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Three essays analyzing the role of social capital on individual and firm decision making

Ariana P Torres Bravo
Purdue University

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Maria I. Marshall
_____
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Michael S. Delgado

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THREE ESSAYS ANALYZING THE ROLE OF SOCIAL CAPITAL ON

INDIVIDUAL AND FIRM DECISION MAKING

A Dissertation

Submitted to the Faculty

of

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by

Ariana P Torres Bravo

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Dedico esta tesis a mi familia. A mi madre, por enseñarme a amar lo hago. A mi padre, por mostrarme el valor del sacrificio. A mi hermano, por siempre creer en mí. A mi hermana, por ser un ejemplo de inteligencia y trabajo duro. Y a Ana, por ser mi hombro y mis sueños.

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ABSTRACT

Torres Bravo, Ariana P. Ph.D., Purdue University, August 2016. Three Essays Analyzing the Role of Social Capital on Individual and Firm Decision Making. Major Professor: Maria Marshall.

The following dissertation is comprised of three essays that focus on different mechanisms on which social capital influences firm and entrepreneur behavior. All three essays use different econometric techniques to account for endogenous variables.

Essay 1: *Are Local Market Relationships Trumping Organic Certification? The Case of Small and Medium Fruit and Vegetable Farmers*. This article investigates how an organic fruit and vegetable farmer's choice to use direct-to-consumer market channels impacts his/her decision to be certified organic. First, we model the decision to be certified organic as a conditionally independent decision from the farmer's chosen market channels. Second, we estimate the probability of certifying organic as an endogenously-determined marketing decision to the choice of market channels, and use a bivariate probit specification to model this decision. Empirical evidence indicates that the decision to certify is endogenous to the chosen market channels. We show that farmers selling direct to consumers are less likely to certify organic.

Essay 2: *The Economic Implications of Social Capital on Hispanic Entrepreneurship*. This essay assesses the effect of social capital, defined as the clustering of Hispanics, on the probability of Hispanic business creation. A big issue in

the social capital literature is identification. We use new econometric procedures to try to address this possible endogeneity and draw causal conclusions on the effect of social interactions on individual economic behavior. This essay provides robust empirical evidence on the role of social capital on Hispanic entrepreneurship. We also tackle the constructs of Hispanic heterogeneity and find that second generation Hispanics may be used as a potential indicator for Hispanic entrepreneurial environment.

Essay 3: *The Resilience of Small Business: A Post-Katrina Analysis of Social Capital.* Small business resilience becomes more relevant as natural disasters become more frequent. Post-disaster business resilience is the product of many complex decisions that result from the interaction of individuals, families, businesses, and communities. Little is known about what it takes for a small business to build resilience after a natural disaster and most studies have focused at a single point in time or look at the community as the unit of analysis. This study enhances the literature by providing empirical evidence on the factors that help small businesses to build post-disaster resilience over time. This article bridges the gap between social capital and post-disaster small business resilience. We answer two main questions. Does social capital explain small business resilience after a natural disaster? And, what type of social capital has the greatest impact for building small business resilience? These questions aim to shed light on the relevance of social networks to help small businesses face post-disaster situations. Incentives and interventions should support the creation and strengthening of community linkages through community participation and leadership development.

CHAPTER 1. INTRODUCTION

1.1   Introduction

A great deal of academic work is dedicated to understanding the role of financial and human capital on the individual and firm decision making. Researchers often overlook the missing link in the economic growth process that involves social interactions and shapes economic decisions: social capital. The three essays of this dissertation address the role of social capital on the decision-making of firms and individuals. Social capital is defined as the networks between individuals, families, communities, and institutions (Elliott et al., 2010). What makes these networks a form of capital is the density of ties among the agents and how these ties enable them to exchange resources. These associations can be a source of information, employment, financial opportunities, technological knowledge, market access, and complimentary resources.

According to Iyer et al. (2005), the effect of social closeness can impact economic decision-making. How social capital influences firm and individual behavior follows the rationale that being part of a social network diminishes the social distance between individuals and their networks and leads to collaboration. The societal component changes the environment in which individuals operate. Thus, it is likely that social interactions affect the firm's or individual's economic welfare and can be included as a factor in an extended utility function.

Several researchers participate in the analysis of social capital in regards to economic performance (Coleman, 1988; Putnam, 1995; Iyer et al., 2005; Westlund, 2006; Danes et al., 2009; Adger, 2010; Elliott et al., 2010; Hawkins and Maurer, 2010; Aldrich, 2011; Aldrich and Meyer, 2014). Researchers such as Bourdieu (1986), Coleman (1988), and Putnam (1995) are among the first ones discussing the effect of social resources embedded in individual social interactions. For Bourdieu (1986), economic decisions are explained by both, the profit maximization behavior – or the economic forms of capital – and the immaterial form of social capital. Putnam (1995) uses a social capital index to tap into several dimensions of social capital. He presents evidence on the wide range of benefits of social capital such as productive communities, child welfare, economic growth, and government performance. From the sociology perspective, Coleman (1988) investigates several dimensions of social capital and reports that the accumulation of social capital reduces the probability of high schools dropouts.

More recently, Hinrichs (2000) finds that social capital in certain markets can present economic opportunities for both customers and sellers. For instance, in local markets there is an interplay between economic – price premium – and social – trust – aspects that serve both the consumer and the grower. Adger (2010) highlights the interdependence of social capital and state planning for community development, especially in the context of vulnerable communities. He finds that local networks can be efficient in managing climate change risks and providing support to vulnerable communities. Danes et al. (2009) reports that family businesses with social capital are more successful in the short and long term.

Several disaster researchers build strong empirical evidence regarding the role of social capital on the recovery of shocks. For Hawkins and Maurer (2010), individuals and communities rely on social capital for recovery, especially among those with lower income. Chang and Falit-Baiamonte (2002), Hawkins and Maurer (2010), Aldrich (2011), and Aldrich and Meyer (2014) illustrate how social capital is as important as physical circumstances in recovering from a natural disaster. In social networks, individuals sharing similar characteristics are more likely link their socioeconomic activities (Kim and Aldrich, 2005). Danes et al. (2008) show that immigrants tend to rely heavily on social capital as a major source of solidarity, information, resources, or as type of informal economic organization.

One of the most important discussion regarding social capital is to what extent this capital can be considered a form of capital. Economists provide evidence that values embedded in social interactions can promote economic growth (Arrow, 2000), spread of good and bad behavior (Glaeser et al., 1995), civic cooperation (Iyer et al., 2005), and supplementation of markets through nonmarket relations (Arrow, 2000). The main mechanisms in which social capital affects individuals' and firms' utility are technology adoption, human capital acquisition, and explaining individual decisions (Iyer et al., 2005). Social capital affects economic output through the way in which individuals use or adopt technology (Solow, 1956). For instance, farmer-customer relationships may allow farmers to create new market linkages and motivate their technology adoption. Loury (1977) reports that social interactions shape individuals' economic behavior, especially for ethnic groups. The availability of social resources in immigrant clusters can increase the odds of self-employment for immigrants. Lastly, in the context of a natural disaster,

social interactions offer assets that can be as important as physical resources to recovering small businesses.

Recognizing the importance of social capital, this dissertation analyzes firm and individual behavior and expands the current literature in two broad ways. First, this dissertation integrates indicators of social interaction into the analysis of individual and firm decision making. Most economic studies have relied on physical and human capital as the main drivers of economic performance. There is a recent wave of literature that links social capital to firm and individual economic performance (Coleman, 1988; Iyer et al., 2005; Elliott et al., 2010; Hawkins and Maurer, 2010; Aldrich, 2011). This dissertation uses various indicators, econometric procedures, and databases to identify key social capital mechanisms. Empirical analyses in each of the three essays include variables that represent networks, social interactions, and collaboration among individuals, firms, communities, and institutions.

The first essay in this dissertation uses a proxy for the farmer-customer relationships in the estimation of farmer's adoption of technology. This essay analyzes whether social interactions in local markets matter. We model the decision to adopt organic certification as an endogenously-determined marketing decision to the choice of direct-to-consumer market channels. In other words, marketing choices and adoption of new technologies are modeled in a simultaneous framework. How this form of social capital affects organic certification follows the rationale that when producers and consumers create social ties, there is an interplay between economic (price premium) and social motives (trust) that drive technology adoption decisions.

The second essay assesses the role of ethnic clustering – as a proxy for social interactions – on the labor choice of Hispanics. The goal is to fill the gap in the literature by understanding the role of Hispanic clustering on Hispanic entrepreneurship. Hispanics are likely to cluster in areas where other Hispanics live and work (Stark, 1991). In clusters, individuals sharing similar characteristics, such as ethnicity, are more likely to know each other and link their socioeconomic activities. This essay also tackles the constructs of immigrant heterogeneity and a potential indicator of entrepreneurial environment.

The third essay enhances the social capital and business resilience literature. Self-reported social capital tends to be the least studied by scholars due to the lack of data availability (Iyer et al., 2005). Following Aldrich (2011), we offer a fine measurement of social capital using self-reported indicators from a unique dataset. The data comes from the first and second wave of the Small Business Survival and Demise after a Natural Disaster Project (SBSD). This study explains how social capital in terms of support from friends and family (bonding), communities (bridging), and institutions (linking) can explain the resilience of small businesses after a disaster (Aldrich, 2011). After a disaster, firms must survive to recover and to build resilience, and the drivers of each of these stages may not be necessarily the same (Stafford et al., 2010). Based on the comparison between pre- and post-disaster indicators, operating businesses are further categorized as survived, recovered, and resilient (Marshall and Schrank, 2014). We contribute to the literature by providing empirical evidence on the factors that enable small businesses to become resilient after a natural disaster. Following the Small Business Disaster Recovery

Framework (Marshall and Schrank, 2014), this study builds on a universal definition of small business resilience.

The second contribution of this dissertation is the empirical methodology employed in each of the three essays. Endogeneity is one of the main challenges of empirical economics, especially in studies exploring the effect of social interactions on individual economic behavior (Manski, 1993). Most empirical studies often conclude that an observed economic outcome denotes the effect of social interactions on the population of interest. Manski (2013) raises the importance of carefully identifying the mechanisms in which social interactions influence individual behavior. This dissertation controls for social capital endogeneity by addressing the lack of identification in the social capital literature. The three essays use new econometric procedures to identify of the mechanisms of social capital under more general conditions. The first and third essay rely on primary-collected data to incorporate social capital variables that denote interactions between individuals, firms, communities, and institutions. Surveys and interviews allow us to ask direct questions regarding social interactions and carefully identify its mechanisms. The third essay uses a large secondary dataset and a series of robust econometric procedures to address the possible endogeneity between social interactions and individual behavior.

The first essay uses a bivariate probit to accommodate endogeneity between farmer's marketing decisions that are discrete in nature. Similar to a model with continuous variables, the bivariate probit uses a seemingly unrelated regression to account for the effect of the key explanatory variable on the dependent variable. In this model, the binary dependent variable and the key explanatory variable are unobserved

latent variables regressed with a different set of covariates. Endogeneity is addressed by allowing correlation across the error terms ϵ_i that appear in each equation. Our study –the first one to test for this endogeneity explicitly– supports the presence of endogeneity in the farmer's decision making.

The second essay uses a series of modern econometric techniques on a census dataset to control for the possible endogeneity between Hispanic clustering and entrepreneurship. To our knowledge, the literature on Hispanic entrepreneurship has not yet addressed this endogeneity that may produce inconsistent parameters. First, our identification strategy includes an extensive list of observables to control for individuals' background, culture, language acquisition, and assimilation into the American mainstream. This strategy makes endogeneity unlikely (DeSimone, 2007). However, it is still possible to find endogeneity from 1) unobserved macroeconomic shocks that may lead to Hispanic clustering and 2) unobserved individual and peer characteristics that may increase the likelihood to become self-employed. This study uses Card's (2007) 2-stage instrumental variable approach to control for the possible endogeneity from unobserved characteristics that may lead to Hispanic clustering. The essay addresses the individual and peer endogeneity by using a Generalized Propensity Score method that removes the bias caused by non-random treatment assignment (Hirano and Imbens, 2004). The identification strategy reports significantly consistent estimates across econometric procedures.

The third essay uses an ordered probit regression to analyze the effect of social capital on small business resilience after Hurricane Katrina. The ordered probit is an appropriate framework to model ordinal survey responses where the observed dependent

variable has an ordinal scale (Greene, 2008). We assume that small business resilience post-disaster has a natural ordering. For instance, an operating business may report that his/her post-Katrina gross annual revenues are lower, same, or higher when compared to pre-Katrina levels. The order of the dependent variable follows the Small Business Disaster Recovery Framework (Marshall and Schrank, 2014). This article sheds light on the relevance of social networks to help small businesses recovery from natural disasters.

This dissertation provides evidence that social capital is a major determinant of individual's and firm's decision making. The three essays show that communities where individuals and firms interact matter. Family, friends, community, and institutions are an important asset to create new market linkages, for economic mobility, and to call upon in a crisis. Major policy implications include the creation of strategies that boost social and economic linkages in communities and the availability of community-based programs to encourage participation and leadership development.

This dissertation is organized by essay. Each essay contains its own review of the literature, methodology, results, and conclusions sections. Following the three essays, a concluding chapter summarizes and synthesizes the major contributions of this dissertation.

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CHAPTER 2. ARE LOCAL MARKET RELATIONSHIPS TRUMPING ORGANIC
CERTIFICATION? THE CASE OF SMALL AND MEDIUM FRUIT AND
VEGETABLE FARMERS[1]

2.1   Introduction

Organic foods, one of the fastest growing food segments, offers new economic

opportunities for farmers, wholesalers, processors, and retailers in the US (Greene et al.,

2009; Constance and Choi, 2010). The Organic Trade Association (OTA) projects a

market growth of at least 14% for the 2013-2018 period. According to OTA, the 2010

growth rate of organic food sales was nearly 8%. Organic food sales tend to grow faster

than total food sales, which totaled 0.6% during the same period. Among organic foods,

the United States Department of Agriculture (USDA) reports that fruits and vegetables

continue being the top selling category with a 43% share of organic food sales. Yet,

organic certification remains low in the US (Greene et al., 2009).

Low adoption of organic certification is a response of growers to the structural

and institutional barriers related to organic agriculture (Constance and Choi, 2010). Sierra

et al. (2008) report that an increasing number of farmers are willing to adopt organic

farming practices, though most of them are not interested in certification. Many

noncertified farmers extensively use organic practices and tend to substitute the USDA

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[1] Coauthors of this study are: Maria I. Marshall, Corinne E. Alexander, and Michael S. Delgado.

organic seal for alternative labels such as "locally grown", "sustainable", "whole", and "natural". This is especially true for farmers selling their products through direct-to-consumer (DTC) market channels, those with smaller operations, or those that have convenient access to consumers located near urban centers (Kremen et al., 2004; Hu et al., 2012). DTC market channels are defined as channels where the farmer makes direct contact with the customer to produce a sale. DTC markets are farmers' markets, internet sales, Community Supported Agriculture (CSA), on-farm sales, and festivals.

Veldstra et al. (2014) are the first to report that the farmer's decision to adopt organic certification are two sequential but separate business decisions. They find that first, farmers make a production decision of whether or not to adopt organic production practices. Then, farmers who choose to use organic practices make a marketing decision of whether or not to certify their production under the National Organic Program standards. Differentiating these decisions is key for understanding the farmers' decision-making process to adopt organic certification.

This article enhances the research by Veldstra et al. (2014) by investigating whether the marketing decisions embedded in the adoption of organic certification are endogenously determined. In other words, we examine if the decisions to certify and to use DTC market channels made by organic farmers are simultaneous. Our proposition is that farmers maximize their utility by making marketing decisions depending on the bundle of available choices. We propose that certification and market channels are two conditionally-dependent decisions. For instance, farmers may choose to sell through DTC market channels to capitalize on price premiums commonly offered to local- and organically-produced fruits and vegetables while avoiding the paperwork, financial costs,

and production requirements of certification. In this case, grower-customer relationships built in DTC channels may be trumping the choice of certification among organic farmers. In contrast, farmers selling through wholesale outlets and using organic production practices will only receive a price premium if they are certified organic.

Previous studies have separately investigated the drivers of organic certification and market outlet decision among organic farmers (Kremen et al., 2004; Park and Lohr, 2006; Sierra et al., 2008; Park, 2009; Dimitri, 2012). The literature has not yet considered the possibility that choosing to certify and choosing the market outlet may be endogenous. Failing to address endogeneity and assuming that marketing decisions are conditionally independent may produce inconsistent parameter estimates, which leads to erroneous statistical inference (Wooldridge, 2010). Dimitri (2012) suggests that exploring the simultaneity between market channel and certification decisions among farmers is key to shedding light into the local foods and organic certification debate. This article contributes to the literature in two ways. First, a unique dataset of certified and noncertified organic farmers is used to investigate how the choice to sell directly to consumers impacts the decision to certify. Second, we enhance the Veldstra et al. (2014) study by allowing the decision to certify to be simultaneously determined with the choice of market channel.

2.2 Literature Review

2.2.1 Organic Certification in the US

In order to use the USDA organic label, all organic growers, processors, and handlers of food products are required to be certified by a USDA National Organic

Program (NOP) accredited third-party agency. This rule does not apply to farmers with gross sales less than $5,000 per year in organically produced foods (e.g. exempt farmers) and retailers that sell and do not process organic products. These exempt farmers can market their products as "organic" as long as they follow the NOP standards, but cannot use the USDA organic seal to market their products.

The main drivers to adopt organic certification are farmer's demographics characteristics, organic management practices, potential profitability, environmental concerns, and philosophical beliefs towards organic agriculture (D'Souza et al., 1993; Burton et al., 1999; Padel, 2001; Walz, 2004; Klonsky and Greene, 2005; Genius et al., 2006; Sierra et al., 2008; Mzoughi, 2011; Veldstra et al., 2014). On the other hand, there are multiple barriers to organic certification such as market availability and reliability, the certification process, financial constraints, attitudinal constraints, and the loss of freedom due to certification paperwork and requirements (Burton et al., 1999; Oberholtzer et al., 2005; Dimitri et al., 2007; Strochlic and Sierra, 2007; Sierra et al., 2008; Mzoughi, 2011).

