices. So, the interface between policy and market developments in the organic sector is particularly interesting because of the interdependency of consumer preferences, producer certification choices and the

policy advocates who see organic food market development as a solution to some of the negative spillovers of conventional agricultural systems.

However, the organic food market is in a unique position because its supply chain is interdependent with organic certification policies that are managed by state and federal policymakers. The present U.S. market for organic food is regulated by the United States Department of Agriculture [USDA] National Organic Program [NOP], housed in the Agricultural Marketing Service, which sets the standards for the production and labeling of organic goods. The current third-party implementation scheme is based on prior state policies on organic food and agriculture. Starting in the 1970s in the United States, local and state governments were the first to enact organic regulatory policies. Earlier regulations varied by state; some states delegated policymaking power to administrative agencies while others, such as California, relied on voluntary compliance to specific definitions. By the passage of the national Organic Food Production Act (NOFP) of 1990, regulation had shifted to a more collaborative scheme among both public and private entities. Post-1990 organic policy legislation at the federal and state levels would delegate power to the bureaucracy to develop the appropriate regulatory scheme. This resulted in the third-party certification scheme in place today. One interesting aspect of this historical sector development is what it allows one to learn about how early state regulation activity (from 1976 to 1989) interacted with federal policy actions, differing cultural and political aspects of independent states, and the role of national media consumer attention toward the organic industry.

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This article seeks to explore the recent history of organic food policy formation in the United States to better understand how food labeling policies (and other government-industry certification programs) may diffuse from state to federal activity. And, this diffusion did not occur in a vacuum, but instead, intersected with a very dynamic marketplace that commonly saw consumer demand outstrip the supplies available (Thilmany, 2012). Given the proliferation of state ballot initiatives and policy actions to address a wide variety of food system activities, this analysis provides a timely, interesting set of findings on how diffusion may be influenced by a variety of factors.

The organic farming movement in the U.S. has an extensive history dating back to the beginning of the 20th century. According to Guthman (2004, 4), four broadly conceived social movements, which have substantial overlap, influenced the emergence of the organic market in the U.S. The first social movement is linked to soil conservation and alternative production technologies. Key figures within this movement, such as Edward Faulkner, Jerome Rodale, Louis Bromfield and Aldo Leopold, were largely concerned with improving agricultural practices to address the negative consequences, such as poor soil quality and unintended implications on ecosystems that could result from conventional agriculture methods. The primary concern of this movement was that conventional farming was ineffective and could result in broader environmental disasters such as the Dust Bowl. The second social movement is tied to efforts to promote pure food (Guthman, 2004, 5–6). The range of scholars and journalists within this movement are primarily concerned with the contamination and adulteration of foods. The third social movement influenced organic agriculture through a fringe, “hippie” counterculture, which is also responsible for attempts to distinguish the differences between organic and natural foods. Finally, the environmental movement is considered by Guthman (2004, 7–9) to have a less direct influence on organic farming. Beginning with Rachel Carson’s (1962) *Silent Spring*, the environmental movement’s focus on sustainable development has led to indirect influences on organic practices and markets such as questioning the role of various dietary choices, considering appropriate technology and bioregionalism, and determining how energy is linked to agricultural production.

While it could be argued that these social movements could be expanded or consolidated, it is evident in each movement that there is a concern for how food is produced, processed, and distributed, as well as its interface with natural resources and human health. Yet, it is important to remember that organic farming largely remained at the fringes of the agricultural community and was unpopular in mainstream political circles for most of the twentieth century (Blobaum, 2010; Ingram and Ingram, 2005; Lipson, 1998; Youngberg et al., 1993). It was only in the late 1980s that the organic market growth “took off” (Rawson, 1998). Sales grew in the late 1980s as consumer concern over chemical residues on foods grew and the number of organic farms increased. According to an industry survey, retail organic foods sales in 1990 reached \$1 billion in the U.S. (OTA, 2011). Sales continued to increase by approximately 20% each year after the passage of the Organic Food Production Act in 1990.

Still, it is important to remember that, prior to the 1990s, a patchwork of state and third-party standards regulated a market where federal policy was absent. This was a necessary solution to providing the market, and the producers seeking to supply to that market, some method to provide assurances of truth in labeling until federal standards were established. And, if one was to compare the EU and U.S. systems, it is clear that different factors may be influencing any potential barriers to growth in organic markets. In contrast to the EU where there has been public support for producers to transition to organic, one could argue U.S. organic diffusion and policy has been driven by market forces. Veldstra

et al. (2014) suggest that less direct financial support for transition, the perceived costliness of certification, and other marketing opportunities that do not require certification (local and direct markets) has led to interesting dynamics in determining what producers are choosing to certify. Janssen and Hamm (2014) highlight another interesting dimension in exploring the trade-offs between government and private actors in European organic markets, suggesting the perceptions of different oversight groups may influence confidence in certification.

So, this paper’s focus to explore how these policy solutions diffused differentially through the U.S. and it is an interesting exploration of the interaction between market forces and regional policy dynamics. This paper will continue by summarizing more details of the organic movement, review the literature on policy diffusion and characterize a model that extends previous political science modeling. We then present a cross-sectional, time-series logit to assess how internal, external and salience factors influence adoption across states throughout the last three decades. We conclude with discussion of how these results may inform our understanding of policy diffusion, particularly where the role of state and federal levels interact with the needs of market development and industry pressures.

Background and literature

The organic farming movement in the U.S. has an extensive history dating back to the beginning of the 20th century. Organic agriculture can be broadly defined as a “holistic production management system which promotes and enhances agroecosystem health, including biodiversity, biological cycles and soil biological activity” (FAO/WHO Codex Alimentarius Commission, 1999/2001). In the 1970s, organic agriculture was not promoted as a viable industry at the federal level. An iron triangle¹ existed that maintained support for conventional agricultural practices and resulted in limited federal support for alternative production methods including organic farming (Ingram and Ingram, 2005). Earl Butz, in an infamous response to proponents of organic agriculture, remarked (1971), “Before we go back to organic agriculture, somebody is going to have to decide what 50 million people we are going to let starve.” Even after the end of Butz’s term in 1976, it would be a few years before the USDA or Congress demonstrated any notable support for organic agricultural practices.

Amidst increasing environmental concerns, Congress commissioned the USDA to publish *Report and Recommendations on Organic Farming* in 1980 and created an Office of Organic Resources Coordinator to oversee organic research and education programs (Rawson, 1998; Rich, 2008; USDA Study Team, 1980); however, this office would be abolished by Reagan in 1981, effectively ending organic agriculture programs and research in the USDA in the 1980s.

State and third-party regulations

Despite being kept at the fringes at the national level, organic farmers had success in promoting organic agriculture at the state level. In 1976, New York was the first state to pass organic legislation by creating an organic advisory board. California, Connecticut, and Maine would follow New York’s lead in developing organic labeling rules in 1979.² By 1990, twenty-six states had passed

¹ The iron triangle concept refers to the stable relationship between congressional committees, an executive branch administrative agency, and interest groups to maintain a particular policy or program. The iron triangle is believed to result in a monopoly of power in a particular policy area.

² Oregon passed administrative rules in 1973. Similarly, Massachusetts passed administrative rules in 1978.

organic legislation ranging from labeling and certification programs to agreements with third-party certifiers to oversee and audit state-specific organic certification standards. By 2010, thirty-eight states would adopt policies regulating the organic food and agriculture market (see Fig. 1).

Coinciding with state action in the 1970s and 1980s, several organic farmers' associations began to self-regulate to serve emerging markets. As Fig. 1 illustrates, the speed of policy diffusion was fairly slow in these early years of the movement. The Rodale Institute, Oregon Tilth,³ and California Certified Organic Farmers (CCOF) were three of the most prominent organic farming organizations that sought to improve organic methods and influence policy at the state and federal level. In addition, each organization offered organic certification of products, occasionally in partnership with states that had established standards. In fact, the earliest certification program was conducted and paid for by Rodale Press in the early 1970s (CCOF, 1988) and it would be several years later before Oregon Tilth's first certification program was organized. These early efforts by farmers to self-regulate had profound implications for the federal regulatory structure that would emerge in the 1990s by pushing for collaboration among farmers and policymakers in developing unified national standards. The increased pace of policy diffusion after the mid-1980s, prior to the federal policy development, indicates increased interest across a wider set of states (Fig. 2).

The Organic Food Production Act & current developments (1990–present)

The Organic Foods Production Act (OFPA) was passed by Congress as Title XXI of the 1990 Farm Bill. State agency associations and several industry groups petitioned Congress in the late 1980s to eliminate problems in the market. These groups were collectively seeking to eliminate the differences in state-based standards and to address newly emerging concerns related to market coordination (*The Organic Foods Production Act of 1990*, 493–44; Johnson, 2008).⁴ In short, OFPA aimed to eliminate consumer confusion and improve interstate commerce by establishing national standards for governing the organic market (7 U.S.C. 6501).

The bill authorized the creation of the National Organic Program (NOP) and the National Organic Standards Board (NOSB) to be implemented by the USDA Agricultural Marketing Service. The NOP is responsible for setting the standards for organic production, handling and processing. In addition, the NOP oversees organic certification to ensure compliance with set standards. Private certifiers and state certification programs would have to be accredited under the new national standards to certify organic producers, processors and handlers. As another key element of the legislation, the NOSB is an advisory committee for setting the standards by which the NOP operates. Seven years after the passage of *The Organic Foods Production Act of 1990*, the NOSB issued proposed rules in 1997. By the end of the extended public comment period in April 1998, the USDA received over 275,000 comments on the proposed rule. Most of the controversy surrounding the 1997 proposed rules centered on the permissible use of irradiation, GMOs, and sewage sludge in organic production. Referred to as the “Big Three”, the USDA did not explicitly condemn or exclude the use of such materials or practices for organic production (Manoochehri, 1998).

³ Oregon Tilth began as Regional Tilth in 1974 with chapters in Oregon, Washington, Idaho, and Northern California (*Oregon Tilth N.A.*). The Willamette Valley chapter became Oregon Tilth in 1986.

⁴ Newly emerging concerns included a burgeoning international organic market, multi-ingredient organic products, and addressing organic production methods for meat, poultry and seafood.

There are two broader trends that led to the controversy surrounding the 1997 proposed rule including a changing USDA constituency base and a variety of high profile international trade dilemmas between the U.S. and Europe. Since the 1950s, the USDA's key constituents were farmers that willingly adopted conventional agricultural practices including the use of synthetic pesticides and GMOs (Rawson, 1998). By the 1990s, a new constituency emerged as the USDA became responsible for executing part of the nation's food safety regulations. This would attract a base of sustainable agriculture and health-concerned constituents. The other broad trend influencing the outcome of the 1997 proposed rules was the precautionary agricultural approach by many in the international community. In the 1990s, the U.S. was seeking to ensure conventional agricultural products could be traded in international markets as the European Union denied import of GMOs on the basis of environmental and health concerns. The 1997 proposed rules were reflective of the agency distinguishing conventional agricultural practices as different but as equally as safe as organic agricultural practices.

When the NOP was officially implemented in 2002, the role of the states in organic policy changed dramatically. Some states, like California, were actively engaged in NOP rulemaking and sought to influence the direction and structure of the national program. California and Alaska even passed legislation in 1998 urging the USDA to reconsider aspects of the proposed rule. Yet, despite a state's decision to influence the development of the NOP, only a few policy options would be available for states to engage after 2002. First, states may apply to operate their own organic program. OFPA required that *minimum* standards be set and allowed for the option of states and certifiers to have additional and more stringent requirements or standards if they had concerns with federal standards. A second potential role for the states is to become certifying agents similar to private entities. State departments of agriculture (with varying names related to food, environment and markets) are commonly the government entity that operates as a certifying agent and sixteen states were accredited certifying agents as of 2013 (AMS, 2013), including; Colorado, Iowa, Idaho, Kentucky, Maryland, Montana, Nevada, New Hampshire, New Jersey, New Mexico, Oklahoma, Oregon, Rhode Island, Texas, Utah, and Washington. The third potential role for states in supporting the national program is participation in one of two certification cost-share programs. The 2002, 2008 and 2014 Farm Bills authorized funds for the National Organic Certification (NOC) Cost-Share Program, including substantial increases in the cost-share allowed per farm or ranch.