The decision to certify organic is complex. From the production perspective, Veldstra et al. (2014) find that farmers start by incorporating organic production practices then decide to adopt the USDA certification. However, there is an important decision-making process that remains to be answered: are organic farmers that capitalize on price premiums and consumer trust by selling directly to customers refusing to certify? Exploring the simultaneity between the marketing decisions embedded into organic certification have major policy implications as local markets are important economic outlets for organic farmers (Dimitri, 2012).

2.2.2   Organic Markets and Market Channels

Organic foods are sold in the US through three main outlets: conventional grocery stores, natural food stores, and DTC markets. The choice of organic market outlet can help farmers to access markets and price premiums, and affect earned income (Park and Lohr, 2006). Depending on the choice of market channels, farmers may choose whether or not to certify organic given that certification may help them reach high-valued markets and access to certified price premiums (Park, 2009).

The Fourth National Organic Farmers' Survey reports that in 2004 about 53% of organic foods were sold through DTC market channels (Walz, 2004). In contrast, by 2009, OTA reports that DTC channels only accounted for 6% of the US organic food sales. Most of the organic sales volume in the late 2000s were captured by natural food stores and conventional grocery stores.

One explanation for this change in channel volume is that when certified farmers increase sales volume or acreage, they commonly diversify their portfolio of market channels over time (Park, 2009). According to Park and Lohr (2006), certified organic farmers with diversified market channels tend to attain the highest average revenue. Thus, it is possible that many noncertified organic farmers start by selling through DTC markets and then switch to a more diversified market channel strategy as their businesses grow or they become certified (Dimitri and Greene, 2000).

Another explanation for the changes in organic markets is the growing interest of large food companies to offer organic products. Large food retailers, packers, and brokers are capturing more organic foods and driving the growth of the organic foods market (Park and Lohr, 2006). Conversely, Adams and Salois (2010) argue that the industrialized

organic foods sold by massive retailers has switched consumer demand from these retail outlets to foods sold through DTC market channels. Consumers against the corporate organic market prefer to buy organically-produced foods directly from their farmers or markets that offer locally-produced foods (Dimitri, 2012; Hu et al., 2012). We expect that the increasing demand of foods through local markets may have significant impacts on the supply chain of organic foods and the adoption of organic certification.

Independent of organic market trends, the choice of market channels remains a major difference between certified and noncertified organic famers (Dimitri and Greene, 2000; Park and Lohr, 2006; Park, 2009). Depending on farm size, organic farmers tend to prefer DTC market outlets and/or alternative labels to substitute the USDA organic seal (Dimitri and Greene, 2000; Kremen et al., 2004; Hu et al., 2012). These DTC channels offer a higher share of the consumer's dollar, have relative short distances to their operations, and can rely on a trust relationship with consumers to capitalize on price premiums (Kremen et al., 2004; Park and Lohr, 2006; Adams and Salois, 2010; Dimitri, 2012).

Strong and direct grower-customer relationships are commonly achieved in DTC markets (Kremen et al., 2004). The trust-based interactions are likely to allow farmers selling directly to consumers to receive a price premium without the use of the USDA organic label (Ward et al., 2004). Kremen et al. (2004) find that organic farmers represent approximately a third of the farmers in farmer's markets. The authors report that most locally-sold organic foods tend to be marketed with alternative labels such as "natural", "local", and "sustainable", rather than the USDA organic label (Kremen et al., 2004). It is

reported that consumers are willing to pay higher prices in markets that offer direct contact with growers with specialty crop varieties, local or home-made products, excellent customer service, or more transparent farming practices (Kremen et al., 2004; Klonsky and Greene, 2005; Dimitri, 2012; Hu et al., 2012).

Many of the local and organic foods market trends are influenced by initiatives such as "Know your farmer, know your food" and programs at the state and community level that have been actively encouraging the demand and supply of local foods. The local food movement is fueled by social values such as sustaining and maintaining local farmland and the local economy (Matson et al., 2013). Thus, it is likely that the grower-customer relationship is more important than the organic certification label in local markets.

The relationship between the choice of market channel on the farmer's decision to certify is briefly and separately reported by the literature. Kremen et al. (2004) report that farmers closer to their markets tend to prefer DTC market channels, especially small-sized operations. Adams and Salois (2010) state that small organic farmers that are opposed to certification prefer to sell directly to consumers and build trust relationships with consumers to access local markets. To our knowledge, the literature has not yet addressed the possible endogeneity between farmers' marketing strategies and the decision to certify among organic farmers. Based on the literature, we hypothesize that 1) organic farmers that chose DTC market outlets are less likely to certify organic, and 2) the decisions to certify organic and to use DTC market channels are conditionally dependent and made simultaneously by organic farmers.

2.3   Data and Methodology

2.3.1   Data Description

This study uses data from a 2012 online survey of fruit and vegetable farmers registered in the Food Industry MarketMaker database. This database contains the addresses for 4,312 fruit and vegetable producers located in 16 states (AL, AR, DC, FL, GA, IA, IL, IN, KY, MI, MS, NE, NY, OH, PA, and SC), of which 3,015 also include an email address. Farmers registered in the Food Industry MarketMaker database tend to have small and medium-sized farms looking for a network resource to direct market food products to consumers.

An online survey with a mixed-mode design was conducted using Qualtrics software. An incentive of a two-dollar bill was included with the invitation letter that was sent by mail on January 4, 2012. The provision of token incentives included in advance letters are reported to increase Internet survey participation and to be even more effective than providing rewards upon completion (Dillman et al., 2014). Email reminders to those with email addresses were sent on January 10, January 18, and February 1, 2012. The optimal suggested time for sending reminders is between one and two weeks, depending on the population sampled (Dillman et al., 2014). We obtained 1,559 responses that yielded a response rate of 36.15%. The survey includes questions regarding the percentage of the farm under production practices with the choices being: conventional, certified organic, transitioning to become certified organic, or under organic practices but not certified. The survey asked demographic, management, and attitudinal questions.

The sample for this study includes 480 farmers using organic production practices. We exclude conventional farmers and farmers that use a mix of conventional and organic

production practices. A sample of farmers that exclusively use organic practices provides

clear-cut differences between certified and noncertified farmers and allowed us to

investigate the key factors deterring the adoption of organic certification. Similarly,

Genius et al. (2006) group producers according to their level of organic practices. They

cluster *only* certified farmers along with farmers that had all their operation under the 3-

year transition period to organic certification because these farmers had similar

perceptions, practices, and mind sets as certified producers. Forty-six farmers are

removed from the study because they were previously certified but chose to decertify.

From the sample of 480 farmers, we find that 129 (27%) had 100% of their farm under

organic certification and that 351 (73%) used organic production practices in the entire

farm but were not certified.

2.3.2 Empirical Model Specification

2.3.2.1 Baseline Setup

Univariate standard and seemingly unrelated bivariate probit regressions are used to

assess how marketing choices influence producers' decision to certify organic. The

standard probit is used to estimate how the choice of direct market channels drives the

decision to certify among organic farmers. However, we suspect that farmer's decision

making is a simultaneous process in which the individual chooses among the stream of

alternatives that maximizes his or her utility, rather than a set conditionally independent

choices (Eisenhardt and Zbaracki, 1992). Thus, the decision to certify and the choice of

market channels are likely endogenously-determined. For instance, farmers capitalizing

on a price premium from DTC outlets may be less likely to certify organic. The

implications of such endogeneity include inconsistent estimates from the standard probit and inaccurate inference. We use a seemingly unrelated bivariate probit regression to control for the potential endogeneity between the choice of marketing strategy and the organic farmer's decision to certify.

Model 1 is a univariate probit given by Eq (1). The dependent variable is the binary decision to certify among organic farmers. Producers were grouped into two categories. The first group is the certified group made up of farmers with 100% of the farming operation under USDA organic certification or in a 3-year transition period to certification. The second group is the noncertified group which is made up of farmers that used organic practices but decided not to certify. Thus, the dependent variable has the value $I = 1$ if the farmer reported being certified 100% organic or in transition to certification (certify), and $I = 0$ if the farmer uses organic practices. We estimate the conditional probability of certification

$$\Pr(certify = 1|X) = \Phi(X\beta) = \Phi(\beta_0 + \beta_1 dtc + X_2\beta_2) \tag{1}$$

where $\Phi(\cdot)$ is the standard normal cumulative distribution function, $X = (1, dtc, X_2)$ is a vector of covariates, and $\beta = (\beta_0, \beta_1, \beta_2')'$ is a vector of unknown constants.

The key explanatory variable is *dtc*. The variable *dtc* has the value of 1 if the farmer uses only DTC market outlets, and 0 otherwise. DTC channels include on-farm sales, farmers' markets, CSA sales, via Internet or mail order, through co-op or association, roadside, delivery, festivals, exchange, and friends. Of the 238 farmers using only DTC market channels, 193 (81%) are noncertified and 45 (19%) are certified organic.

The set of covariates X_2 corresponds to the set of control variables such farm management, demographic, and attitudinal questions. Farm management observables include number of employees, the average distance to market in miles, average number of hours per week spent on farm business, number of crops, number of acres, and amount of time spent on farm record keeping. Demographic control variables include educational attainment, gender, location, number of years farming, and form of ownership. Farm size is used as a control variable and grouped based on annual gross sales: exempt (<$5,000), small ($5,000-$50,000), and medium and large (>$50,000). This articles group respondents in four geographical regions: South, Delta, Northeast, and Midwest. The South region consists of Florida, Georgia and South Carolina. The Delta region consists of Alabama, Arkansas, Mississippi and Louisiana. The Northeast region consists of New York and Pennsylvania. Lastly, the Midwest region consists of Iowa, Illinois, Indiana, Michigan, Nebraska, Ohio and Kentucky.

The survey includes attitudinal questions to examine their perceptions and opinions towards organic agriculture and certification. The survey asks if farmers perceive that the process of organic certification is confusing on a 5-point Likert scale from strongly disagree (1) to strongly agree (5). An index variable *bcerti* groups attitudinal questions related to the certification process barriers to entry organic markets. The certification process index *bcerti* includes perceptions that the organic certification is a barrier due to loss of freedom, paperwork, cost of certification, interaction with the certifier, and lack of information about certification. The index variable *bcerti* sums multiple 3-point Likert-scale from not a barrier (1) to severe barrier (3) questions and divides by the number of answered questions (see Table 1). Index variables reduce the number of missing

observations and minimize the number of explanatory variables. The validity of this

index variable is confirmed by the factor analysis (available on request).

Table 1. Variable List and Description

Variable	Description
dtc	1 = if farmer used DTC channels such as: farmers market, CSA, Internet, coops, roadside stands, delivery, festivals, exchange, friends
female	1 = if farmer is female
college	1 = if farmer's highest level of education is college or postgraduate work
exempt	1 = if annual gross sales less than $5,000
small	1 = if annual gross sales between $5,000-$50,000 (Reference Group)
medium/large	1 = if annual gross sales larger than $50,000
parttime	1 = if respondent farms part-time
south	1 = in Florida, Georgia, South Carolina
delta	1 = in Alabama, Arkansas, Mississippi, Louisiana
midwest	1 = in Iowa, Illinois, Indiana, Michigan, Nebraska, Ohio, and Kentucky
northeast	1 = in New York and Pennsylvania (Reference Group)
sole	1 = if the business structure of the farm is a sole proprietorship
upremium[a]	1 = if farmer perceives uncertainty in obtaining organic price premiums
labor	Number of employees
distance	Average distance to markets in miles
distance2	Square of average distance to markets
onfarm	Average number of hours per week farmer works on farm business
ncrop	Number of crops
acres	Acreage of rent, own, or leased land in the farm
yfarming	Number of years farming
yfarming2	Squared number of years farming
paperw	Percentage of time farmer spends on farm record keeping
distbarr[a]	Farmer's perception that distance to available organic markets is a barrier to entry organic markets
confusing[b]	Farmer's perception that the process of organic certification is confusing

Table 1. Continued.

bcerti[a]   Farmer's perception that loss of freedom, paperwork, cost of certification, interaction with the certifier and lack of information are certification barriers

[a]Indicates a Likert-scale variable, where 1=if not a barrier, 2=moderate barrier, and 3=severe barrier

[b]Indicates a Likert-scale variable, where 1=strongly disaggree, 2=somewhat disagree, 3=neither agree or disagree, 4=somewhat agree, and 5=strongly agree

2.3.2.2   Addressing Endogeneity

A concern with Eq (1) is the possible endogeneity between the farmer's choice of direct-to-consumer market channels and the decision to certify organic. For instance, a farmer that decides to sell directly to consumers may be able capitalize on the higher price commonly paid for organically- or locally-produced products. By selling directly to consumers, organic noncertified farmers may be able to avoid the paperwork, financial costs, and production requirements of certification. Farmers may also be able to build consumer-producer trust that will allow him/her to maintain a price premium without having to certify.

Mzoughi (2011) finds that attitudinal and philosophical concerns towards organic agriculture can drive farmers' decision making. Noncertified farmers may not be willing to certify if they perceive that organic certified foods have become a corporate business. Also, farmers that perceive that certification does not support their philosophy with respect to the environment or family- or privately-owned agriculture may be less likely to certify. Thus, direct markets may offer organic noncertified farmers enough economic and/or philosophical incentives to sell directly to customers and may decrease their probability to certify. Conversely, a farmer that chooses to sell wholesale and not through DTC markets likely has to certify organic in order to earn a price premium commensurate with organically produced goods via traditional market outlets.

We propose that the market channel decision leads to the certification choice. In other words, both observable and unobservable factors that determine a farmer's decision to sell directly to consumers also influences the farmer's decision to certify organic. To address the possible endogeneity as described, Model 2 uses a seemingly unrelated

bivariate probit to account for the effect of *dtc* on the choice of certification shown in Eq

(2) and (3). In Model 2, Y_1^* represents the decision to certify and Y_2^* the decision to use

DTC market channels as unobserved latent variables with a different set of covariates, Y_1

and Y_2, as:

$$Y_1^* = X_1\alpha_1 + \gamma Y_2 + u_1, \quad Y_1 = \begin{cases} 1 \ if \ Y_1^* > 0 \\ 0 \ if \ Y_1^* \leq 0 \end{cases} \tag{2}$$

$$Y_2^* = X_2\alpha_2 + u_2, \quad Y_2 = \begin{cases} 1 \ if \ Y_2^* > 0 \\ 0 \ if \ Y_2^* \leq 0 \end{cases} \tag{3}$$

Eq (2) shows the case where Y_1 is determined in part by Y_2 given by the parameter

γ. Maddala (1987) and Greene (2008) document that the joint probability calculations

from the conditional probability of $\text{Prob}[Y_1 = 1, Y_2 = 1 | X_1, X_2]$ does not require special

consideration besides the additional term γY_2 that tests the joint probability between a

specification with endogeneity and without endogeneity. If the error terms u_1 and u_2 are

correlated, then the outcomes are endogenously determined; a significance test on the

correlation parameter ρ is a test of exogeneity between *certify* and *dtc* (Fabbri et al.,

2004).

The set of covariates X_1 follow the same identification strategy of the standard

probit in Eq (1). The control variables are *female, college, exempt, medium, parttime,*

south delta, Midwest, sole, upremium, labor, distance, distance2, onfarm, ncrop, acres,

yfarming, yfarming2, paperw, distbarr, confusing, and *bcerti*. The set of covariates X_2

include demographic variables such as gender, educational attainment, and location in

geographic regions.

Farm management characteristics are included in the set of explanatory variables X_2 of Eq. (2). The vector X_2 includes observables such as annual gross sales as a proxy of farm size, business structure, distance to markets, time spent on farm business and on filling paperwork, farming experience, and number of employees, acres, and crops.

It is expected that larger farms, in sales volume or acreage, are more likely to have commercial relationships with large wholesalers and retailers that would capture all or at least most of their produce. On the other hand, smaller farms or farmers with less farming experience are expected to sell directly to consumers as their produce volume is lower. In addition, these farmers may be more likely to receive price premiums if they are able to build trust-based relationships with their customers. In our sample, over 81% of farmer selling DTC are small in sales and in number of acres. Similarly, the flexibility of sole proprietorship reflects the likelihood of farmers to engage in direct marketing techniques. Almost 65% of farmers using DTC market outlets in our sample are sole proprietors.

2.4   Empirical Results

2.4.1   Summary Statistics

Table 2 provides the description of the explanatory variables with mean differences for all the variables used in our models, by producer type. Over 50% of noncertified farmers use only DTC market channels, but this number is significantly lower for certified farmers (35%) $(P < 0.01)$. Similarly to Genius et al. (2006), we find that the percentage of organic farmers with college education is higher for the certified group $(P < 0.1)$. Most of the growers in our sample are small (annual gross sales less than or equal to $50,000) and only 30% are medium or large (annual gross sales higher than

$50,000). Our findings are consistent with Constance and Choi (2010), who also find that organic farmers tend to be smaller in size. These results should be interpreted carefully as the sample from Food Industry MarketMaker is mainly composed of small- and medium-sized farms. We find that certified farmers tend to report higher annual gross sales than noncertified farmers. Over 62% of noncertified farmers are sole proprietors, while only 47% of certified farmers report the same business structure ($P < 0.01$).

Table 2 suggests that certified organic farmers have on average more years of farming ($P < 0.01$), bigger farms ($P < 0.01$), and higher number of crops ($P < 0.01$) and employees ($P < 0.05$). For example, certified farmers have on average about 20 years of farming, while noncertified farmers report 14 years of farming experience. These results are consistent to findings from Constance and Choi (2010) and Walz (2004). Certified farmers, on average, sell to more distant markets when compared to their noncertified counterparts. For instance, the average distance to market for certified farmers is 35 miles, while it is 21 miles for noncertified farmers ($P < 0.01$).

Over 50% of noncertified organic farmers in our sample are located in the Midwest (Iowa, Illinois, Indiana, Michigan, Nebraska, Ohio and Kentucky), while most certified farmers (46%) are located in the northeast region (New York and Pennsylvania). The high concentration of certified farmers in New York and Pennsylvania may be due to large metropolitan areas (e.g. New York City and Philadelphia). Large metro areas represent big and high-value markets for certified organic foods. These results are consistent with the USDA National 2011 Organic Production Survey that reports New York as one of the top ranking states for number of organic farms and value of organic sales.

Surprisingly, certified farmers consider the process of certification more confusing than noncertified ones ($P < 0.01$). It is likely that certified producers are more aware of the process of certification. As expected, certified farmers spend more time on farm record keeping ($P < 0.1$) and working on the farm business than noncertified farmers ($P < 0.01$).

Table 2. Variable Means by Producer Type

	N Obs	Full Sample[c]	Certified	Noncertified	
dtc	475	0.50	0.35	0.56	***
female	480	0.45	0.40	0.46	
college	480	0.61	0.67	0.58	*
exempt	480	0.24	0.06	0.31	***
small	480	0.70	0.48	0.78	***
medium	480	0.30	0.52	0.22	***
parttime	480	0.41	0.26	0.47	*
south	480	0.20	0.14	0.22	*
delta	480	0.07	0.05	0.07	
midwest	480	0.47	0.35	0.52	***
northeast	480	0.26	0.46	0.19	***
sole	480	0.58	0.47	0.62	***
upremium[a]	453	1.83	1.74	1.87	*
labor	463	4.59	5.73	4.17	**
distance	475	25.03	35.11	21.27	***
distance2	475	2,192.50	4,167.98	1,455.98	***
onfarm	480	37.93	44.79	35.41	***
ncrop	480	22.84	25.55	21.84	***
acres	462	88.30	164.67	59.66	***
yfarming	466	15.52	19.86	13.93	***
yfarming2	466	399.97	565.57	339.26	***
paperw	460	10.39	11.85	9.86	*
distbarr[a]	455	1.57	1.60	1.56	
confusing[b]	427	3.40	2.74	3.66	***
bcerti[a]	455	1.91	1.50	2.06	***

Data source: Purdue 2012 survey of MarketMaker growers.

[a]Indicates a Likert-scale variable, where 1= if not a barrier, 2=moderate barrier, and 3=severe barrier

[b]Indicates a Likert-scale variable, where 1=strongly disagree, 2=somewhat disagree, 3=neither agree or disagree, 4=somewhat agree, and 5= strongly agree

[c]The mean is the percentage of respondents with that attribute.

*p < 0.10, ** p < 0.05, and *** p < 0.01.

2.4.2 Regression Results

Table 3 contains the coefficients and marginal effects from the standard and bivariate probit models. When testing for endogeneity, the bivariate probit reports a significant ρ ($P < 0.1$). A significant ρ indicates the significant correlation between unobserved factors affecting the decision to use DTC channels and to adopt organic certification (Greene, 2008). Table 3 provides empirical evidence that the choice of organic certification is endogenously determined by the choice of market channels. In other words, producers choose to certify organic conditionally dependent on their choice of market channels. Studies modeling adoption of certification among organic farmers should account for the endogeneity between farmers' marketing decisions.

The bivariate probit shows that the choice to use DTC outlets negatively influences farmers' decision to certify ($P < 0.01$). Organic farmers selling their products through DTC outlets are 26% less likely to certify organic than farmers selling wholesale. An explanation is that producers selling directly to customers may be able to build customer-grower relationships and convey production practices that allows them to gain customers' trust and obtain price premiums. Direct marketing techniques are extensively used by fruits and vegetable organic farmers to capture a much higher share of the consumer dollar without the USDA certification label (Dimitri and Greene, 2000). Dimitri and Greene (2000) report that organic farmers tend to prefer DTC market outlets.

Table 3. Results of the Standard and Bivariate Probit Regressions. Marginal Effects Are Illustrated on Percentage Change.

	Probit Certify			Probit DTC			Seemingly Unrelated Bivariate Probit Certify			DTC		
	Coeff.		M. Eff.	Coeff.		M. Eff.	Coeff.		M. Eff.	Coeff.		M. Eff.
certify	-		-	-0.34	**	-12.33	-		-	-		-
dtc	-0.26		-5.47	-		-	-1.68	***	-26.17	-		-
female	-0.09		-1.81	0.01		0.29	-0.04		-0.63	0.05		1.80
college	0.56	***	11.76	-0.07		-2.74	0.32	*	5.03	-0.07		-2.64
exempt	-0.61	**	-12.83	-0.01		-0.54	-0.45	**	-6.95	-0.04		-1.76
medium	0.19		4.05	-0.51	***	-18.67	-0.14		-2.21	-0.51	***	-20.42
parttime	0.03		0.53	0.12		4.58	0.02		0.32	0.15		6.13
south	-0.19		-3.96	0.05		1.87	-0.11		-1.74	0.18		7.20
delta	-0.48		-9.93	0.06		2.05	-0.38		-5.85	0.17		6.90
midwest	-0.24		-4.92	-0.06		-2.19	-0.20		-3.17	0.02		0.94
sole	-0.21		-4.46	0.18		6.73	0.01		0.17	0.33	**	13.22
upremium	0.00		-0.06	-0.14		-5.07	-0.02		-0.24	-0.09		-3.41
labor	-0.03		-0.60	0.00		0.15	-0.02		-0.27	0.01		0.22
distance	0.01	*	0.21	-0.01		-0.19	0.01		0.03	-0.01	*	-0.30
distance2	0.01		0.01	0.01		0.01	0.01		0.01	0.01		0.01
onfarm	0.01		-0.09	0.01		-0.08	-0.01		-0.08	0.01		-0.04
ncrop	0.01		0.19	0.01	*	0.31	0.01	*	0.16	0.01		0.31
acres	0.01		0.01	0.01		0.01	0.01		0.01	0.01		0.01
yfarming	0.07	***	1.49	0.01		0.20	0.05	***	0.82	0.01		0.01
yfarming2	0.01	*	-0.02	0.01		-0.01	0.01	*	-0.01	0.01		-0.01
paperw	0.01		-0.04	0.01		-0.12	0.01		-0.03	0.01		-0.16
distbarr	0.19		3.94	-0.03		-1.10	0.09		1.41	-0.11		-4.23
confusing	-0.07		-1.57	-		-	-0.04		-0.63	-		-

Table 3. Continued.

bcerti	-1.59	***	-33.19	-	-	-1.10	***	-17.07	-	-
intercept	1.36	**	-	0.31	-	1.80	***	-	0.14	-
rho	-			-		0.82	*			
N Obs	392			430		392				
Log Likelihood	-144.19			-275.56		-396.50				

Data Source: Purdue 2012 survey of Market Maker growers. Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The bivariate probit illustrates that exempt organic farmers are 7% less likely to certify organic ($P < 0.05$). This group is formed by farmers that are considered exempt from certification requirements because they report less than $5,000 on total gross sales of organic product per year. Exempt farmers are able to label their products as "organic" and sell their fruits and vegetables at farmers markets, grocery stores, restaurants, and a variety of market outlets. Our data shows that over 91% of exempt farmers sell their crops directly to customers, where they may be able to receive a price premium.

Results from the bivariate probit suggest that the certification process is a significant barrier to certify among organic farmers. Over 17% of organic farmers are not likely certify due to the loss of freedom, paperwork, cost of certification, interaction with the certifier, and lack of information embedded in the certification process. Farmers with college education and more experience and number of crops are more likely to certify. The probability to certify decreases by 8% for each ten-year increase in farming experience ($P < 0.01$). However, the probability of having certified starts to decrease with years farming at an increasing rate ($P < 0.1$). Each crop added to the production system decreases the probability to certify by 0.2% ($P < 0.1$). College educated organic farmers are 5% more likely to certify ($P < 0.1$). Similarly, D'Souza et al. (1993) and Genius et al. (2006) find that the organic adoption is more likely for farmers with higher levels of education.

Table 3 column DTC from the bivariate probit regression illustrates the marginal effects of the covariates driving the choice of DTC outlets. For instance, for each 100-mile increase in distance to markets, the probability of having chosen DTC market channels significantly decreases by 30%. Farm size is a major determinant to sell directly

to customers. Results suggest that medium- and large-sized organic farms are 20% less likely to sell directly to consumers. An explanation is direct marketing may not be able to capture the production supply of larger farms and farmers are more likely to establish commercial relationships with wholesalers and retailers.

Sole proprietorship farms are 13% more likely to have chosen only DTC market channels. As expected, farmers with a less formal business structure are more likely to engage in direct marketing techniques. These findings are consistent with findings from Park and Lohr (2006), who report that farms with a sole proprietorship structure are more likely to use direct market channels.

2.5   Conclusions and Implications

The major contribution of this article is the empirical evidence that organic farmers' marketing decisions are simultaneously determined. A farmer's decision to sell directly to customers simultaneously decreases the probability he/she will certify organic, given the use of organic production practices. Organic farmers may be able to capitalize on the higher price paid for using local or alternative labels in direct markets and substituting those for the USDA certification label. Direct market channels are a vital component of local food systems, especially for small- and medium-sized farms. Our results indicate that owners of small- and medium-sized farms are not likely to certify unless they have access to wholesale markets. A major policy implication is that policymakers aiming to increase organic certification should consider the market choices available to organic farmers before designing policies and strategies. Thus, these policies and strategies may be more state and region specific than national in nature. Local food

hubs may be one way of helping farmers to access mainstream markets, while enabling food retailers to obtain a reliable supply of organic food products.

Social interactions that take place in local markets matter. These direct markets may create strong social ties between producers and consumers. Local markets represent a source of information, trust, market access, and price premium (Hinrichs, 2000). How this form of social capital affects organic certification follows the rationale that when producers and consumers create social ties, there is an interplay between economic (price premium) and social aspects (trust) that serve both the consumer and the farmer. Thus, organic noncertified producers may be using grower-customer relationships obtained through DTC channels to capitalize on the price premium and may not have economic incentives to certify.

Several studies have reported the preference of consumers towards local food systems (Toler et al., 2009; Onozaka and Mcfadden, 2011; Connolly and Klaiber, 2014). In these systems, the grower-customer relationship may be more important than the organic certification label. This finding demonstrates the importance of local food systems for organic farming and organic certification. Initiatives such as the USDA Local Food Marketing Promotion Program, which provides over $35 million in grants to revitalize local and regional food systems, may strengthen these grower-customer relationships. Public and private stakeholders in the local food industry can use our findings to better understand the interaction between local markets and organic certification.

Several factors could greatly impact the organic certified food supply: perceptions that organic certification does not support family- and privately-owned agriculture,

perceptions that the certified food market is corporate-driven, large food companies incorporating local foods to meet consumer preferences, and consumer awareness on the differences between local and organic foods. This article demonstrates that farmer attitudes are an important driver of marketing decisions among organic farmers. The private and public sectors need to consider whether the certified organic value chain economically and philosophically supports owners of small and mid-sized farms that want to become certified. This is especially true, as our results show that the certification process is detrimental to the adoption of organic certification.

2.6 Acknowledgements

2.7 List of References

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CHAPTER 3. THE ECONOMIC IMPLICATIONS OF SOCIAL CAPITAL ON
HISPANIC ENTREPRENEURSHIP[2]

3.1   Introduction

The socioeconomic relevance of Hispanics is expected to increase as Hispanics

remain the largest minority in the US (Liu, 2012). Pew Research Center projections for

the 2000-2020 period report that the Hispanic labor force will grow in 77% (Suro and

Passel, 2003). The growth in the Hispanic population is likely to increase the number of

Hispanic-owned businesses. According to the 2010 census data, about 9% of Hispanics

living in the US are entrepreneurs. Hispanic-owned businesses grew from 1.6 to 2.3

million firms in the 2002-2007, three times the percent growth of non-Hispanic

businesses (Dávila and Mora, 2013). The US Hispanic Chamber of Commerce (USHCC)

projects the presence of over 4 million Hispanic businesses with a total of $661 billion

sales in 2015 (USHCC, 2015). The importance of self-employment for Hispanics'

economic mobility is widely documented by the literature (Fairlie and Meyer, 1996). This

is especially true as 2010 census data shows that Hispanic business owners tend to report

higher income compared to wage-salaried Hispanics.

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[2] Coauthors of this study are: Michael S. Delgado and Maria I. Marshall.

Yet, Hispanics are a heterogeneous group (Dávila and Mora, 2013). Hispanic heterogeneity can be correlated to the place of birth. Individuals self-identified as Hispanic may be born in South America, Central America, the Caribbean, or the US. For instance, US-born Hispanics tend to have higher levels of human capital, better access to financial capital, and more access to information to succeed in entrepreneurship (Suro and Passel, 2003). On the other hand, those born abroad tend to rely more on social capital – the ties that bring people with the same ethnicity together – as the main and most valuable resource for starting their own business (Castiglione et al., 2008; Liu, 2012). Generational differences may also help to understand the Hispanic diversity. Generations are categories that combine to the place of birth and how long Hispanics have been in the US.

Hispanics tend to form clusters in the US (Stark, 1991). Ethnic clusters are solidarity groups, networks, and organizations formed by the agglomeration of individuals in a geographical location. Ethnic clusters accumulate ethnic capital, the skills level of the ethnic group, which is a major driver of intergenerational mobility (Borjas, 1991). Borjas (1998), Danes et al. (2008), and Ulhøi (2005) report that Hispanic immigrants tend to form and rely on Hispanic clusters as their most valuable source of information, opportunities, solidarity, and resources. Thus, these clusters have great impact on the socioeconomic outcomes of Hispanics (Dávila and Mora, 2013). This article defines social capital as the resources and opportunities available to individuals living in clusters.

With the current immigration discussion, understanding the interaction between Hispanics and their clustering is key to develop and target national policies that improve the economic performance of all groups of Hispanics. This article investigates Hispanic heterogeneity and the main drivers for the creation of Hispanic-owned businesses. Policymakers, scholars, and public and private stakeholders may use this study to fuel future generations of Hispanic entrepreneurs. Public and private programs targeted through community linkages are more likely to effectively increase the access to training programs, strategic business planning, technical assistance, and financial capital (Danes et al., 2008). For instance, increasing the Hispanic representation among community-based entrepreneurial organizations, such as Community Development Financial Institutions (CDFIs) can bring expertise and resources to Hispanic entrepreneurs. Most importantly, one-size-fits-all policies disregarding the heterogeneity among Hispanics, such as the Small Business Administration (SBA) program that connects business owners with local lenders, will likely have contrasting implications for certain groups.

Yet, the literature has not reached a conclusion on how Hispanic clusters influence the economic performance of Hispanic entrepreneurs. While Borjas (1996) suggests that Hispanics are more likely to be entrepreneurs in areas where the proportion of Hispanics is higher due to the availability of community resources, Liu (2012) does not find that Hispanic-concentrated areas are correlated with higher rates of Hispanic self-employment, and Yuengert (1995) reports no correlation. The lack of consensus may be a consequence of lumping Hispanics together as a homogenous group. Bradley (2004) and Georgarakos and Tatsiramos (2009) suggest that grouping immigrants as a homogenous group may not provide generalizable results.

We define Hispanics as any individual that is self-identified in the US census as Hispanic or whom his/her parent, or ancestor was born in a Latin American country. Foreign-born Hispanics are naturalized citizens, lawful permanent residents, refugees and asylees, authorized non-immigrants (student, work, or temporary visas), and persons residing in the country without authorization. Foreign-born Hispanics are disaggregated further into first and 1.5 generation. First generation Hispanics are individuals born in Latin America that migrated to the US at the age of 16 or older. The 1.5-generation are Hispanics born in Latin America that migrated before turning 16 years old. US-born Hispanics are disaggregated further into second and third generation Hispanics. Second generation are individuals born in the US with either parent born in Latin America. Third generation are individuals born in the US who reported to have Hispanic ancestry (Jensen and Chitose, 1994). This disaggregation is motivated by the increasing proportion of second and third generation Hispanics in the US relative to foreign-born Hispanics. It is expected that US-born Hispanics follow different economic behavior than Hispanics born abroad.

This study assesses the effect of social capital, defined as the clustering of Hispanics, on their probability of self-employment. This article uses self-employment as a surrogate for entrepreneurship. The goal is to address the gap in the literature by understanding if Hispanic clusters are driving (or not) Hispanic entrepreneurship. A secondary goal is to understand the role of generational heterogeneity by disaggregating Hispanics by foreign- and US-born and across generations. The overall hypothesis is that the probability of Hispanic self-employment increases as the share of *all* Hispanics in a

geographic area increases. But, we expect that this probability has generational differences.

This study applies a series of modern econometric techniques on census data to address the identification issues in the social capital literature. The identification strategy helps us control for the possible endogeneity between Hispanic clustering and entrepreneurship. To our knowledge the literature on Hispanic entrepreneurship has not yet addressed the possible endogeneity and how it may produce inconsistent parameters. First, the identification strategy includes an extensive list of covariates at the individual and Public Use Microdata Areas (PUMA) level. Still, we suspect that cluster, individual, and peer endogeneity are possible. An instrumental variable approach controls for unobserved PUMA characteristics such as macroeconomic shocks, laws or policies benefitting immigrants, and pleasant weather that may lead to Hispanic clustering. Lastly, a Generalized Propensity Score (GPS) estimator addresses the unobservable individual and peer endogeneity.

This article contributes to the literature in three ways. First, a unique econometric procedure is used to draw causal conclusions on the effect of social interactions on an individual's economic behavior. Second, we provide robust empirical evidence on how the probability of Hispanic entrepreneurship responds to a specific level of Hispanic clustering. Lastly, we tackle the constructs of Hispanic heterogeneity and find potential indicators for the Hispanic entrepreneurial environment.