Contemporary concerns: regional variation in production & label competition

The organic market has changed dramatically since the first organic policy was passed in 1976 by New York. Aside from compliance and enforcement concerns, there are two broader challenges in the market relevant for future examinations of organic policy in the U.S. at both the federal and state levels. First, the organic market is facing increasing pressures from alternative labeling schemes in the marketplace such as local, fair trade, GMO-free, and natural (Brush and Link, 2012; Costanigro et al., 2014; ERS, 2009; Onozaka and Thilmany-McFadden, 2011; Renner, 2012). Historically, natural and organic labels have competed in the market with early organic advocates attempting to distinguish between the two; meanwhile, fair trade, GMO-free, and local-labeled goods are more recent developments focused on particular motivations of consumers. Some would argue these label strategies are in response to the belief that the organic label has lost some the connotation of representing small-farm and locally produced goods or equitable sustainability practices

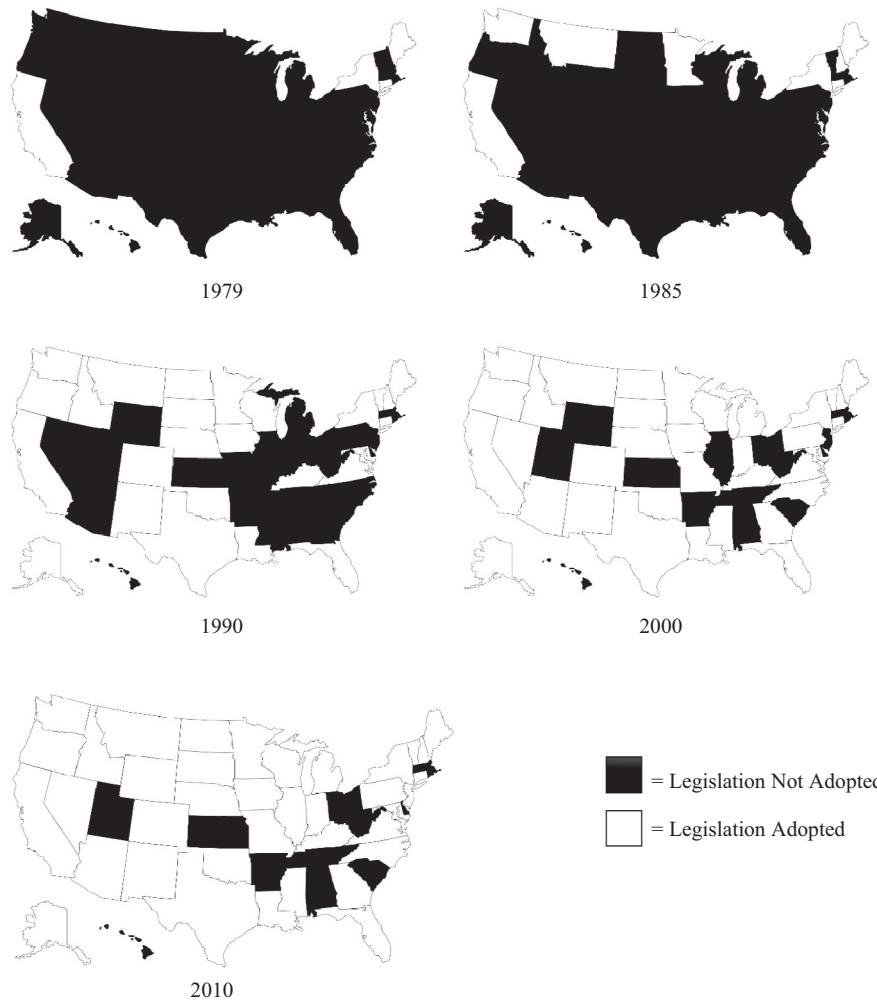


Fig. 1. Spatial depiction of diffusion.

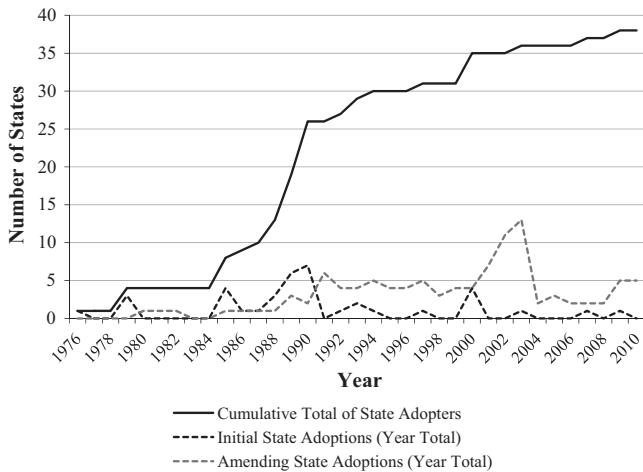


Fig. 2. State organic legislative adoptions, 1976–2010.

globally (Adams and Salois, 2010; Guthman, 2004; Popoff, 2010; Rigby and Brown, 2003; Raynolds, 2000; Yue and Tong, 2009; Zepeda and Deal, 2009). Indeed, consumers may have different motivations for buying organic goods as opposed to local, non-GMO, or fair trade goods (Guthman, 2004; Loureiro and Hine, 2002; Onozaka et al., 2011; Raynolds, 2000).

A second and related concern is what Miles McEvoy terms “geographic-specific challenges” (2012). U.S. organic acreage has doubled since the late 1990s (ERS, 2009). However, certified organic operations remain concentrated in certain states and regions. For example, while there are numerous certified operations in California and Washington, the southeast region has less than 50 certified operations in each state. In their exploration of the organic producer decisions, Veldstra et al. (2014) found some regional variation among certifying producers. Moreover, Hooker and Shanahan (2012) confirm spatial concentration of the organic supply chain has increased over-time. The concentration of production may impact how well the market functions for organic foods that are also locally-labeled or raised by small-scale farmers that already face market access challenges. Collectively, competition from other labeling programs (with less stringent standards) and regional concentration represent potential policy barriers that cannot be adequately addressed without examining the initial development and geographical evolution of U.S. organic policy and programs. Specifically, accounting for regional variations requires consideration of how states and constituents in these areas were, and are, stakeholders in the policy process.

Policy diffusion modeling in an organic certification context

This paper uses a policy diffusion approach to examine organic food policy enactment decisions among U.S. states. The policy

Table 1
Enhanced unified policy diffusion model variables referenced.

Model variable	Measuring	Analysis variables
Adoption	The adoption of a policy as broadly defined	Adoption – Includes All Adoptions, Initial Adoption, and Amending Adoption
Internal Determinants	State characteristics or internal conditions of state	State Legislature Professionalism, Political Culture, Partisan Control of State Government, Divided State Government, Per Capita Income, % of State GDP From Agriculture, Percentage of State Agricultural Sales from Fruit and Vegetables
External Determinants Issue Saliency	Influences of federal policy Attention and perception of the issue	National Adoption in 1990; Federal Implementation (starting 2002) # of Articles Appearing in the <i>New York Times</i>

diffusion approach, a focus of scholars conducting policy diffusion studies over the past 25 years, uses event history analysis as the basis for modeling diffusion. [Berry and Berry's \(1990\)](#) seminal work on a unified theory of diffusion was based on discrete event history analysis and dichotomously coding annual state legislative outputs.⁵ Discrete models are often preferred and utilized by scholars compared to other EHA approaches such as cox proportional hazards. Discrete modeling caters to the theoretical construct of evaluating both internal and external conditions present in states that could lead to diffusion.⁶ Diffusion scholars identify broad categories of variables that influence the adoption of a policy⁷ including internal determinants, external determinants, and the implementation and characteristics of the policy itself ([Berry and Berry, 2014](#); [Boushey, 2010](#); [Mosier, 2014](#)).

Internal determinants examine the role of conditions inherent to an adopting unit including a range of socio-economic and political conditions including political culture, issue saliency, partisan control of government, and economic health indicators. External determinants are conditions that exist outside of the adopting unit but may influence adoption decisions. Pressure from other state adopters, regionally or nationally, and federal activity may influence a state legislature's decision to adopt a policy. Finally, characteristics of the policy itself, such as the complexity and scope, have also been evaluated ([Glick and Hays, 1991](#); [Hays, 1996](#); [Mooney and Lee, 1995](#)). While this category of variables is important, quantifying relevant policy characteristics is a complicated endeavor given the nature of how organic policy regulations are established and the focus on legislative adoption in this study.

A broad summary of policy diffusion variable categories considered in this policy model is presented in [Table 1](#). While the analysis includes a broad range of conditions, hypotheses are developed based on a careful review of the literature.

Our dependent variable is the adoption of organic food and agriculture legislation in U.S. states from 1976 to 2010. This includes both initial adoption and any subsequent amending adoptions that could expand or contract state legislative statutes.⁸ An adoption was counted if the legislative adoption regulated the organic food and agriculture market. Development and adoption of administrative rules is not included within the analysis as administrative rules are the result of delegate policymaking authority to bureaucratic

agencies and involve a different nexus of decision-making. Comparing legislative policy adoptions to administrative rule development is akin to comparing apples and oranges. It also creates difficulties in truly determining the regulatory design as the policy scope and content changed during the 35-year period both through legislation, administrative rules, and litigation. Some states initially began with just regulatory parameters with no certification requirements while others created third-party certification agreements or pursued a state-operated organic certification program to regulate the market. It is outside the current scope of research to examine the variation in policy content over time through various policymaking avenues. Future research will address this dynamic, the aspects of the policy itself, which is currently explored qualitatively by (2014 and 2015).

Eleven hypotheses are identified based on a review of the policy diffusion literature. For political internal determinants of diffusion, past literature shows that it is more likely for a state to adopt legislation if the state legislature is more professionalized ([Shipan and Volden, 2006](#)), state government is controlled by Democrats ([Kamieniecki, 1997](#); [McCright and Dunlap, 2011](#); [Shipan and Lowry, 2001](#); [Kraft, 2012](#)), and the state government is not divided.⁹ It is generally believed that states with more resources available to state legislators are more likely to afford the costs associated with developing and adopting innovations compared to state with fewer resources. If more professionalized (e.g. more resources available) state legislators may not only consider routine legislation but could also embark on evaluating and enacting new policy ideas. Previous research has also identified the tendency of Democratic-leaning states to be more open and actively pursuing innovative policies, which can be perceived as progressive in nature. Republicans are generally perceived as protecting the status quo and not actively pursuing innovation.¹⁰ As an added component, divided government is also included within the analysis to determine if partisanship differences between the executive and legislative branches may influence enactment outcomes. It is believed that divided government would be less likely to adopt innovative policies. The hypotheses for internal political conditions are as follows:

H1: States with more professionalized state legislatures are more likely to adopt organic legislation than states with less professionalized state legislatures.

H2: State governments under the control of Democrats are more likely to adopt organic legislation than states under Republican control.

H3: States with divided government are less likely to adopt organic legislation than states under unified control.

⁵ An overwhelming majority of policy diffusion studies focus on U.S. state legislative adoptions. Given the nature of state policy analysis and construction of key social and political variables, the unit of time is year. Yet, it is important to note that while state legislative sessions vary, the development of legislation can cover the span of a few years before adoption.

⁶ While discrete modeling is not without certain shortcomings, some diffusion studies also rely on complementary qualitative techniques to further unpack diffusion dynamics (see [Starke, 2013](#)).

⁷ [Walker \(1969, 881\)](#) defines a policy innovation as "a program or policy which is new to the state adopting it, no matter how old the program may be or how many other states may have adopted it."

⁸ In very few cases, an amending adoption may result in termination of state legislative statutes. This does not always equate to full policy terminate as state administrative agencies can continue implementation of organic food policy programs and regulations.

⁹ While there is no conclusive evidence within the policy diffusion literature to demonstrate the effect of divided government on policy outcomes, this analysis does take into consideration the potential effects of divided government on adoption decisions. For more detailed examination of divided government consequence see [Mayhew's \(2005\) *Divided We Govern*](#).

¹⁰ Some exceptions to this general confirmation are morality policies that focus on restriction to gambling, abortion, or gay marriage ([Mooney and Lee, 1995](#)). In these cases, Republican-leaning governments and citizenry are more likely to support these policies than Democrats.

The other internal condition hypothesis pertains to economic and industry-related conditions; specifically, we expect higher per capita income states are more likely to adopt innovative policies, and broader agriculture and organic agriculture dynamics will also catalyze adoption (Lindert, 1991; Oberholzer-Gee and Waldfoegel, 2005). First, states with a higher income citizenry may be more likely to have the resources to buy into the organic market in addition to supporting the emergence of new ideas (Berry and Berry, 2014; Dettmann and Dimitri, 2007). To add some context to the organic certification focus of this study, the size of the total agricultural industry relative to the state's total GDP is included with ambiguous expectations. First, states with larger agriculture industries may have more resources to invest or experiment with alternative production methods, especially as we note a market shift in organic agriculture from a fringe to mainstream food industry. However, if traditional agricultural interests contribute more to political lobbying, organic agriculture may be negatively affected by an overall increase in productivity; this assumption is grounded in historical perceptions of organic agriculture as a viable industry compared to traditional agriculture (Butz, 1971; Rawson, 1998; Rich, 2008).