3.2 <u>Theoretical Framework</u>

3.2.1 Motivations to Enter Self-employment

A prominent theory explaining the motivations to enter self-employment is referred as the "Push" and "Pull" entrepreneurship theory (Amit and Muller, 1995). The push and pull theory states that the choice to start a business is a function of the individual's motivational factors. Factors such as the demographic context, personal characteristics, and living and working environment shape labor choices (Shapero and Sokol, 1982). This study uses the "Push" and "Pull" model as an overarching conceptual framework to incorporate the opposing mechanisms driving the choice of self-employment among Hispanics (Light, 1979; Cromie, 1987; Evans and Leighton, 1989). The "Push" and "Pull" framework is useful to accomodate the assumption that not one all-encompassing model can explain labor choices of immigrants (Clark and Drinkwater, 2000).

"Pull" factors are self-employment features that motivate individuals to start a business. Self-employment provides the opportunity to achieve economic mobility and independence from current employment. The class mobility theory explains that individuals enter self-employment driven by opportunity and the search of freedom and autonomy (Cromie, 1987). Many Hispanics start a business motivated by pull factors such as financial independence, higher household income, potential economic growth, freedom, and access to financial capital. Fairlie (2004a) suggested that many Hispanic entrepreneurs perceive self-employment as a means to achieve economic mobility.

"Push" factors are aspects that block the opportunity of individuals to enter the wage-salary sector. Thus, these factors push Hispanics into self-employment as a way to

secure income and economic mobility. The concept of disadvantaged minorities in self-employment explains how labor market discrimination, lack of opportunities in the primary job market, lack of educational credentials, and low wages push Hispanics to start their own businesses to secure economic mobility (Light, 1979). Similarly, the minority discrimination model has been used to explain immigrant entrepreneurship (Evans and Leighton, 1989). In this theory, Hispanic entrepreneurs in the US start their own businesses driven by labor market constraints. The disadvantaged and discrimination models are commonly used to explain why Hispanics excluded from the wage-salary sector choose self-employment.

Ethnic clustering is commonly considered a major pull factor to start a business (Clark and Drinkwater, 2000). Under the pull assumption, Hispanic clusters tend to provide entrepreneurs with access to ethnic clientele, low-cost labor, and key suppliers. Alternatively, Hispanic-dominated clusters that tend to be economically depressed can be pushing Hispanics into self-employment (Reimers, 1983). Hispanics tend to suffer from labor discrimination in clusters characterized with high unemployment and low educational attainment (Borjas, 1983). Rumbaut (2008) describes Hispanic-dominated areas where many of them work as manual laborers in the secondary sector[3], their children tend to drop out of school, and individuals are exposed to violence and poverty. Thus, these Hispanic clusters can act as mobility traps that push Hispanics to start a business as their only way to achieve economic mobility.

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[3] Secondary sector in the context of immigrant labor refers to industries characterized by low wages, poor working conditions, high turnover rates, low-skill jobs, and low returns on human capital (Shinnar and Young, 2008).

Further, the leader-follower model is used to explain the formation of Hispanic clusters and the creation of entrepreneurial economies (Alchian, 1957). This model states that individuals are motivated to follow the leaders – previous generations of immigrants – and form clusters. The theory explains how Hispanics follow previous settlements of Hispanics to form clusters and create entrepreneurial ecosystems. Successful Hispanics are observed and copied by others in their pursuit of improving their economic performance. According to Amit and Muller (1995), the fact that clusters tend to remain stable over time provides incentives to create Hispanic entrepreneurial ecosystems.

3.3   Literature Review

3.3.1   Hispanic Self-employment

The US Census Bureau defines self-employed individuals as those who "operate their own business, professional practice, farm, or who in any other way regularly work independently to earn a living". Scholars widely recognize the importance of self-employment on the economic mobility of immigrants in the US (Fairlie and Meyer, 1996). This is especially true for immigrants facing labor market barriers due to the lack of education and the devaluation of skills obtained in the country of origin (Portes and Bach, 1985; Georgarakos and Tatsiramos, 2009; Liu, 2012). According to Liu (2012), these immigrants tend to substitute the lack of human capital with family and community resources to create their own businesses.

Hispanics are more likely to be an entrepreneur than non-Hispanics, their businesses have on average lower returns than US entrepreneurs, they enter industries with lower barriers, and they report additional sources of income other than self-

employment (Light, 1984; Cromie, 1987; Borjas and Bronars, 1989; Evans and Leighton, 1989). Hispanic entrepreneurs usually find in self-employment the alternative to face labor discrimination (Shinnar and Young, 2008). Common industries for Hispanic-owned businesses are retail, services, and construction (Liu, 2012). However, most of the current entrepreneurship studies have focused on foreign-born Hispanic entrepreneurs (Yuengert, 1995). Studies using samples of only foreign-born immigrants tend to overlook the Hispanic heterogeneity and may lack generability of results.

Many Hispanics rely heavily on self-employment as the most secure source of income to achieve economic mobility. According to Borjas (1986) and Fairlie (2004b), the decision to entrepreneur is positively correlated with the agglomeration of Hispanics. Similarly, Wang (2010) found that immigrant self-employment is highly influenced by the environment where entrepreneurs live, such as the concentration of immigrants. Liu (2012) reported four main clustering factors driving immigrant self-employment: spatial structure, economic structure, social context, and ethnic concentration. Spatial structure and economic structure relate to the context where Hispanics live or work and the market conditions and industrial component of a locality, respectively. Alternatively, social context and ethnic concentration respond to the ethnic environment and the ethnic composition of those areas, respectively.

3.3.2   Control Factors

Major drivers of self-employment are regional factors, age, marital status, human capital, and other individual, family, business, and community characteristics (Robinson and Sexton, 1994; Robles and Cordero-Guzman, 2007; Xie and Gough, 2011; Liu, 2012;

Tata and Prasad, 2015). Additional factors influencing the likelihood of self-employment are the features of areas where entrepreneurs live and work. For instance, the level of educational attainment in the locality, type of predominant industries, housing prices, population diversity and density, and urban or metro status impact the business creation environment (Brock and Evans, 1986; Parker, 2004; Liu, 2012).

3.3.2.1   Pull Factors

The likelihood of choosing self-employment over wage-employment increases if individuals had parental self-employment experience (Parker, 2004). This is possibly a result of role models acting as a pull factor to Hispanic entrepreneurs inheriting family businesses. Studies have shown that individuals are more likely to be self-employed as they become older (Lucas Jr, 1978; Marshall and Flaig, 2014; Simon and Way, 2015). This may be the result of older individuals accumulating more entrepreneurial skills or financial capital for start-ups. Married individuals are more likely to choose self-employment as they may benefit from spousal help or access to family savings to start their own business (Borjas, 1986; Parker, 2004). Clark and Drinkwater (2000) report that the longer immigrants stay in the host country the more likely they are to entrepreneur, which may be a result of skills and language proficiency acquired from assimilation in the host country. Educational attainment, access to capital, language proficiency, and the need of freedom, autonomy, and control are considered entrepreneurship pull factors (Cromie, 1987; Fairlie, 2004b).

3.3.2.2   Push Factors

Push factors include low wages, chronic unemployment, labor market discrimination, poor working conditions in current employment, low-skill jobs, lack of education credentials, and language barriers (Light, 1979; Shinnar and Young, 2008). According to Evans and Leighton (1989), high levels of unemployment in the living environment can push individuals to start their own businesses and take advantage of existing human capital. The effect of education on immigrant self-employment has ambiguous results. For Clark and Drinkwater (2000), education decreases the likelihood of immigrants to enter self-employment due to the lower rate of return of formal education when compared to wage-employed individuals. On the other hand, Robinson and Sexton (1994) and Davidson and Honig (2003) find a positive correlation due to higher levels of education among self-employed than their wage-employed counterparts. Bates (1997) and Simon and Way (2015) report that the acquisition of skills and educational attainment can provide business opportunities and networks.

The mechanisms affecting the correlation between Hispanic clusters and the creation of Hispanic-owned businesses has been studied by few scholars. Studies that find a positive correlation between Hispanic clustering and entrepreneurial activity conclude that communities with Hispanic clustering provide labor, inputs, information, business incubation, and market niches for entrepreneurs (Portes and Jensen, 1989; Aldrich and Waldinger, 1990; Liu, 2012). Wang (2010) reports that ethnic entrepreneurship depends on the characteristics of the individuals living in the cluster such as average income, educational attainment, and unemployment. For instance, areas with vibrant and successful economies provide a positive environment for job creation

(Wang, 2010). Lee et al. (2004) find that the increasing proportion of college educated individuals can drive self-employment activity due to human capital accumulation and creation of dynamic environments.

The growth of the Hispanic population in the US is expected to increase the number of Hispanic-owned businesses that make use of the cluster resources. While Borjas (1986) and Wang (2010) suggest that Hispanics are more likely to be self-employed in areas with high proportion of Hispanics because of the community resources and opportunities, Liu (2012) does not find that Hispanic-concentrated areas are correlated with higher rates of Hispanic self-employment, and Yuengert (1995) reports no correlation. These inconsistencies may be due to lumping Hispanics as a homogenous group and failing to recognize that the heterogeneity among generations of Hispanics is likely to affect their economic decision-making (Jensen and Chitose, 1994; Bradley, 2004; Georgarakos and Tatsiramos, 2009). This is especially true as scholars have shown that generational differences is a key trait likely to affect the economic behavior of Hispanics (Yuengert, 1995; Georgarakos and Tatsiramos, 2009; Portes and Rumbaut, 2012).

3.3.3   Clustering

Hispanics are likely to cluster in areas where other Hispanics live and work (Stark, 1991). Hispanic clusters are defined as solidarity groups, networks, and organizations formed by the agglomeration of Hispanics in a geographical location. Hispanic clusters tend to create trust, loyalty, altruism, and cooperation and can improve human capital, economic development, and entrepreneurial collaboration (Putnam, 1995;

Nahapiet and Ghoshal, 1998). Ethnic clusters accumulate ethnic capital, the skills level of the ethnic group, which is a major driver of intergenerational mobility (Borjas, 1991).

Social capital is defined as the source of information, opportunities, solidarity, and resources in Hispanic clusters (Coleman, 1984). The creation and existence of Hispanic clusters and Hispanic entrepreneurial ecosystems is explained by the leader-follower model (Alchian, 1957). How Hispanic clustering affects Hispanic entrepreneurs follows the rationale that being part of a Hispanic cluster diminishes the social distance between individuals and the individual's (formal or informal) associations (Parker, 2004). The social connectedness leads to collaboration and information flows, which serve individuals, firms, and other members of the network.

In Hispanic clusters, individuals sharing similar characteristics, such as ethnicity, are more likely to know each other and link their socioeconomic activities (Kim and Aldrich, 2005). Danes et al. (2008) show that Hispanics tend to rely heavily on Hispanic clusters as a major source of solidarity, information, resources, or as type of informal economic organization. The creation of individual-community ties are explained by sociologists in the theory of attachment (Bowlby, 2008). In this theory, a person is driven to achieve individual mobility as well as to create and maintain social ties within a community. The effect of social linkages is supported by Ulhøi (2005), who finds that Hispanic clusters are key to the social and economic development of Hispanics living in the US.

Nevertheless, not all outcomes from Hispanic clusters may be desirable. Hispanic clusters can improve the odds of self-employment for Hispanics, but they can also become a mobility trap if clusters concentrate poverty and lack human capital. Hispanic

clusters can limit the economic success of Hispanics due to low wages, long working hours, poor working conditions, and antagonistic competition (Light and Gold, 2000). Clusters can also undermine the success of entrepreneurs in economically-depressed clusters with limited social capital (Kim and Aldrich, 2005).

Although Hispanics tend to experience economic mobility in the US, a significant group is left behind. Portes (2007) reports that Hispanic immigrants are experiencing segmented assimilation. Upward assimilation occurs when the second generation is successfully learning English and joining the mainstream middle class. On the other hand, downward assimilation occurs as a substantial proportion of Hispanics are joining the population at the bottom of the US economy. Waldinger and Feliciano (2004) reported that while children of middle class Hispanic immigrants tend to improve their socio-economic situation, children of low-skilled immigrants face more difficulties.

3.4 Data and Methodology

3.4.1 Data and Sample

The data used in this study is a sample of Hispanics living in the US obtained from the 2010 census of the Integrated Public Use Microdata Series (IPUMS). The American Community Survey (ACS) data provides a representative sample of Hispanics who are self-employed and compiles extensive information on individual, household, and community parameters. This study includes person weights[4] in the ACS database to make the sample representative of the national population.

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[4] The observations are weighted utilizing US Census provided person weights from the American Community Survey. Following Wooldridge (2002), we use weights for household surveys. The weights help us to make the sample representative to the national population.

The sample contains Hispanics between 18 and 70 years old. Hispanics are categorized by generation such as first, 1.5, second, and third generation. First generation Hispanics are those individuals born in a Latin American country[5] that arrived in the US at the age of 16 or older. Generation 1.5 consists of Hispanics born in a Latin American country that were younger than 16 years old when they arrived in the US. Second generation Hispanics are born in the US with either parent born in Latin America. Lastly, third generation Hispanics are born in the US and report Hispanic ethnicity or ancestry. The sample contains 307,698 Hispanics living in 2,043 PUMAs in the US. In this sample, 38% are first generation, while 1.5, second, and third generation make up to 14%, 7%, and 41% of the sample, respectively.

3.4.2   Empirical Model Specification

In the following section we explain the econometric techniques used to control for endogeneity from societal effects. The identification strategy in Eq (1) includes an extensive list of observables that controls for individual's background, culture, language acquisition, and assimilation into the American mainstream. This strategy makes endogeneity unlikely (DeSimone, 2007). However, it is still possible to find endogeneity from 1) unobserved macroeconomic shocks that may lead to Hispanic clustering and 2) unobserved individual and peer characteristics that may increase the likelihood to become self-employed. We use Card's (2009) 2-stage instrumental variable approach to control

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[5] The country of origin for the 1st and 1.5 generation Hispanics are Puerto Rico (PRico), Cuba (born in Cuba), Mexico (Mexico), Caribe (born in Dominican Republic, Haiti, Jamaica, and West Indies), Central America (born in Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama), and South America (born in Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela).

for the possible endogeneity from unobserved characteristics that lead to Hispanic

clustering. The 2-stage procedure captures macroeconomic shocks, laws or policies

benefitting immigrants, or pleasant weather. Lastly, we address the individual and peer

endogeneity by using a GPS method that removes the bias caused by non-random

treatment assignment (Hirano and Imbens, 2004).

3.4.2.1   Standard Probit

A standard probit regression is used to assess how Hispanic clustering drives

Hispanic entrepreneurship at the PUMA level. The model is given by

$$Pr(selfemp = 1) = \varphi(\beta_0 + \beta_1 platino + X_2\beta_2) \tag{1}$$

In Eq. (1), the dependent variable *selfemp* takes the value of Y=1 if the individual

self-reported being employed in their own enterprise in 2010, and Y=0 otherwise.

Approximately 8.5% of Hispanics in our sample are self-employed, compared to 11.1%

of white US-born non-Hispanic, 12.6% of non-Hispanic immigrants, and 4.6% of black

US-born non-Hispanic. Among Hispanics, first generation are the most entrepreneurial

generation with 11.6% of them owning a business, followed by 1.5 generation (8.3%),

third generation (6.7%), and second generation (2.8%). Table 4 shows the distribution of

Hispanics by generation, the proportion of self-employment, and the mean household

income of an average Hispanic and a self-employed Hispanic.

The key explanatory variable *platino* is the share of Hispanics living in a PUMA[6]

(Public Use Microdata Area), and represents the clustering of Hispanics. Similarly,

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[6] PUMAs are the smallest geographic identifier in the ACS database. This study used concentration of Hispanics at the PUMA level as the basis for the geographic analysis. The PUMA boundaries are updated for every decennial census were first created for the 1990 census. The 2000 and 2010 census share the same

Lazear (1999) calculates immigrant clustering by the proportion of individuals in a geographic area. In this study, the share of Hispanics ranges from 0.2% to 96.8% with a mean of 13.5%. The choice of PUMA as the spatial scale is motivated by data availability as PUMAs are the smallest geographic unit available in the census. Although PUMAs can include large areas with low population in rural cases, urban areas may contain one or more PUMAs. Thus, PUMAs are geographic areas large yet also small enough to capture the environment where individuals interact.

The identification strategy of this study follows DeSimone (2007) and includes an extensive list of covariates at the individual and PUMA level. This strategy allows us to draw causal conclusions in the model. We expect that endogeneity is unlikely given the richness of the conditioning set. For instance, this study includes major observable confounding factors that influence the choice of self-employment for Hispanics living in the US. Demographic covariates include gender, age, household income, marital status, number of children, English and Spanish proficiency, education, access to mortgage, industry, metropolitan status, parent and spouse education and employment status, and spouse ethnicity. The study captures the effect of Hispanic clustering on the probability of self-employment for each generation by including interaction terms between *platino* and a dummy from each generation.

The study controls for geographic variability. The vector of location variables follows the Bureau of Economic Analysis (BEA) division of the US territory. Nine

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2,069 PUMA boundaries. However, this subsample included only the 2,043 PUMAs were Hispanics live. PUMAs do not overlap and may not cross state lines and follow boundaries of county groups, single counties, or census-defined areas with populations of at least 100,000 (but not more than 200,000). PUMAs are contained within a single state and should be used in combination with the five-digit census state code.

dummy variables[7] are created for PUMAs located in New England, Mideast, Great Lakes, Plains, Southeast, Southwest, Rocky Mountain, and Far West. Alaska and Hawaii are excluded from the analysis as the subsample does not report Hispanics living in these states.

This study includes PUMA-level observables related to share of other races and the economic status of Hispanic clusters. Including other ethnic and racial groups allows us to control for potential labor segregation (Borjas, 1983; Reimers, 1983; Charles, 2003). Thus, it is likely that other race and ethnic clusters affect the creation of Hispanic-owned business. High correlations between *platino* and *pwhite* (-0.73) validates our decision to include the share of other races and ethnicities in the list of explanatory variables. Controlling for an extensive group of observables allows us to infer on the effect of Hispanic clusters on the economic choices of individuals living in these clusters.