Following similar logic, the production and sales of specialty crops, like fruits and vegetables, may influence adoption decisions. Alston and Pardey (2008) argue for more research to be directed toward specialty crop production because of the "social rate of return" associated with making fruit and vegetables more affordable and available to include in healthy diets. Furthermore, according to OTA (2011), organic fruit and vegetable sales constitute 39.7% of all organic sales in 2010. Therefore, it is expected that states with higher sales of fruit and vegetables are more likely to potentially benefit from the margins that can be gained with certification, and thus, may be more likely to adopt organic legislation. The socio-economic hypotheses are as follows:

H4: States with higher per capita income are more likely to adopt organic legislation than states with lower per capita income.

H5: States with a higher percentage of GDP resulting from the agriculture industry are more likely to adopt organic legislation.

H6: States with higher percentage of fruit and vegetable sales are more likely to adopt organic legislation.

For external determinants of diffusion, the diffusion literature identifies both horizontal and vertical dimensions of external influence. The horizontal dimension considers how states influence each other either regionally or nationally, while vertical diffusion considers the influence of the federal policymaking process on the organic sector. For the horizontal effect, this analysis particularly focuses on regional pressures of diffusion. Not only does this tap into "geographic-specific challenges" associated with organic production (McEvoy, 2012), but it also assesses the literature on how regional pressures from neighboring states affect diffusion (Walker, 1969). It is expected that as more states within a region adopt organic regulatory legislation, the more likely a state is to adopt organic legislation as well. From a vertical perspective, this analysis considers how federal adoption of organic legislation and implementation of the NOP final rule in 2002 influences state adoption decisions. The role of preemption and concept of federalism is important to consider in this particular scenario. The adoption of legislation at the federal level likely coincides with states initially adopting legislation in 1990 and modifying state policies later in the decade. It is not expected that federal adoption diminishes the likelihood of state adoptions, as there was uncertainty in developing final rules. Along similar lines, implementation of the 2002 final rule likely has a positive relationship with state adoptions, as many states seek to modify their policies to comply with

federal supremacy. Hypotheses for external determinants are as follows:

H7: States are more likely to adopt as more states within their region adopt organic legislation.

H8: Federal adoption of organic legislation more likely to spur state legislative adoption.

H9: Implementation of the NOP final rule in 2002 is more likely to have a positive effect on state adoptions.

Finally, as noted by numerous public policy scholars (Baumgartner and Jones, 2009; Kingdon, 2003; Sabatier and Weible, 2007), high issue salience, also described as national mood, is associated with elevated attention to a policy problem and the potential to lead to change in a policy system.¹¹ Change can permit the emergence, adoption, or modification of a policy innovation. In turn, our final hypothesis is the following:

H11: Increasing salience of organic food and agriculture on a national scale increases the probability of state adoption.

Data and methods

Data

The quantitative methods used in this research include analysis of state-annual data from 1976 to 2010. Depending on the model, up to 17 variables¹² were utilized to test our research hypotheses (Table 2). Data for both independent and dependent variables was collected through archived materials, government sources, and academic sources. Government sources include the United State Department of Agriculture's Ag Census and the U.S. Department of Commerce's Bureau of Economic Analysis.¹³ For the dependent variables, archived materials were compiled and cross-referenced with the assistance and feedback of law library staff, career civil servants, or organic agriculture interest groups. Initial information was collected through surveying the current organic policy literature and evaluating current and historical state statutes and administrative rules. After compiling a list of states that had either passed legislation or administrative rules, a list of states to further examine was generated and dates of initial legislative adoption, amending legislative adoption, and effective dates for statutes were confirmed.

One binary dependent variable, adopt, was used in this analysis to give an overall evaluation of organic policy adoption; it represents both initial (e.g. first-time) and amending (e.g. modification or reinvention) legislative adoptions, although each individual measure of adoption was calculated and tabulated separately in Mosier (2014) to explore disaggregated policy decisions. Adopt reflects the state legislative adoption in a given calendar year.¹⁴

¹¹ Following Mosier's (2014) enhanced policy diffusion model, salience is neither an external variable nor confined as an internal determinant. Both national events and local/state events can contribute to mass media attention to organic food and agricultural issues.

¹² The variables time and statenum (i.e. state identification numbers) are not included in the 17 variable count. These variables are included in univariate descriptive statistics and correlation assessment.

¹³ The USDA Ag Census data included reported sales of fruit, tree nuts, berries, vegetables, melons, potatoes, and sweet potatoes from 1969 to 2009 (<http://www.agcensus.usda.gov/Publications/>). Data from the Bureau of Economic Analysis includes per capita income calculations by state, total GDP by, and agriculture, forestry, fishing, and hunting GDP by state from 1974–2010 (https://www.bea.gov/iTable/index_regional.cfm). Extrapolation and interpolation were used to fill in missing yearly values.

¹⁴ Adopt reflects action by state legislatures in a calendar year. If a state legislature passed an organic legislative bill, then the year would be coded as 1. If a state legislature did not pass an organic legislative bill, then the year would be coded as 0.

Table 2
Description of variables.

Model variable	Variable	Description	Level of measurement
Adoption	Adopt	Any year of state adoption of organic legislation (initial and amending)	0 = No adoption 1 = Adoption
Issue Saliency	Saliency Logsal	Issue saliency – number articles published in <i>The New York Times</i> in a year Log of saliency	Interval –
Internal Determinants	Pcweathl Logpcinc Stlegprof	Per capita income of residents in a state (deflated to 1990) Log of pcincome State legislative professionalism	Continuous variable – Interval (0–1) 0 = Less professional 1 = More professional
	Sharkculmeas	Sharkansky's measurement of Elazar's political cultures (Moralistic, Individualistic, Traditionalist)	Interval (1–9) 1 = Perfectly moralistic 5 = Perfectly individualistic 9 = Perfectly traditionalist
	Parcont	Party that truly controls state government (ignores governor's party when veto-proof majority)	– 1 = Republican control 0 = Neither party in control 1 = Democratic control
	Dividedgov	Divided government – control of state government institutions (two chambers of legislature and governor's office)	0 = All 3 institutions controlled by same party 1 = All 3 institutions not controlled by same party
	Peraggdp Logpagdp	Percentage of state's gdp that results from the agriculture industry Log of peraggdp	Interval (0–100%) –
	Fruper	Percentage of state agricultural market value sales resulting from fruit, tree nuts, and berries	Interval (0–100%)
	Logfru	Log of fruper	
	Vegper	Percentage of state agricultural market value sales resulting from vegetables, melons, potatoes and sweet potatoes	Interval (0–100%)
	Logveg	Log of vegper	
	External Determinants	Fedadopt Fedadoptlag	Federal adoption of organic legislation (initial or amending) Federal adoption of organic legislation in the previous year
Fedimpl		Federal statutes officially enacted/in effect	0 = No enacted statutes 1 = Enacted statutes
amsregion7		Agricultural Marketing Service seven agricultural regions designation	1 = Far West 2 = Rocky Mountain 3 = Southwest 4 = North Central 5 = Southeast 6 = Mid-Atlantic 7 = Northeast
ar71		Far West Dummy Variable (Alaska, California, Hawaii, Nevada, Oregon, Washington)	0 = Not in region 1 = In region
ar72		Rocky Mountain Dummy Variable (Arizona, Colorado, Idaho, New Mexico, Montana, Utah, Wyoming)	0 = Not in region 1 = In region
ar73		Southwest Dummy Variable (Arkansas, Louisiana, Oklahoma, Texas)	0 = Not in region 1 = In region
ar74		North Central Dummy Variable (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin)	0 = Not in region 1 = In region
ar75		Southeast Dummy Variable (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee)	0 = Not in region 1 = In region
ar76		Mid-Atlantic Dummy Variable (Delaware, Maryland, New Jersey, Pennsylvania, Virginia, West Virginia)	0 = Not in region 1 = In region
ar77		Northeast Dummy Variable (Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont)	0 = Not in region 1 = In region