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[7] The eight regions by the BEA are: New England (newengland) which consists of Connecticut, Main, Massachusetts, New Hampshire, Rhode Island and Vermont; Mideast (mideast) which consists of Delaware, District of Columbia, Maryland, New Jersey, New York, and Pennsylvania; the Great Lakes (greatlakes) region which consists of Illinois, Indiana, Michigan, Ohio, and Wisconsin; the Plains (plains) which consists of Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota; the Southeast (southeast) region which consists of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia and West Virginia; the Southwest (southwest) region which consists of Arizona, New Mexico, Oklahoma, and Texas; the Rocky Mountain (rockym) which consists of Colorado, Idaho, Montana, Utah, and Wyoming; and the Far West (farwest) which consists of California, Nevada, Oregon, and Washington.

Table 4. Share of Hispanics, Their Rate of Self-Employment, Average Household Income, and Average Household Income from Self-Employment.

	Observations		Self-employed		Household Income		Selfemp. Income	
	Freq.	%	Freq.	%	Mean	Med	Mean	Med
1st	116,774	37.95	8,604	11.60	55,419	43,100	58,896	41,000
1.5	43,519	14.14	2,383	8.27	64,453	53,300	71,371	53,300
2nd	21,906	7.12	339	2.76	71,334	59,300	78,433	63,600
3rd	125,499	40.79	5,403	6.70	69,737	55,720	85,677	60,000
All	307,698	100.00	16,729	8.54	63,451	50,000	69,712	49,000

The set of PUMA covariates includes the share of white and black US-born non-Hispanic and the proportion of non-Hispanic immigrants that were not born in the US. Additional PUMA variables were included such as crime level and the proportion of college educated, unemployed, and self-employed individuals. These variables were included to control for local market conditions. Table 5 presents the list of variables used in this study and their description. Pearson and Spearman correlations are used to compare relationships among continuous and categorical variables, respectively.

Table 5. Descriptive Statistics of Dependent and Explanatory Variables for The Hispanic Sample Using US Census Weights.

Variable	Description
selfemp[a]	1= if individual is self-employed, 0 otherwise. Reported that is employed (empstat=1) and works for own enterprise (classwkr=1)
platino	average percentage share of Hispanic at the PUMA level
lincome	log of average household income
age	age in years
agetwo	square of age in years
crime	violent crime rate per 100,000 at the state level
nchild	average number of children in Hispanic household
married[a]	1= if individual is married with either present or absent spouse
speakenglish[a]	1= if individual speaks English well, very well, or only English
spanish[a]	1= if individual speaks Spanish in household, 0 otherwise
female[a]	1= if individual is female
college[a]	1= if individual has 1 year of college or more
metroarea[a]	1= if individual lives in a metro area
accessmort[a]	1= if individual reports to have a mortgage or contract to purchase
collparent[a]	1= if either mother or father have some college education or graduate studies
selfemppar[a]	1= if either mother or father is self-employed, 0 otherwise
employsp[a]	1= if spouse is employed
sphispanic[a]	1= if spouse is Hispanic
collspouse[a]	1= if spouse has some college education or graduate studies
newengland[a]	percentage of Hispanics living in PUMAS located in Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
mideast[a]	percentage of Hispanics living in PUMAS located in Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania
greatlakes[a]	percentage of Hispanics living in PUMAS located in Illinois, Indiana, Michigan, Ohio, Wisconsin
plains[a]	percentage of Hispanics living in PUMAS located in Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota
southeast[a]	percentage of Hispanics living in PUMAS located in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, West Virginia
southwest[a]	percentage of Hispanics living in PUMAS located in Arizona, New Mexico, Oklahoma, Texas. Reference group
rockym[a]	percentage of Hispanics living in PUMAS located in Colorado, Idaho, Montana, Utah, Wyoming
farwest[a]	percentage of Hispanics living in PUMAS located in California, Nevada, Oregon, Washington
agmin[a]	percentage of Hispanics working in agriculture or mining
construc[a]	percentage of Hispanics working in construction

Table 5. Continued.

manuf[a]	percentage of Hispanics working in manufacturing
trade[a]	percentage of Hispanics working in trade
transport[a]	percentage of Hispanics working in transportation
inform[a]	percentage of Hispanics working in information
finance[a]	percentage of Hispanics working in finance
profserv[a]	percentage of Hispanics working in professional services
otherserv[a]	percentage of Hispanics working in other services. Reference group
pwhite	share of US born whites at the PUMA level
pblack	share of US born African-Americans at the PUMA level
pminorit	share of other US-born minorities at the PUMA level
pimmigrant	share of other immigrants at the PUMA level
pselfemp	share of self-employed individuals at the PUMA level
punemployed	share of unemployed individuals at the PUMA level
pcollege	share of individuals with college or higher education at the PUMA level

[a]The mean value for dummy variables represents the percentage of individuals showing that characteristic.

3.4.3 Dealing with Endogeneity

Endogeneity is one of the main challenges of empirical economics (Manski, 2013). This is especially true for studies exploring the effect of social interactions on individual economic behavior. Most empirical studies tend to conclude that certain outcomes denote the effect of social interaction on the population of interest (Manski, 2013). Though this inference is feasible for studies including an extensive list of observables, researchers should carefully identify the mechanisms in which group behavior influence individual behavior (Manski, 1993).

Using secondary census data, this study aims to measure the effect of Hispanic agglomeration (social interactions) on the choice of employment among Hispanics (individual economic behavior). Following Manski (1993), the mechanisms in which Hispanic agglomeration may affect the decision to be an entrepreneur are 1) an endogenous effect (Hispanics' probability of self-employment vary with the average probability of self-employment of Hispanics living in the PUMA), 2) an exogenous effect (Hispanics probability of self-employment vary with the socioeconomic composition of Hispanics living in the PUMA), and 3) a correlated effect (Hispanics living in the PUMA tend have similar probability of being self-employed because they share similar unobserved individual characteristics).

While subjective primary-collected data or controlled-experiment data can improve the identification of the effects of social interactions on an individual's behavior, research using secondary data needs to clearly identify the existence of endogenous or exogenous societal effects in the model identification. This study uses a 2-stage

instrumental approach and a GPS to tackle the mechanisms between social interactions and individual decision making.

3.4.3.1 Instrumental Variable Approach

The instrumental variable approach aims to find a PUMA attribute that induces clustering of Hispanics at the PUMA level but is not related to their decision to start a business. We use this attribute as the instrumental variable for the key explanatory variable *platino*. Card (2007) developed an instrument that captures the tendency of immigrants to move to pre-existing clusters. Specifically, this instrument controls for local macroeconomic shocks that may increase the attractiveness of a city and increase immigrant inflow. Card's instrument is defined as the supply-push component of immigration inflows.

The instrument *IV1* measures the expected number of Hispanics going to a PUMA ($\lambda_s \Delta M^{US}$), which is the multiple fraction of all arriving Hispanics who choose to live in a PUMA (e.g. the share of immigrants in a PUMA in an initial period 2000) ($\lambda_s = M_s/M^{US}$) and the total number of new Hispanics to the US in 2010 relative to 2000 (ΔM^{US}). Lastly, the instrument is multiplied by the fixed multiple of the fraction of immigrants in the PUMA. In other words, *IV1* captures how current Hispanic clustering is a product of historical settlement patterns of Hispanics in a PUMA and newly arriving Hispanics in the PUMA.

Additional instruments proposed by Coates and Gindling (2010) are weather variables. The motivation for using weather variables is that the average Hispanic is more likely to live in PUMAs with comfortable temperatures similar to tropical and subtropical

regions. This study uses a measure of heating (and cooling) degree days to calculate how

often the temperature is high (low) enough to feel comfortable outside. The number of

heating degree days and cooling degree days from 2000 were collected from each county

where the PUMA is located from the National Ocean and Atmospheric Administration

(NOAA). Heating degree days (*heat00*) expresses the frequency in which the temperature

falls low enough that heating is required in buildings. Cooling degree days (*cool00*)

measures the frequency in which the temperature is high enough that air conditioning is

needed in the buildings.

The instrumental variable probit is an extension of the standard probit model in

Eq. (1), in which the key explanatory variable is endogenously determined. This study

uses an ordinary least square (OLS) for the first stage to regress the endogenous variable

(*platino*) on the instrumental variables (*IV1, heat00, and cool00*) and other exogenous

variables as shown in Eq. (2).

$$platino = \ \alpha_0 + \alpha_1 IV1 + \alpha_2 heat00 + \alpha_3 cool00 + X'\gamma + u \qquad (2)$$

where $\alpha_0, \alpha_1, \alpha_2, \alpha_3$ and γ are the parameters to be estimated. *X* represents the

explanatory variables as in Eq. (1). The error term *u* captures the unobservables, e.g. the

individual's ability to be an entrepreneur as such. Table 6 illustrates the validity of the

instrumental variables and Graph 1 measures the predictive power of *IV1*. The share of

Hispanics in a PUMA significantly increases by 5% as the historical settlement of

Hispanic increases at the PUMA level. Conversely, Hispanic agglomeration significantly

decreases as the number of heating and cooling degree days increases. Figure 1 gives a

discernable correlation between the instruments and the share of Hispanics in 2010,

confirming the clustering effect. The second stage uses a maximum likelihood estimation to estimate the probability of self-employment.

Table 6. First Stage of the Instrumental Variable Approach. The Dependent Variable Is the Share of Hispanics Living in a PUMA.

	Coefficient.	Std. Err.	
IV1	5.150	0.145	***
heat00	-0.001	0.000	***
cool00	0.001	0.000	
lincome	0.083	0.014	***
age	0.004	0.003	
agetwo	0.000	0.000	*
crime	-0.002	0.000	***
nchild	0.003	0.008	
married	-0.063	0.031	**
speakenglish	-0.076	0.020	***
spanish	0.246	0.027	***
female	0.025	0.012	**
college	0.056	0.022	**
metroarea	1.923	0.061	***
accessmort	0.117	0.028	***
collparent	-0.034	0.057	
selfemppar	0.120	0.044	***
employsp	-0.050	0.020	**
sphispanic	0.154	0.031	***
collspouse	0.008	0.023	
newengland	2.273	0.056	***
mideast	2.081	0.045	***
greatlakes	1.534	0.047	***
plains	0.746	0.072	***
southeast	0.804	0.033	***
rockym	1.113	0.071	***
farwest	-1.077	0.056	***
agmin	-0.256	0.086	***
construc	0.004	0.038	
manuf	0.012	0.028	
trade	0.056	0.023	**
transport	0.095	0.038	**
inform	0.026	0.054	
finance	0.113	0.034	***
profserv	-0.036	0.017	**

Table 6. Continued

pwhite	-0.724	0.008	***
pblack	-0.692	0.009	***
pminorit	-0.694	0.036	***
pimmigrant	-0.916	0.010	***
pselfemp	0.125	0.003	***
punemployed	-0.003	0.005	
pcollege	-0.072	0.002	***
cons	70.947	0.848	***

Data source: 2010 census N = 166,916
Prob > F = 0.00
R^2 = 0.996
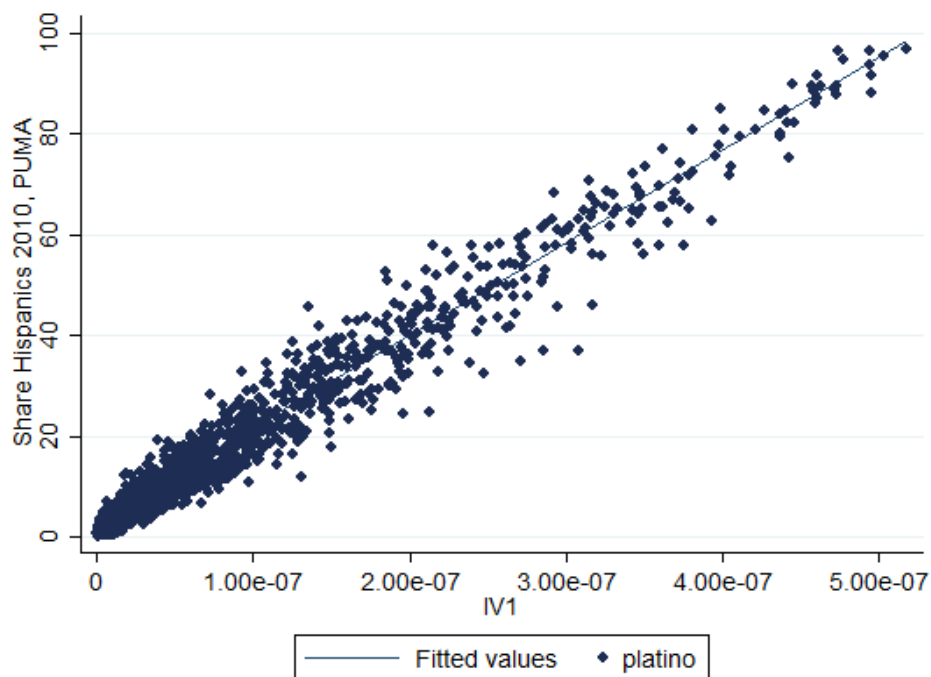
Figure 1. First Stage of the Instrumental Variable Approach.

3.4.3.2 Generalized Propensity Score

The GPS estimation is a method that identifies the continuous treatment effects of *platino* conditional on the observable determinants of treatment intensity X_2. The GPS

allows us to estimate to what extent a specific share of Hispanics in a PUMA influences the probability of Hispanic self-employment. Furthermore, the GPS is a well-suited econometric approach for deriving the optimal treatment intensity as it is able to correct for selection bias into different levels of treatment intensity. Specifically, the GPS compares the probability of being self-employed for an individual living in a specific level of Hispanic clustering with respect to individuals that live in another level of clustering, both of them with similar observable characteristics X_2.

We apply the GPS method to our data set of 307,698 Hispanics living in 2,043 PUMAs. The outcome, Y_i, is the probability of being self-employed, the treatment intensity, T_i, is the share of Hispanics (*platino*) at the PUMA level, and the set of covariates is the vector X_2 specified in Eq. (1). We use a logarithmic transformation since the empirical distribution of Hispanic clustering is positively skewed. This study uses a cubic approximation of the treatment variable, *platino*.

In order to construct a quasi-experimental setting, the GPS allows the comparison of individuals with sufficiently similar characteristics but different treatment intensity. For each Hispanic i we observe the vector of covariates X_i, the treatment intensity T_i, and the outcome corresponding to the level of treatment received, $Y_i = Y_i(T_i)$. Hirano and Imbens (2004) replace the joint independence of all potential outcomes Y, T, X for the weak unconfoundedness concept, which requires conditional independence to hold at a given treatment level. The weak unconfoundedness is useful because it states that, after controlling for observables X, any remaining difference in treatment intensity T across Hispanics is independent of the potential outcomes Y.

Following Hirano and Imbens (2004), the implementation of the GPS consists of three steps. First, we estimate the score $R(T,X)$ in Eq. (3), which is the conditional distribution of the treatment T given the vector of covariates X. Second, Eq. (4) uses ordinary least squares (OLS) to estimate the conditional expectation of the outcome as a function of two scalar variables: the treatment level T and the GPS R. Eq (4) uses polynomial approximations of order no higher than three. Eq. (5) estimates the dose-response function by averaging the estimated conditional expectation over the GPS at each level of the treatment. In addition to the dose-response function, the GPS displays its derivative with respect to the treatment intensity.

$$\hat{R}_i = \frac{1}{\sqrt{2\pi\hat{\sigma}^2}} \exp\left(-\frac{1}{2\sigma^2}\left(T_i - \hat{X}\beta\right)^2\right) \tag{3}$$

$$E[Y_i|T_i, R_i] = \alpha_0 + \alpha_1 T_i + \alpha_2 T_i^2 + \alpha_3 T_i^3 + \alpha_4 R_i + \alpha_5 R_i^2 + \alpha_6 R_i^3 + \alpha_7 T_i R_i \tag{4}$$

$$E[\widehat{Y_i|T_i, R_i}] = \frac{1}{N}\sum_{i=1}^{N}\left(\hat{\alpha}_0 + \hat{\alpha}_1 T_i + \hat{\alpha}_2 T_i^2 + \hat{\alpha}_3 T_i^3 + \alpha_4 \hat{r}(t, X_i) + \alpha_5 \hat{r}(t, X_i)^2 + \alpha_6 \hat{r}(t, X_i)^3 + \right.$$
$$\left. \alpha_7 T_i \hat{r}(t, X_i)\right) \tag{5}$$

3.5   Empirical Results

3.5.1   Summary Statistics

Table 7 illustrates the descriptive statistics of the Hispanic dataset. The average Hispanic in the 2010 census is 39 years old. As expected, first generation Hispanics are the oldest group with an average of 43 years old, followed by third generation (39 years old), 1.5 generation (36 years old), and second generation (25 years old) ($P < 0.05$). On average, 52% of Hispanics are married and have 1 child. Educational attainment varies across Hispanics. Thirteen percent of Hispanics have college education or higher. Third

generation has the highest proportion of college-educated Hispanics (17%) and it is significantly higher than first generation Hispanics ($P < 0.05$). On the other hand, only a minority of the respondents' parents have a college education (2%) or have been self-employed (2%). Approximately 32% of their spouses are employed, 17% have at least a college education, and 39% are Hispanic.

Over 80% of Hispanics are English proficient and a similar proportion speak Spanish at home. When looking at the group of entrepreneurs, our sample suggests that the proportion of Spanish-speakers (84%) is higher than English-proficient (69%) Hispanics. As expected, first generation Hispanics are significantly more Spanish-fluent than other generations ($P < 0.05$). Contrarily, first generation Hispanics are significantly less English-proficient than other generations ($P < 0.05$).