Passed legislation was counted as an adoption if it outlined organic food and agriculture regulations, delegated policy-making power to administrative agencies, created task forces, or some combination of regulations, task forces, or delegated power. The power to create state-based certification programs, establish cooperative third-party agreements, or other standards for proof-of-standards was often delegated to states agencies. Non-substantive legislation, such as legislation funding organic agriculture research to universities or legislation that was proposed but never passed was not considered an adoption or policy action for this study. Moreover, administrative rules are considered a separate form of law than state statutes or code created by legislative action. Therefore, those actions by states that related to organic administrative rules but not state statutory code were not directly explored in this analysis.

Table 2 details each independent variable and how it is included within the broader diffusion model. Up to seventeen independent variables are used to test internal conditions (with regional variables excluded in one specification of the model). Summary statistics of these variables are presented in Table 3.

State legislative professionalism (stlegprof) is calculated using Squire's (2007) assessment of data from 1960, 1979, 1986, 1996, 2004, and 2009. For missing years, legislative professionalism was calculated through interpolation and extrapolation as needed. For this variable, states that have more professionalized state legislatures would have scores closer to 1 whereas less professional legislatures would be scored closer to 0. Squire calculates professionalism according to member pay, staff members per legislator and total days in session. The U.S. Congress is used a baseline for

Table 3
Descriptive univariate statistics.

Variable	Observations	Mean	Std. dev.	Min	Max
Year	1750	1993	10.10	1976	2010
Adopt	1750	0.08	0.27	0	1
Fedadopt	1750	0.23	0.42	0	1
Fedimpl	1750	0.26	0.44	0	1
Salienc	1750	31.37	36.45	0	151
Logsali	1750	2.57	1.53	0	5.02
Pcincome	1750	19,273	4045	10,902	35,218
Logpcw	1750	9.86	.54	8.46	10.95
Stlegprof	1750	0.20	0.12	0.03	0.66
Sharkculmeas	1750	5.06	2.56	1	9
Parcont	1715	.15	.65	–1	1
Dividedgov	1715	.55	.50	0	1
Peraggdp	1750	.025	0.028	0.001	0.41
Logpagdp	1750	–2.39	0.18	–4.46	–0.15
Frufer	1750	0.05	0.08	.00000377	0.35
Logfru	1750	9.50	2.54	0.69	16.30
Vegper	1750	0.05	0.10	0.00	1.59
Logveg	1750	10.28	2.01	4.19	16.13
amsregion7	1750	4.1	1.90	1	7
ar71	1750	.12	.32	0	1
ar72	1750	.14	.35	0	1
ar73	1750	.08	.27	0	1
ar74	1750	.24	.43	0	1
ar75	1750	.16	.37	0	1
ar76	1750	.12	.32	0	1
ar77	1750	.14	.35	0	1

an ideal professionalized legislature; thus, states are compared to the U.S. Congressional baseline (which is 1).

This analysis elects to use a scaled version of Elazar's political cultures (sharkculmeas) to assess the influence of political beliefs on adoption. Unlike other political ideology measures, political culture encompasses broader conceptualization for the scope of government and moves beyond the Republican–Democrat dichotomous categorization. Sharkansky's (1969) scaled version of political cultures eliminates problems associated with the dichotomous classification of political culture. In particular, the political cultures were not envisioned as a continuum but rather a circular reference. The scaled version accounts for the presence of strong contradictory strains in culture with 1 equal to a perfect moralistic culture, 5 equal to a perfect individualistic culture, and 9 equal to a perfect traditionalist culture. This political concept may also complement the food values and motivations explored in the consumer behavior literature on organic foods (Lusk, 2011; Onozaka et al., 2011). Note that a state's political culture can be predominantly one culture but contain strong strains of another culture.

We also consider partisan control (parcont) and divided government (dividedgov) as factors that may influence policy adoption. Each variable originates from Klarner's (2013) state partisan balance data set. Partisan control is Klarner's true government control variable (true_government_cont_a2), which "ignores the part of the governor when there are veto proof majorities in the state legislature." Divided government is a binary variable where 1 indicates divided government and 0 equals unified control of the governor's office and both chambers of the legislature. Both variables help to assess the impact of Republican and Democratic politics in state policymaking.

Finally, we consider economic and industry factors. Per capita income (pcincome) is measured as a raw number, and given it is in the tens of thousands, the scale should be considered when interpreting the coefficient of the model. The industry variables include the share of a state's total GDP that is derived from the agricultural sector, as well as logged values of the share of all agricultural market revenues that come from the fruit and vegetable sectors. The initial sales percentages are calculated by dividing the fruit and vegetable market value sales by total agriculture

market sales. Since the Census of Agriculture was only available every five years, extrapolation and interpolation were used to fill in missing yearly values.

Table 2 describes the external variables included in the analysis. To evaluate regional horizontal patterns of diffusion, the AMS 7-region designation used by the Sustainable Agriculture Research and Education Program is used to control for and examine the influence of regional adoption and existing policy patterns in one of the model specifications. Dummy variables (AR71–AR77) were created for each region (see Table 2 for definitions). The vertical dimension of diffusion is examined through federal adoption (fedadopt) and federal implementation (fedimpl). Federal adoption of organic legislation is a dichotomous measure: thus, any year Congress passed organic legislation, whether initial or amending, is marked as a 1. Similarly, any year federal policy was officially implemented is marked as 1. This effect begins in 2002 after the National Organic Program rule went into effect and signifies federal policy preemption. The effect ranges from 2002 to 2010 in the dataset.