Similar to Parker (2004), over 91% of Hispanics live in metro areas, and this is a trend for all generations of Hispanics. The proportion of Hispanics with mortgages is similar across generations, but second, third, and 1.5 generation are significantly different than first generation Hispanics ($P < 0.05$). Consistent with the literature, the bigger proportion of Hispanics live in the Southwest (38%), Far West (28%), and South East regions (13%). The vast presence of Hispanics in the south may be explained by the variety of policies and circumstances in the US and their countries of origin that make Hispanics join well-established Hispanic communities (Kochhar et al., 2005). The lowest proportion of Hispanics in our sample live in the Plains (1%), New England (2%), the Rocky Mountains (3%), and the Great Lakes regions (5%). Table 7 shows a higher concentration of US-born and foreign-born in southwest and southeast regions, respectively. When looking across generations, it seems that most of Hispanics in the

southeast are first generation. On the contrary, third generation Hispanics are mainly

concentrated in the southwest region. Table 7 shows that most Hispanics in our sample

work in professional services (23%), other services (19%), and trade (12%). The high

presence of Hispanics in services and trade industries is due to US-born Hispanics. Our

sample suggests that PUMAs have on average 14% of Hispanics, 42% of white US-born,

8% of black US-born, 7% of US-born non-black minorities, and 8% of non-Hispanic

immigrants.

Table 7. Descriptive Statistics of Dependent and Explanatory Variables for the Hispanic Sample Using US Census Weights.

Variable	Full Sample N = 307,698 Mean	Std. Dev	First Gen N = 166,774 Mean	Std. Dev	1.5 Gen N = 43,519 Mean	Std. Dev		Second Gen N = 21,906 Mean	Std. Dev		Third Gen N = 125,499 Mean	Std. Dev	
selfemp[a]	0.09	0.28	0.12	0.32	0.08	0.28	*	0.03	0.16	*	0.07	0.25	*
lincome	10.92	1.28	10.73	1.12	10.92	1.18	*	10.92	0.77	*	11.10	1.48	*
age	39.05	13.83	43.39	12.42	35.62	12.97	*	24.64	7.71	*	38.72	14.09	*
agetwo	1,716.36	1,159.76	2,037.20	1121.92	1,436.85	1,038.91	*	666.49	501.28	*	1,698.01	1,180.21	*
crime	437.32	72.74	437.55	76.52	438.77	72.11	*	439.80	59.97	*	436.18	71.35	*
nchild	1.01	1.28	1.30	1.36	1.04	1.32	*	0.22	0.70	*	0.87	1.20	*
married[a]	0.52	0.50	0.65	0.48	0.50	0.50	*	0.08	0.27	*	0.49	0.50	*
speakenglish[a]	0.76	0.43	0.45	0.50	0.83	0.38	*	0.98	0.13	*	0.98	0.15	*
spanish[a]	0.78	0.42	0.96	0.19	0.93	0.26	*	0.87	0.34	*	0.54	0.50	*
female[a]	0.50	0.50	0.49	0.50	0.48	0.50	*	0.47	0.50	*	0.52	0.50	*
college[a]	0.13	0.33	0.10	0.30	0.11	0.32	*	0.09	0.28	*	0.17	0.37	*
metroarea[a]	0.91	0.29	0.92	0.27	0.92	0.27		0.94	0.23	*	0.88	0.33	*
accessmort[a]	0.75	0.44	0.75	0.43	0.78	0.42	*	0.72	0.45	*	0.74	0.44	*
collparent[a]	0.02	0.15	0.01	0.07	0.03	0.17	*	0.11	0.31	*	0.02	0.15	*
selfemppar[a]	0.02	0.15	0.00	0.07	0.03	0.18	*	0.14	0.35	*	0.01	0.11	*
employsp[a]	0.32	0.47	0.37	0.48	0.31	0.46	*	0.04	0.20	*	0.32	0.47	*
sphispanic[a]	0.39	0.49	0.54	0.50	0.38	0.49	*	0.05	0.22	*	0.30	0.46	*
collspouse[a]	0.17	0.37	0.14	0.35	0.16	0.37	*	0.02	0.14	*	0.22	0.41	*
newengland[a]	0.02	0.14	0.02	0.15	0.03	0.16		0.02	0.13	*	0.02	0.13	*
mideast[a]	0.10	0.30	0.12	0.32	0.12	0.32		0.11	0.31	*	0.07	0.26	*
greatlakes[a]	0.05	0.22	0.05	0.22	0.05	0.22	*	0.05	0.22		0.05	0.22	
plains[a]	0.01	0.12	0.01	0.12	0.01	0.10	*	0.01	0.08	*	0.02	0.13	*
southeast[a]	0.13	0.34	0.18	0.39	0.16	0.37	*	0.10	0.30	*		0.28	*

Table 7. Continued.

southwest[a]	0.38	0.48	0.30	0.46	0.31	0.46		0.32	0.47	*	0.48	0.50	*
rockym[a]	0.03	0.16	0.02	0.14	0.02	0.14		0.01	0.11	*	0.04	0.19	*
farwest[a]	0.28	0.45	0.29	0.45	0.31	0.46	*	0.39	0.49	*	0.25	0.43	*
agmin[a]	0.03	0.17	0.05	0.21	0.03	0.17	*	0.01	0.12	*	0.02	0.13	*
construc[a]	0.08	0.27	0.11	0.32	0.09	0.28	*	0.04	0.19	*	0.06	0.23	*
manuf[a]	0.09	0.28	0.11	0.31	0.09	0.28	*	0.05	0.22	*	0.07	0.25	*
trade[a]	0.12	0.32	0.09	0.29	0.12	0.33	*	0.19	0.39	*	0.13	0.34	*
transport[a]	0.03	0.18	0.03	0.17	0.03	0.18	*	0.03	0.16	*	0.04	0.18	*
inform[a]	0.01	0.11	0.01	0.08	0.01	0.11	*	0.02	0.13	*	0.02	0.13	*
finance[a]	0.04	0.20	0.02	0.15	0.05	0.21	*	0.04	0.20	*	0.05	0.22	*
profserv[a]	0.23	0.42	0.18	0.39	0.23	0.42	*	0.21	0.40	*	0.27	0.44	*
otherserv[a]	0.19	0.39	0.19	0.39	0.19	0.39		0.22	0.41	*	0.19	0.39	
pwhite	41.64	25.09	40.18	25.25	39.95	25.03		33.64	24.02	*	44.98	24.64	*
pblack	8.20	10.21	9.37	10.98	8.78	10.44	*	8.20	10.23	*	6.91	9.17	*
pminorit	0.75	1.25	0.65	1.08	0.67	1.05	*	0.66	0.99		0.88	1.47	*
pimmigrant	8.27	7.89	9.01	8.09	8.86	8.04	*	8.90	8.41		7.27	7.45	*
pselfemp	10.32	3.27	10.32	3.38	10.28	3.35	*	10.07	3.21	*	10.38	3.15	*
punemployed	11.21	3.49	11.56	3.50	11.60	3.49	*	12.01	3.40	*	10.61	3.42	*
pcollege	18.49	10.06	18.69	10.24	18.36	10.04	*	16.84	9.57	*	18.63	9.95	

*The difference of the variable mean of the group and the variable mean of first generation Hispanics is statistically different from zero (P < 0.05)

[a]The mean value for dummy variables represents the percentage of individuals showing that characteristic.

3.5.2   Regression Results

This section answers two main questions: how does the probability of self-employment of any Hispanic change as Hispanic clustering increases, and how does Hispanic heterogeneity influence the probability of Hispanic self-employment. The first question is answered by looking at the coefficient and marginal effect of *platino* in Table 8. The relationship of Hispanic heterogeneity and Hispanic entrepreneurship is answered by Table 8, 9, 10, and Figure 3. The probability to start a business for each generation of Hispanics as Hispanic clustering increases is illustrated by the coefficient of the interactions terms in Table 8 and the graph of marginal effects in Figure 3. Table 9 demonstrates the probability of self-employment of each generation regardless of *platino*, and Table 10 answers how the clustering of each generation affects Hispanic entrepreneurship.

3.5.2.1   How Does the Probability of Self-employment of any Hispanic Change as Hispanic Clustering Increases?

Table 8 illustrates the coefficients and marginal effects from the standard probit and the IV probit. Figure 2 left panel shows the dose-response function from the GPS method. The dose-response function displays how the average probability of self-employment varies depending on the level of Hispanic clustering. Figure 2 right panel shows the treatment effect function, which is the derivative of the dose-response function with respect to the level of Hispanic clustering. The results together provide robust empirical evidence that, on average, the probability of self-employment for Hispanics

decreases as the share of Hispanics increases at the PUMA level; but this relationship is not necessarily linear.

The standard probit suggests that the average Hispanic is significantly less likely to start a business as the share of *all* Hispanics living in the PUMA increases. Contrary to Borjas (1986) and Wang (2010), this study provides empirical evidence that the agglomeration of Hispanics in a PUMA discourages the entrepreneurial motivation of Hispanics. One explanation is that Hispanic-dominated neighborhoods may suffer from limited social capital resources possibly due to residential segregation. It is likely that Hispanic-dominated PUMAs may concentrate poverty and low consumer demand, which inhibits the creation of Hispanic businesses. Further analysis yields that employment, household income, and educational attainment proportionally decreases as the share of Hispanics increases. By concentrating Hispanics geographically, the decrease of Hispanic household income appears to deteriorate the entrepreneurial environment. It is likely that PUMAs where household income is below-average will show limited demand and create an unfavorable business atmosphere. This finding supports the theory that Hispanic clustering can act as a mobility trap and harm Hispanic entrepreneurship (Borjas, 1983; Reimers, 1983; Fischer and Massey, 2000).

The standard probit regression displays other parameters detrimental to Hispanic entrepreneurship such as financial factors, household characteristics, industry, and gender. Study results illustrate that Hispanics are less likely to be an entrepreneur as household income increases ($P < 0.01$). In our sample, higher household income may be associated with broader labor market prospects among Hispanics. Thus, Hispanics with higher household income are less likely to be self-employed. Further factors deterring the

probability that Hispanics enter self-employment are access to mortgage ($P < 0.05$) and Hispanic ethnicity of the spouse ($P < 0.01$). Hispanics working in agriculture ($P < 0.01$), manufacturing ($P < 0.01$), trade ($P < 0.01$), information ($P < 0.01$), or service ($P < 0.05$) industries are less likely to be self-employed. PUMAs with high concentration of white US-born ($P < 0.05$) and non-Hispanic immigrants ($P < 0.05$) are detrimental to Hispanic entrepreneurial endeavors. The results may provide evidence of the residential segregation mentioned above and its negative effect on Hispanic entrepreneurial activity. Lastly, Hispanic women are less likely to be self-employed ($P < 0.01$). This finding is supported by the literature that describes women's lower entrepreneurial activity due to lower human capital accumulation, motherhood penalty, and lower work-force participation rates (Fairchild, 2010; Marshall and Flaig, 2014)

The more human and social capital at the entrepreneur's disposal, the greater the odds of self-employment among Hispanics. Consistent with the literature, Hispanics are more likely to be self-employed as the number of children increases ($P < 0.01$), , his/her parents are self-employed ($P < 0.01$), and the spouse is employed ($P < 0.05$) or has attended college ($P < 0.01$). Age significantly increases the probability of self-employment. This may be due to the fact that age is associated with higher levels of human capital and access to financial capital that can improve the odds to start a business (Fairchild, 2010).

Hispanics living in metro areas, the Southeast, or in PUMAs with a high concentration of self-employed individuals are more likely to start their own business. Well-established Hispanic communities in the south of the US may bring adequate resources, such as clientele, that motivate Hispanic entrepreneurship. Consistent with the

literature, areas with vibrant entrepreneurial ecosystems can offer the clientele and resources that motivate Hispanics into self-employment (Wang, 2010; Liu, 2012). Lastly, Hispanics working in construction are 5.1% more likely to be self-employed ($P < 0.01$).

The IV Probit uses Card's (2009) and Coates and Gindling's (2010) instruments to control for endogeneity from macroeconomic shocks that may induce Hispanic agglomeration. A key finding is that the IV probit reports a ρ that is not statistically significant ($P > 0.01$). The ρ parameter represents the correlation between the errors in the standard probit and the reduced-form equation for the endogenous regressor. A ρ that is not statistically significant is equivalent to saying that *platino* is unlikely to be endogenous. In other words, endogeneity is unlikely and the results from the standard probit can be used to disentangle the effects of Hispanic clustering on the probability of self-employment. One reason why endogeneity is not an issue may be the extensive list of covariates included in the right-hand side in the standard probit. The IV probit results are significantly consistent with the standard probit, though the IV probit parameters are higher in magnitude.

The GPS method constructed a quasi-experimental setting to control for individual and peer endogeneity. The GPS estimated a dose-response function based on the functional relationship between Hispanic clustering and Hispanic self-employment. Consistent with the standard probit and the IV probit, Figure 2 displays that, in general terms, the Hispanic entrepreneurial activity decreases as the share of Hispanics in a PUMA increases. Thus, we concluded that our results are econometrically robust.

An important contribution from the dose-response and treatment effect functions is how Hispanic self-employment responds to the level of Hispanic clustering. For

instance, if a policymaker were to choose or recommend an optimal level of Hispanic clustering to maximize Hispanic entrepreneurial activity, then he or she would be interested in knowing the behavior of the dose-response and treatment effect curves. Figure 2 points to three regions where the direction of the response of Hispanic entrepreneurship changes with respect to Hispanic clustering. In regions 1 (less than 20% share of Hispanics) and 3 (greater than 80% share of Hispanics) Hispanic clustering has a positive (or zero) effect on the entrepreneurial activity of any Hispanic. For instance, PUMAs with less than 20% (low-concentrated) or more than 80% (high-concentrated) of Hispanics may have a positive (or zero) effect on the probability of self-employment among Hispanics. Alternatively, Hispanics are less likely to start a business if living in PUMAs where the share of Hispanics is between 20% and 80%. Thus, this study validates the use of opposing theories to explain why Hispanic clustering can be either beneficial or detrimental to Hispanic entrepreneurial activity.

Further analysis shows that as the concentration of Hispanic increases, PUMAs are mainly composed of foreign-born Hispanics who tend to have lower household income and educational credentials. Household income decreases as the concentration of Hispanics increases in a PUMA. For instance, Hispanic households living in low-concentrated PUMAs made on average $69,283, while medium-concentrated and Hispanic-dominated PUMAs made $54,346 and $54,754 in 2010, respectively. Household income among generations varies as well. In all levels of Hispanic clustering, we find that second and third generation Hispanics report higher household income than first generation Hispanics. Moreover, the higher the Hispanic clustering, the bigger the income gap between foreign-born and US-born generations. Hispanic-dominated PUMAs

have below-average levels of self-employment and individuals with college education.

Unemployment and crime rates are higher in these PUMAs compared to national levels.

Table 8. Standard Probit and IV Probit Results on the Probability of Hispanic Self-Employment.

	Probit				IV probit			
	Coeff.		Marginal Eff.[a]		Coeff.		Marginal Eff.	
platino	-0.005	**	-0.065	**	-0.011	*	-1.097	*
platino*first	0.002	***	-[b]		0.002	***	0.177	***
platino*second	-0.005	***	-[b]		-0.005	***	-0.526	***
platino*third	-0.002	***	-[b]		-0.002	***	-0.224	***
lincome	-0.177	***	-2.313	***	-0.177	***	-17.653	***
age	0.058	***	0.758	***	0.058	***	5.804	***
agetwo	0.000	***	-0.006	***	0.000	***	-0.046	***
crime	0.000		-0.001	***	0.000		-0.011	
nchild	0.043	***	0.564		0.043	***	4.309	***
married	0.034		0.447		0.034		3.396	
speakenglish	0.022		0.284		0.022		2.197	
spanish	0.030		0.395		0.032		3.232	
female	-0.205	***	-2.683	***	-0.205	***	-20.536	***
college	0.032		0.424		0.033		3.256	
metroarea	0.118	***	1.543	***	0.127	***	12.680	***
accessmort	-0.047	***	-0.610	***	-0.047	***	-4.696	***
collparent	-0.004		-0.055		-0.004		-0.430	
selfemppar	0.524	***	6.849	***	0.525	***	52.467	***
employsp	0.066	***	0.862	***	0.066	***	6.566	***
sphispanic	-0.075	***	-0.981	***	-0.074	***	-7.419	***
collspouse	0.092	***	1.207	***	0.092	***	9.206	***
newengland	-0.051		-0.671		-0.041		-4.090	
mideast	-0.010		-0.135		0.002		0.219	
greatlakes	-0.076	*	-0.999	*	-0.067		-6.729	
plains	-0.064		-0.835		-0.059		-5.931	
southeast	0.069	**	0.908	**	0.077	***	7.655	***
rockym	-0.085		-1.116	*	-0.082		-8.168	
farwest	0.083	***	1.087	***	0.073	**	7.324	**
agmin	-0.419	***	-5.475	***	-0.420	***	-41.967	***
construc	0.374	***	4.890	***	0.374	***	37.362	***
manuf	-0.816	***	-10.664	***	-0.816	***	-81.555	***
trade	-0.171	***	-2.230	***	-0.170	***	-17.039	***
transport	0.001		0.010		0.001		0.113	
inform	-0.424	***	-5.548	***	-0.424	***	-42.398	***
finance	-0.014		-0.177		-0.013		-1.304	

Table 8. Continued

profserv	-0.039	**	-0.513	**	-0.039	**	-3.899	**
pwhite	-0.006	**	-0.084	**	-0.012	**	-1.233	**
pblack	-0.002		-0.031		-0.008		-0.815	
pminority	-0.004		-0.048		-0.009		-0.919	
pimmigrant	-0.008	**	-0.101	**	-0.015	**	-1.506	**
pselfemp	0.039	***	0.512	***	0.040	***	4.038	***
punemployed	-0.007		-0.090		-0.007		-0.683	
pcollege	0.003	**	0.039	**	0.003	*	0.266	**
_cons	-0.821	***	-		-0.254		-	
Prob>F			0.000				0.000	
athrho			-				0.018	
lnsigma			-				0.810	***
N. Obs.			111,132				111,132	

Data source: 2010 census

[a]Marginal effects are expressed in percentage points

[b]Marginal effects for the interaction terms are omitted due to the lack of a parameter expressing the flexibility in the relationship between the continuous variable platino and first, second, and third generation dummies. The marginal effects of interaction terms is showed in Figure 3, which visually illustrates this relationship over the range of Hispanic clustering at the PUMA level.