While a number of approaches have been used to construct an issue salience measure, the decision to use the *New York Times* is based on availability of archived articles and validity of the method itself. Specifically, not all newspapers, such as the *Los Angeles Times*, have archived materials reaching the entire span on the study. Therefore obtaining an accurate article count using multiple newspapers sources may not be an achievable or accurate measure. Several scholars have identified the *New York Times* as a key and prominent source for identifying the cultural pulse and setting the national agenda (Dearing and Rogers, 1996; Epstein and Segal, 2000; Kioussis, 2004; Reese and Danielian, 1989; Rogers and Chang, 1991; Roberts et al., 2002). Among past studies, methods vary and include both the number of articles within the paper or on the front page.

In this study, salience is measured according to the number of articles that mention organic food and agriculture printed in the *New York Times* for each year from 1976 to 2010. Relevant articles were identified through three different keyword and title searches with two different *New York Times* newspaper archive databases. Articles, whether on the front page or not, were included in the final count if it referenced organic food, farming, or agriculture substantively. Types of articles included a broad range of discussions from specific organic policy editorials to food editor columns that mention the use of organically certified goods.

Methods

To analyze the set of states across the years considered in this study, we employed a cross-sectional time series logit using random effects (XTLOGIT, re) since there are some variables that already control for fixed effects across states, but there are factors and policy choices that change across the time frame of the study. All estimations were undertaken in STATA 14.0 and reported as odds ratios to facilitate interpretation of the effects of each variable (Table 4). Since the key topic of interest is adoption of organic policies, the left-hand side variable is any adopted or amended legislation in that year for that state. Thus, the odds ratio will represent the effect that each state-specific variable has on the probability of adoption or amendments in each year. Two different specifications are presented; one that includes vertical and state-specific horizontal diffusion drivers (the role of federal policies and implementation as well as state-varying characteristics), and another that also integrates any regional effects that may influence diffusion (additional horizontal drivers).

Table 4
Probability of organic policy adoption by state and by year.

Variable	Odds ratio	Standard error	Odds ratio	Standard error
Fedadopt	2.0064 ^{***}	0.4177	2.0049 ^{**}	0.4174
Fedadoptlag	1.2706	0.2725	1.2709	0.2726
Fedimpl	0.5274 ^{**}	0.1526	0.5246 ^{**}	0.1521
Logsal	1.5875 ^{**}	0.3737	1.5880 ^{**}	0.2276
Pcincome	0.9999	0.0001	0.9999 [*]	0.0001
Stlegprof	0.3297	0.4954	0.3743	0.5723
Sharkculmeas	0.8328 ^{**}	0.0556	0.8195 ^{**}	0.0807
Parcont	1.2827	0.2351	1.2586	0.2315
Dividedgov	1.0234	0.2186	1.0142	0.2164
Peragdp	1.4720	8.7399	3.9925	23.3933
Logfru	1.0142	0.0995	0.9749	0.0982
Logveg	1.3043 ^{**}	0.1536	1.3291 [*]	0.1687
AR2			0.6132	0.3573
AR3			0.9147	0.7003
AR4			0.3977 [*]	0.2127
AR5			0.6081	0.4420
AR6			0.5708	0.3654
AR7			0.6170	0.3700
Log likelihood = -426.40 Prob > chi ² = 0.0000			Log likelihood = -424.65 Prob > chi ² = 0.0000	

* Significant at 10% level.

** Significant at 5% level.

*** Significant at 1% level.

Results and discussion

Summary statistics of the variables included in the study are presented in Table 3. As Fig. 1 illustrates (by the number of states that are highlighted in white as years go by), and Table 3 verifies, in an average year, in an average state, organic policies were adopted about 8% of the time, with great variation across years and states. Also note that the Sharkansky's (1969) measure of political cultures has a mean representing perfect individualism, and given the range and variability, there is also great diversity across states and years in this realm. Finally, there appears to be great diversity in the importance of agriculture across states, and within agriculture, the importance of fruits and vegetables as a share of the agricultural economy.

The evidence presented in Table 4 suggests that adoption of organic food and agriculture legislation was influenced by a variety of factors dependent on vertical diffusion, time period, internal and external factors. In terms of statistical significance, federal adoption, federal implementation, salience (in log terms), adjusted per capita income, Sharkansky's political culture measure and the importance of vegetables within the agriculture sector all play some role in influencing policy adoption. The second specification suggests that horizontal diffusion plays a minimal if any role in state-level adoption, given only one regional dummy was significantly different than the others. Yet, this second specification's fit and similarity in significance of explanatory factors could also be considered a sensitivity analysis since findings changed little across models. To be succinct, the left-most specification, without regional dummy variables, will be the focus of most of the following discussion.

National adoption did play a role in state's policy adoption activities, suggesting that there is some interactive element to policy agendas between the state and national level. The 2.0064 odds ratio suggests that federal organic adoption doubled the chance of a state action (initial or amending) on organics in any one year, perhaps triggering state actions to comply or adapt to federal policy dynamics. However, the lagged term was not significant (and several different specifications of lags were tested). Perhaps the significant finding on federal implementation, that state legislation was far less likely to happen in the same year as federal implemen-

tation, and the insignificance of the lagged variable indicates that only the major federal policy decisions (and the political activity and debates that surround those actions) are relevant to state activity. It should be noted that, despite federal supremacy, Fig. 1 shows that states continued to adopt initial food and organic legislation after 1990 and, even after official federal implementation in 2002. Likewise, amending state adoptions spiked in 2003 but did not result in most states terminating statutory language regarding organic food and agriculture. Subsequently, states' adoption responses signify how innovative policies may diffuse and be modified in the U.S. federalism system, and the remainder of state-specific variables are worthy of more consideration.

Perhaps the more interesting dimensions of state-specific characteristics are the influence of inflation-adjusted per capita income, issue salience, political culture and the nature of agriculture on state adoption decisions. Although the coefficient is small on per capita income, the odds ratio suggests that for every \$1 increase in average per capita income, there was a 1% decrease in the probability of organic adoption, an effect that would be quite substantial once one considers larger differences in average incomes across states (or across years). This finding runs counter to some preconceptions that the quality differentiated aspect of organic may be appealing to more affluent states and stakeholders. Yet, despite the effects of income, states appear to be influenced even more so by the social and political climate of their citizenry. The odds ratio on the log of salience (over 1.5) suggests that a higher level of public interest, discussion and debate in the public domain may spur political activity. Again, this result was not sensitive to specification, so it is likely a robust driver of policy dynamics across the three decades this study covers.