*$p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$.
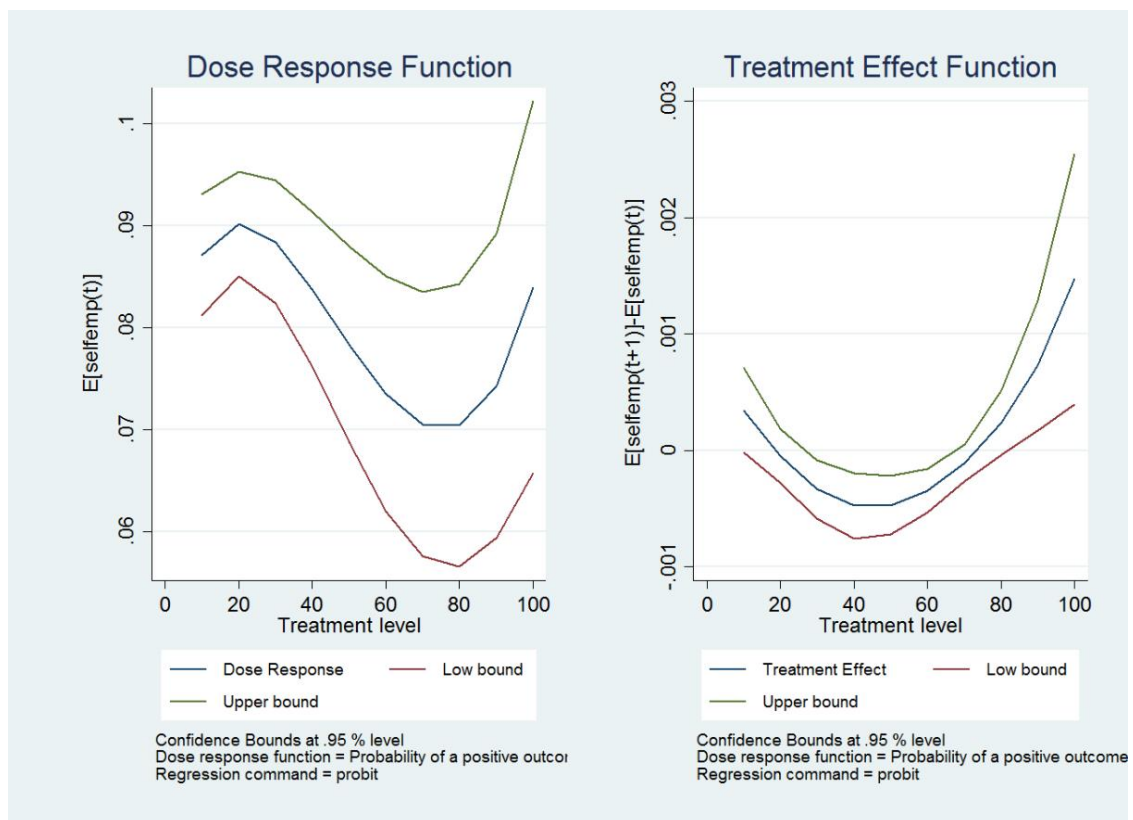
Figure 2. Dose-Response Function on the Effects of Hispanic Clustering On the Entrepreneurial Activity of an Average Hispanic.

3.5.2.2 How Does Hispanic Heterogeneity Influence the Probability of Hispanic Self-employment?

One of the main goals of the article is to understand the role of Hispanic heterogeneity on entrepreneurship. First, we analyze how the probability of self-employment varies across generations. Second, we investigate how the share of different generations of Hispanics influences the probability that Hispanics become self-employed.

Table 8 shows the coefficients for interactions terms between *platino* and *first, second,* and *third* generation Hispanics. The interaction coefficients in Table 8 demonstrate how the probability to start a business varies across generations as the clustering of Hispanics increases. The coefficients show that first generation Hispanics

are significantly more likely to start a business if they live in Hispanic-dominated

PUMAs ($P < 0.01$), relative to generation 1.5. An explanation is that Hispanic-

dominated PUMAs may encourage first generation Hispanics to start a business by

providing access to social resources. On the other hand, second and third generation

Hispanics are less likely to start a business as the clustering of Hispanics increases ($P <$

0.01). Hispanic-dominated areas may be pushing US-born Hispanics out of self-

employment and into wage-salary sectors due to the lack of high-revenue high-growth or

entrepreneurial environment.

Figure 3 illustrates the marginal effects of the interactions terms in Table 8 over

the entire range of Hispanic clustering. Using the same identification strategy that Model

1, Figure 3 a, b, and c show how the probability of self-employment for first, second, and

third, respectively, changes as the value of *platino* increases. In other words, this figure

shows the relationship between self-employment and Hispanic clustering for first (a),

second (b), and third (c) generation Hispanics over the range of Hispanic clustering. The

figure also shows the marginal effects with 95% confidence intervals.
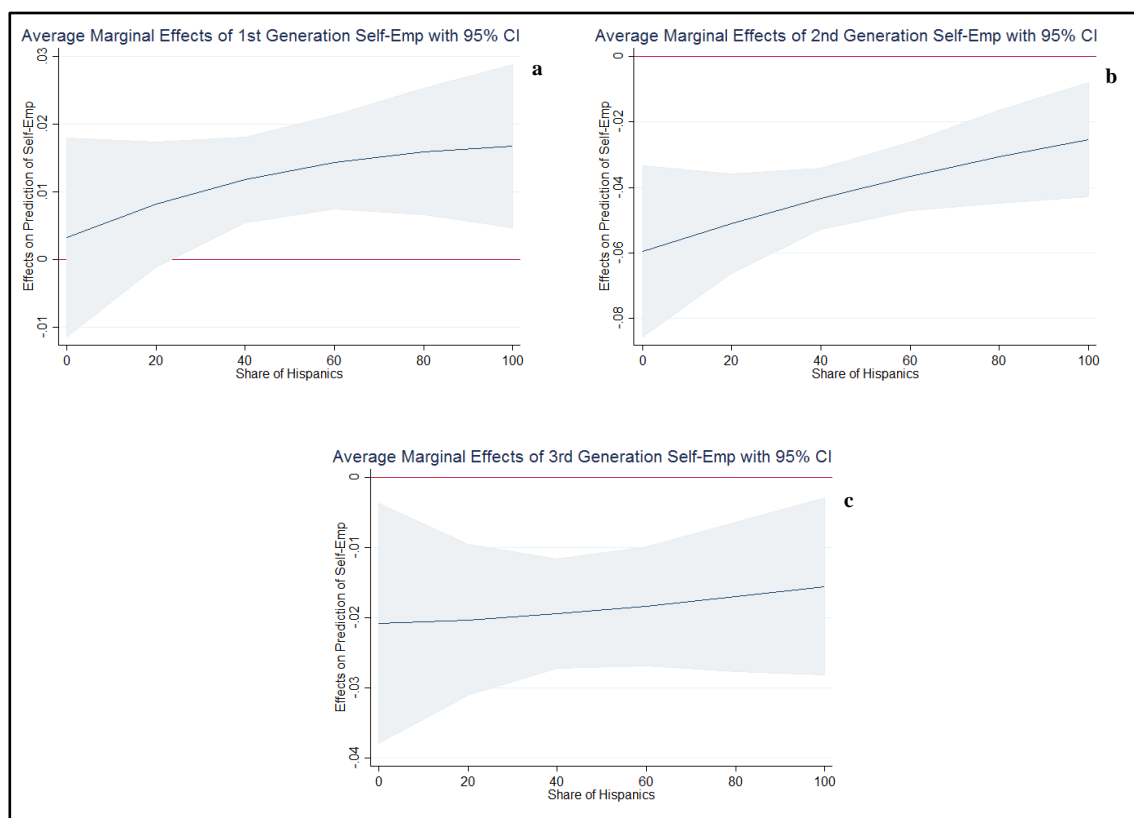
Figure 3. Marginal Effects on the Probability of Self-Employment for First (a), Second (b), and Third (c) generation Hispanics as Hispanic Clustering Increases.

Similar to the coefficients in Table 8, Figure 3 illustrates that the probability of self-employment for first generation Hispanics is positive and it increases as the share of Hispanics increase ($P < 0.01$). While the probability to start a business increases also for second generation Hispanics ($P < 0.01$), the relationship is negative at all levels of Hispanic clustering. Similarly, while the probability of self-employment for third generation Hispanics increases as clustering increases, the relationship is negative throughout the entire spectrum. In other words, the marginal effects illustrate the true effect of Hispanic clustering on the probability of self-employment for first, second, and third generation Hispanics.

Table 9 demonstrates the probability of entrepreneurship for each generation. Using the same identification of Eq. (1), Table 9 replaces the interaction terms with dummy variables if the respondent is *first*, *second*, and *third* generation relative to 1.5 generation. Table 9 shows the estimates and marginal effects of the probability of self-employment across generations of Hispanics. Similar to Model 1, the IV probit shows that endogeneity is not an issue and we use the standard probit regression for all results.

A key finding in Table 9 is that first generation Hispanics are more likely to start a business relative to the 1.5 generation ($P < 0.01$). One explanation is that first generation Hispanics may face larger labor market constraints to enter the wage-salary sector than the 1.5 generation due to lower human capital. Georgarakos and Tatsiramos (2009) explained that many first generation Hispanics enter self-employment from unemployment or underemployment. Thus, first generation Hispanics are more likely start their own business pushed by labor barriers and make use of social capital resources as a way out of poverty. On the other hand, second and third generations are less likely to be self-employed relative to the 1.5 generation (P<0.01). Hence, the opposing theories of factors driving Hispanic self-employment mentioned in the theoretical framework are supported in at least one generational group.

Table 9. Standard Probit Results on the Probability of Self-Employment across Generations of Hispanics.

	Probit			
	Coeff.		**Marginal Eff.[a]**	
platino	-0.006	**	-0.073	**
first	0.075	***	0.979	***
second	-0.359	***	-4.672	***
third	-0.136	***	-1.777	***
lincome	-0.173	***	-2.259	***
age	0.055	***	0.712	***
agetwo	0.000	***	-0.006	***
crime	0.000		-0.001	
nchild	0.042	***	0.543	***
married	0.036		0.471	
speakenglish	0.027		0.357	
spanish	-0.012		-0.157	
female	-0.203	***	-2.644	***
college	0.035		0.450	
metroarea	0.121	***	1.580	***
accessmort	-0.047	***	-0.615	***
collparent	0.006		0.084	
selfemppar	0.549	***	7.159	***
employsp	0.068	***	0.881	***
sphispanic	-0.087	***	-1.139	***
collspouse	0.094	***	1.220	***
newengland	-0.052		-0.679	
mideast	-0.010		-0.133	
greatlakes	-0.069		-0.894	
plains	-0.070		-0.909	
southeast	0.064	**	0.831	**
rockym	-0.080		-1.039	
farwest	0.088	***	1.145	***
agmin	-0.421	***	-5.482	***
construc	0.374	***	4.875	***
manuf	-0.815	***	-10.614	***
trade	-0.165	***	-2.152	***
transport	0.010		0.134	
inform	-0.413	***	-5.384	***
finance	-0.006		-0.076	
profserv	-0.037	*	-0.482	*

Table 9. Continued

pwhite	-0.007	**	-0.087	**
pblack	-0.003		-0.035	
pminority	-0.003		-0.033	
pimmigrant	-0.008	**	-0.108	**
pselfemp	0.040	***	0.518	***
punemployed	-0.007		-0.091	
pcollege	0.003	**	0.036	**
_cons	-0.718	**	-	
Prob>F			0.00	
N. Obs.			111,132	

Data source: 2010 census
ªMarginal effects are expressed in percentage points
*p < 0.10, ** p < 0.05, and *** p < 0.01.

This study also investigates if there is a specific generation that drives the decrease on the probability to start a business for all Hispanics. Table 10 provides the standard probit estimates and marginal effects of the probability that the share of each generation influences Hispanic entrepreneurship. That is, Table 10 displays the probability that *any* Hispanic becomes self-employed as the share of first, 1.5, second, or third generation Hispanics increases.

Table 10 illustrates the key variables of four probit regressions. Each regression replaces *platino* with the share of each generation *pfirst, ponehalf, psecond,* and *pthird*, respectively. For the sake of simplicity, Table 10 only illustrates the key explanatory variables and excludes the set of covariates X_2. Similar to Model 1, the IV probit shows that endogeneity is not an issue and we use the standard probit regression for all results.

Study results in Table 10 indicated an intergenerational Hispanic clustering effect for Hispanic self-employment. Our results, consistent with a growing body of literature, show that generational clustering has an effect on Hispanic self-employment (Fairchild,

2010). Table 10 provides evidence that the clustering of second generation Hispanics drives the decline of entrepreneurial activity among all Hispanics. Thus, second generation clustering can be used as an indicator of the Hispanic entrepreneurial environment.

One explanation is that the socioeconomic behavior of second generation Hispanics diverges from Hispanics born abroad as they assimilate into the American mainstream. Thus, increasing the proportion of second generation Hispanics may be causing co-ethnic segregation. Intergenerational segregations will likely decrease the social and economic interaction between foreign-born and US-born Hispanics. Reduced intergenerational interaction in US-born-dominated PUMAs is likely to shrink the entrepreneurial atmosphere for foreign-born Hispanics. This assumption is echoed in Fairchild's (2010) findings that clustering environment and intergenerational interaction significantly influence ethnic entrepreneurship. These results suggest that social capital resources, market conditions, and social norms that can motivate Hispanic entrepreneurship are minimal in neighborhoods dominated by second generation Hispanics.

Table 10. Standard Probit Results on the Probability that the Share of Each Generation of Hispanics Influences the Decision to Self-employment.

	Probit			
	Coeff.		Marginal Eff.[a]	
pfirst	0.001		0.011	
ponehalf	-0.003		-0.036	
psecond	-0.005	**	-0.071	**
pthird	-0.001		-0.012	

[a]Marginal effects are expressed in percentage points

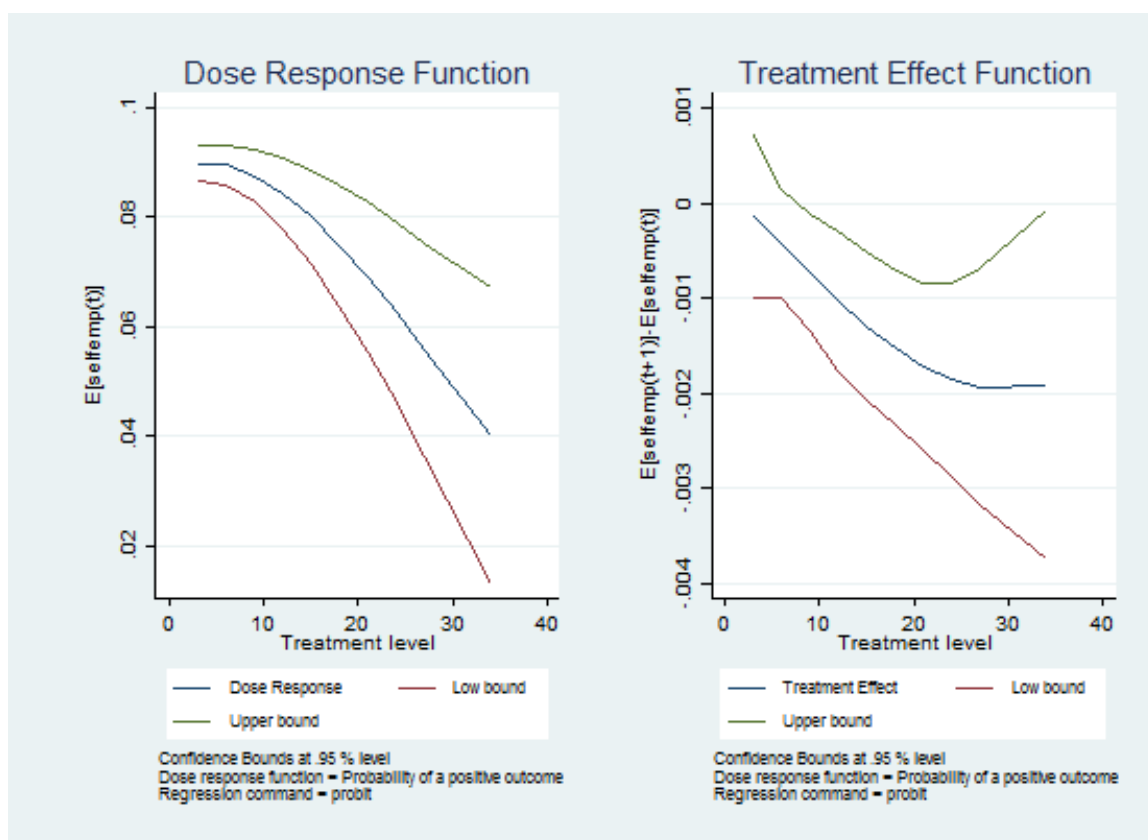Figure 4. Dose-Response Function on Effects of Second Generation Hispanic Clustering On the Entrepreneurial Activity of an Average Hispanic.

Figure 4 illustrates the response of Hispanic self-employment as a function of the

share of second generation Hispanics. Specifically, Figure 4 displays how the intensity of

clustering of second generation Hispanics in a PUMA influences the probability of

Hispanic self-employment. The dose-response and treatment effect functions confirm our findings from the standard probit. Increasing the agglomeration of second generation Hispanics in a PUMA results in lower Hispanic entrepreneurial activity. Figure 4 also illustrates that the level of second generation clustering in PUMAs is from 6% to 33%.