There were also some interesting differences across places of the U.S. given the significance of several variables that were state-specific. Overall, state adoptions and amendments were more likely to occur in states where the state political culture is more moralistic in nature (15–20% more likely for each interval step closer to moralistic in contrast to traditionalist). The results on party control and divided government were not statistically significant in either specification. Although not surprising, this is the first study to examine this effect across time and jurisdictional dimensions. However, it should be noted that, during this era,

political conditions remained stable with most early and middle-of-the-pack state adopters possessing persistent, moralistic-leaning cultures and having either Democratically-controlled or divided control state governments.

Finally, the significant finding on the log of how large a share vegetable production was relative to a state's total agricultural sector may be important to consider as well. Fresh produce is considered a key product sector in the organic foods industry, so the prevalence of produce industry interests in a state may influence interest in providing all marketing opportunities available (including organic markets) (Greene, 2013). This is also consistent with the one significant regional finding in the second model specification, where the North Central region (which is generally dominated by field crop agriculture, which has been slower to adopt organic certification as a business or marketing strategy.

Conclusions and implications

The nature of this study allows us to make inferences about both organic policy and market implications. Third party certifications, such as organic programs, are an interesting case in that they primarily govern the standards and processes to certify products as a means to gain better market position in domestic and international markets (Hatanaka et al., 2005). Thus, industry forces want to shape these policies, but the diversity of agricultural models, political cultures and federal programs governing the organic certification process and its political economy complex. So, it was not surprising to see that, over the past three decades, there were a variety of vertical and horizontal drivers for organic policy diffusion.

The results imply that federal intervention into the marketplace had some correlation with state policy decisions. Federal legislative activity, together with delayed implementation of the National Organic Program in food markets, likely catalyzed state adoption activity. The critical mass of state adoption decisions in the late 1980s and 1990s operated on a “separate but parallel track” to federal interest in the organic regulations (Mosier, 2014, 2015).

In essence, there is an interdependent relationship in policy development between states and the federal government. The rising tide of state organic policies pushed federal lawmakers to pursue a comprehensive national law starting in the late 1980s. Indeed, Mosier (2014) shared evidence from interviews with key policymakers in California that suggested federal law was initiated to correct for the patchwork of state organic regulatory policies. However, state policymakers were uncertain on if and when federal policy would be adopted.

Moreover, some state lawmakers were keen on pursuing state legislation that promoted a particular view on how to best regulate the market since research from the EU and the U.S. suggested there may be diverse preferences that may influence what certification standards are valued (Janssen and Hamm, 2014; Lusk, 2011). In the case of Vermont, organic advocacy groups, including NOFA-VT, and state legislators wanted to propose an alternative implementation design that would be producer-focused rather than consumer-focused, as the federal law was designed. The development and pending adoption of a federal law was not necessarily a deterrent for all states seeking to initiate or reform existing organic laws. Instead, the results suggest OFPA served as a catalyst for states to pursue their own form of regulations and to maintain individual standards should national efforts fail.

After passage of the OFPA in 1990, delayed implementation caused concern and continued interest among states to adopt their own standards as a “just in case” measure (Mosier, 2014, 2015). Delayed development of federal rules ensured reliance on state organic standards until a National Organic Program final rule was

proposed and finalized. The positive relationship the model shows between federal adoption and state adoption activity is likely explained by these dynamics as well. Continual adoption by states in twelve years between the adoption of OFPA and the 2002 Final Rule likely could have been driven, in part, by delayed federal implementation. Once the National Organic Program went into effect in 2002, federal policy preemption became a driving factor behind modifying state laws to comply with federal supremacy and largely deterring new state policies among the few previously non-adopting states.

Among the horizontal drivers, political culture, salience and some industry characteristics of states appear to matter to the differential diffusion patterns among states. This may also explain why so many states had organic legislation that pre-dated the federal laws, as there was more localized stakeholder pressure to support the market development needs. Moreover, the level of amended and post-federal legislative activity in many states was active throughout the entire period studied, suggesting the federal was a necessary, but perhaps not sufficient, level of policy support in the eyes of some states. Not surprisingly, the presence (or scarcity) of organic production and marketing infrastructure remains clustered among some of the same U.S. states that also displayed the most policy activity (Greene, 2013).

The findings on the political culture measure are of particular interest to the food systems literature, where several fields have tried to explore the market structure, values, motivation, psychological constructs and sociological processes underlying the persistent growth (and accompanying consumer adoption) of the organic food sector (Greene, 2013; Lusk, 2011; Onozaka et al., 2011). The significant finding on the prevalence of vegetable production shows there are also supply-side considerations in policy formation.

Although this paper focuses on the certification policies needed to govern organic market development, new investments by the USDA to support organic adoption by producers would be another interesting set of programs to evaluate the diffusion of with attention to spatial heterogeneity. This is particularly acute given the relatively persistent growth in demand for organic food products, and increasing development of organic product lines by larger scale food brands which will likely lead to more mainstream distribution and greater demand for organic foods.

This paper does have some limitations, including the need to use some imperfect proxies for variables that the policy diffusion literature suggests will be important to this issue. Yet, this initial work justifies a deeper look into organic policy dynamics, including some case studies of leading and laggard states that are the “outliers” that have catalyzed or resisted the federal policy formation. Another limitation is that, as thorough as attempts to glean information from policy archives were, the unique policy processes and unstandardized records maintained by states may have introduced some unintended bias to the analyses. In analyses of organic programs in the future, more consistent analyses may be possible if the USDA National Organic Program serves as a clearinghouse of how programs are administered and supported by federal resources.

There are number of opportunities for future research that are motivated by this study. First is the interest in exploring state-level case studies that also integrate some qualitative information from those policy stakeholders who were part of the political economy of organic policies. Specifically, it may be interesting to evaluate the differential roles of consumer groups, industry actors and governmental agencies (who would be asked to oversee certification and regulation) in the political economy of this market-driven, but government-managed food sector innovation. Perhaps the exploration of the insights and themes from those policy processes can add context to the inferences we make from the models

presented here. And, looking forward, the spatial dimensions considered in this study may motivate one to research organic markets through a regional economics lens, for instance, understanding how food industry clustering may have been driven by place-based policy dimensions.

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