3.6 Conclusions and Implications

The US Census Bureau projects that in 2060 one out of three Americans will be Hispanic. If Hispanics are twice as likely to start a business than native-born Americans (Wiens et al., 2015), it is fair to expect that Hispanics will help define the US entrepreneurial landscape in the next few years. However, studies vary the definition of Hispanics. Papers may define Hispanics as those that migrate from Latin America, and others consider Hispanics as any foreign- or US-born individuals. It is also unclear what attracts the different groups of Hispanics to entrepreneur. While most studies lump Hispanics as a homogeneous group, we advance the literature by incorporating heterogeneity among Hispanics. A possible consequence of lumping immigrants together is a lack of generability of results (Bradley, 2004; Georgarakos and Tatsiramos, 2009).

The major contribution of this article is the empirical evidence of Hispanic heterogeneity. Using census data, we derive some insight on the intergenerational differences of Hispanic labor choices. Before designing policies, decision-makers should first understand the diversity among Hispanics and how policies may affect them differently. Further research should investigate other types of immigrant heterogeneity such as nationality. We expect that Hispanics from Mexico and Central America are

likely to make different economic decisions than those from South America and the Caribbean.

The American Dream is the story of immigrants arriving to the US to find better opportunities. Many Hispanics are able to achieve economic mobility but we find that different generations of Hispanic make different labor choices. While first generation Hispanics are the most entrepreneurial group of Hispanics, they have on average lower income, education, and English proficiency than US-born Hispanics. The GoldWater Institute (2015) reports Hispanic entrepreneurs as the second-most dominant group among low-income entrepreneurs. We expect that policies that support low-income entrepreneurs will likely assist more profoundly first generation Hispanics than other generations. This study proposes that generational differences across immigrants is not merely an ethnic control factor, but rather an important factor for the design of strategies and incentives at the federal, state, and local level. Effective policies should focus on these generational differences to accurately promote success among Hispanics entrepreneurs.

Most foreign-born Hispanic business are related to manual low-skilled sectors, especially construction and manufacturing. It seems that entrepreneurship is the way out of poverty for many Hispanics but also a source of employment for many low-wage workers. Hispanic-owned businesses, which tend to be located in low-income inner-city communities, may be a way to reduce unemployment and poverty at the community level. Our results are consistent with the GoldWater Institute (2015), which reports that many new business ventures tend to be concentrated in economically depressed areas.

While foreign-born Hispanic businesses represent the ladder out of poverty for business owners and their communities, they are likely to experience different obstacles to success than US-born entrepreneurs. Lack of access to capital and training, work regulations, and high failure rate are among the most common barriers to Hispanic entrepreneurs (GoldWater Institute, 2015). Targeted policies and incentives that provide training and information to low-income immigrant entrepreneurs may be one way of helping immigrant entrepreneurs to succeed, while shrinking poverty and expanding prosperity in economically-depressed communities.

Our results show that Hispanic entrepreneurship significantly depends on the clustering of Hispanics. Low- and high-clustered Hispanic communities encourage Hispanics to start their own business. These communities may be bringing social resources or offering niche markets that encourage Hispanics to create businesses. On the other hand, the probability to start a business decreases when the agglomeration of Hispanics ranges between 20% and 80%.

There are two main conclusions derived from these results. First, the communities where immigrants live matter. This finding implies that organizations that encourage communities to train and support immigrants to succeed in entrepreneurship are key to sustaining long-term economic growth. Policies that assist immigrant entrepreneurs through the strengthening of ethnic communities, access to resources, and bilingual information could improve the socioeconomic status of Hispanics and their communities. Second, the results validate the use of the "Push" and "Pull" entrepreneurship theory as an appropriate framework to incorporate the opposing mechanisms driving self-employment among immigrants.

Our results suggest the existence of a potential indicator for the Hispanic entrepreneurial environment. The agglomeration of second-generation Hispanics seems to be what drives the decline of Hispanic entrepreneurship at the PUMA level. A major policy implication is that policymakers should consider policies that encourage social and economic interaction between foreign- and US-born immigrants. Increasing intergenerational bonds and social resources is likely to improve the entrepreneurial atmosphere for Hispanic entrepreneurs.

The study uses a series of robust econometric techniques on census data to test our hypotheses. We provide a strong econometric procedure to address the potential endogeneity between social interactions and individual economic behavior mentioned by Manski (2013). Our identification strategy addresses several sources of potential endogeneity such as macro, individual, and peer unobserved characteristics that may affect probability of self-employment and Hispanic clustering. This econometric procedure yields consistent results and allows us to draw causal conclusions on the main drivers of Hispanic entrepreneurship. Researchers and policymakers can use our findings to increase the availability and efficiency of community-based programs to encourage immigrant entrepreneurship.

Hispanic firms tend to be smaller in size, experience, and sales receipts, which makes them less likely to have access to public or private financing (Dávila and Mora, 2013). Data from the Survey of Business Owners (SBO) shows that the average Hispanic-owned businesses report about half of the sales receipts when compared to non-Hispanic firms. Moreover, less than 2% of Hispanic-owned businesses that have access to financial capital had loans from federal, state, or local government. Dávila and Mora

(2013) find that Hispanic-owned businesses are underrepresented among total loan awarded and amount of the loans in 2010 by the Small Business Administration (SBA). They also report that fear of loan rejection and unawareness of business assistance programs are major deterrents to Hispanic entrepreneurial success. Future research should focus on the role of government-sponsored and community-based organizations to offset the barriers to entrepreneurship and support credit access for Hispanic entrepreneurs. Many strategies can emerge from the interaction of local organizations and immigrants to provide the resources needed to start a business. While we do not focus on the legal barriers to immigrant entrepreneurship, this article can be helpful for understanding Hispanic entrepreneurship. Researchers and policymakers can use this study to advocate for ideas at the local, state, and federal level that aim to capture the economic gains from immigrant entrepreneurship.

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CHAPTER 4. THE RESILIENCE OF SMALL BUSINESS: A POST-KATRINA ANALYSIS OF SOCIAL CAPITAL[8]

4.1   Introduction

The importance of small business resilience for the US economy increases as natural disasters become more frequent (Dilley, 2005). When a disaster strikes, small businesses struggle to survive. The economic implications of small business demise are important as they employ over half of America's private workforce (Cochrane, 1992b; SBA, 2016). Disasters affect small business owners two-fold: as business owners and as local citizens (Runyan, 2006). Moreover, small businesses tend to have lower access to resources to deal with disasters, when compared to larger businesses (Schrank et al., 2013).

This study uses the Small Business Disaster Recovery Framework (SBDRF) by Marshall and Schrank (2014) to empirically test the different stages of the recovery process after Hurricane Katrina. Post-disaster operating businesses are categorized as survived, recovered, and resilient based on the change in revenues between pre- and post-Katrina. Resilient businesses are those that remain operating and report higher revenues than pre-Katrina levels. Post-disaster business resilience is the product of many complex decisions that result from the interaction of individuals, families, businesses, and

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[8] Coauthors of this study are: Maria I. Marshall and Sandra B. Sydnor.

communities (Marshall and Schrank, 2014). While the terms resilience, recovery, and survival have been ambiguously and interchangeably used in the literature, this study uses the SBDRF to provide a universal definition of small business resilience. We bridge the gap in the literature and find what it takes for small businesses to become resilient.

Most disaster recovery studies focus on the macroeconomic impacts of disasters using macro-level data (Berke et al., 1993; Zhang et al., 2009; Aldrich, 2012). While the aggregated analysis is useful to understand the effects of disasters at the macro level, it does not shed light on the how and why of the resilience process at the micro level. Little is known about what it takes for a small business to become resilient after a natural disaster (Zhang et al., 2009), and most studies have focused at a single point in time or looked at the community as the unit of analysis (Norris et al., 2008; Haynes et al., 2011). This study enhances the literature by providing empirical evidence that social capital helps small businesses to recover after a natural disaster.

Aldrich (2012) illustrates how social capital—the networks that formally or informally offer resources—explains the ability to withstand a disaster and recover. We expect that small business owners with strong social capital are able to become resilient. However, there is scant literature on the mechanisms in which these networks formed by individuals, community, and institutions drive resilience. Using a unique dataset, this study fills the gap by using a disaggregated measurement of social capital to explain post-disaster small business resilience. We incorporate multiple categories of social capital, such as bonding (support received from similar individuals such as family and friends), bridging (support received from dissimilar individuals such as communities), and linking (support received from institutions) (Hawkins and Maurer, 2010; Aldrich, 2012).

We contribute to the literature in two ways. First, this article bridges the existing gap between the social capital and post-disaster small business resilience. We answer two main questions. Does social capital explain small business resilience after a natural disaster? And, what type of social capital has the greatest impact for small business resilience? These questions aim to shed light on the relevance of social networks to help small businesses face post-disaster situations. Second, the article provides empirical evidence on what drives the different phases of the recovery process for small businesses. Scholars, planners, and government agencies can use these results to advocate for increasing social capital in communities. Incentives and interventions should support the creation and strengthening of community linkages through community participation and leadership development.

4.2   Theoretical Framework

Post-disaster recovery is a complex process that takes place over time and is related to the recovery of individuals, businesses, communities, and institutions (Olshansky, 2005; Chang, 2010). Most studies consider post-disaster business recovery as a binary stage of open or closed at a certain point in time (Marshall and Schrank, 2014; Marshall et al., 2015). The current literature disregards that business recovery is 1) a process that takes place over time, and 2) operating does not equal resilience (Brown et al., 2008; Marshall and Schrank, 2014). For instance, a business can remain operating immediately after a disaster but may close few weeks after they reopen. Similarly, a study that assumes an open firm is resilient may ignore that some businesses may be hardly surviving and are at risk of demise. This study uses the SBDRF, which addresses the lack

of conceptual model for small business resilience (Marshall and Schrank, 2014), and uses the business as the unit of analysis.

Figure 5 illustrates the SBDRF as the proposed guide to study small business resilience under a continuum timeframe (e.g. pre-event, post-event). The SBDRF incorporates several time intervals and compares the pre-disaster baseline to track the process of recovery overtime. The model provides a basis for the terminology used for resilience in this study. Small businesses are categorized as survived, recovered, and resilient based on the comparison of pre- and post-disaster status. For instance, a survived business is one that has not reached pre-event levels. A recovered business has returned to the pre-disaster status. Lastly, a resilient business has exceeded the baseline performance at the time of the survey. Following a disaster, firms must survive to recover and to later be resilient. Thus, we propose that post-disaster recovery is an ordered process. We expect that the drivers of survival, recovery, and resilience may not be necessarily the same (Stafford et al., 2010). In other words, survival, recovery, and resilience are different, but ordered, stages of building resilient small businesses. This study categorizes small businesses as survived, recovered, and resilient, based on the change of pre- and post-disaster gross revenues.
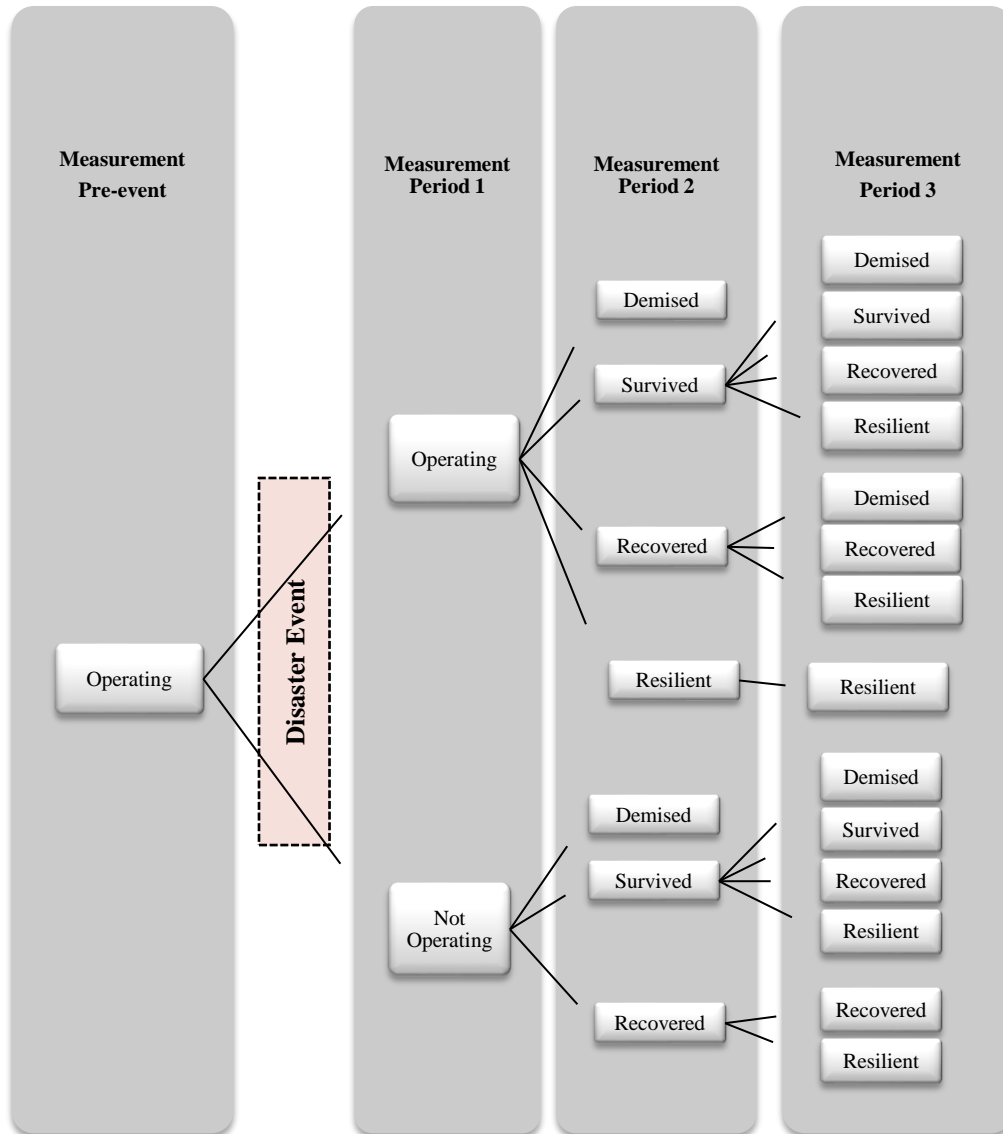
Figure 5. Small Business Disaster Recovery Framework. Adapted from Marshall and Schrank (2014).

This study draws from the Sustainable Family Business Theory (SBFT) enhanced by Danes et al. (2008) to frame this article. The authors base the SFBT on systems theory that values the intersection of business, family, and community to explain small business decision making. The SFBT's central tenets stipulate that the system is composed of business owners that rationally optimize objectives and the business-family-community

interface. The collective action between families, businesses, and community is what ultimately drives system resilience. In this paper we examine small businesses following Hurricane Katrina through the lens of social capital. We use a quantitative indicator to examine the different types of social capital in operating small business located in Mississippi (i.e. bonding, bridging, and linking). The study also accounts for individual, family, community factors that may affect small business recovery.

4.3   Literature Review

4.3.1   Hurricane Katrina

Hurricane Katrina hit the coasts of Mississippi and Louisiana in August of 2005. Hurricane Katrina is considered the most costly and destructive hurricane to ever strike the United States (Hawkins and Maurer, 2010; Deryugina et al., 2014). The Federal Emergency Management Agency (2016) estimates the total damage of Hurricane Katrina to be about $151 billion. While the repercussions of Hurricane Katrina still cast a long shadow over Mississippi, only a few studies document these impacts on small businesses and fewer address social capital as a key factor for resilience (Jarmin and Miranda, 2009; Chang, 2010; Hawkins and Maurer, 2010; Aldrich, 2011; Deryugina et al., 2014; Josephson and Marshall, 2014; Marshall and Schrank, 2014; Marshall et al., 2015).

Using a Geographic Information Systems (GIS), Jarmin and Miranda (2009) estimate that the impact of Hurricane Katrina sharply reduced business growth and number of payrolls relative to previous business performance and to businesses located in unaffected areas. In their study, businesses that suffered the greatest economic impact closed immediately following Katrina. While Deryugina et al. (2014) find that federal aid

and recovery programs were sufficient to cover the economic impact in New Orleans in just a few years, Josephson and Marshall (2014) report a lack of success in the targeted SBA disaster loans to female-owned and coastal small businesses. A qualitative study by Hawkins and Maurer (2010) find that lower income families were able to obtain immediate support mainly through pulling individual, family, and community support during Katrina. Their study also highlights the role of bonding, bridging, and linking social capital for short- and long-term family survival.

Marshall et al. (2015) are the first to predict post-disaster operating status based on the pre-existing business characteristics in a continuum timeframe. They follow small businesses that were operating before Katrina to examine the factors that contribute to demise. This information is key to target assistance programs that support business recovery after a natural disaster. This article enhances Marshall et al. (2015) by analyzing at how social capital explains small business resilience. We study the role of social capital in the success of operating small businesses post-Katrina. In other words, we examine the importance of family, community, and institution linkages that keep businesses operating and succeeding after natural disasters.

4.3.2   Post-Disaster Small Business Resilience

Natural disasters tend to economically and physically affect small businesses to a greater extent than larger businesses (Schrank et al., 2013). One explanation is that small businesses tend to have lower access of physical and financial capital for post-disaster recovery (Runyan, 2006). Another reason is that the impact of disasters on small business owners is two-fold: as business owners and as local citizens (Runyan, 2006). Even within

the small business sector, minority- and women-owned businesses tend to be more vulnerable to disaster aftershocks than their counterparts (Tierney, 2006).

Depending on its resilience, a business can close or remain operating after a natural disaster (Alesch et al., 2001; Cutter et al., 2008). Most studies have defined resilience as an open or closed business scenario (Marshall et al., 2015). We use the SBDRF framework to overcome the binary scenario and incorporate several measurement of openness. Operating businesses can be categorized as survived, recovered, or resilient if their post-Katrina gross revenues are worse, about the same, or better than pre-Katrina, respectively (Marshall and Schrank, 2014). While concepts of resilience, recovery, and survival are ambiguously and interchangeably used in the literature, the SBDRF provides a universal definition of small business resilience.

Business owners engage in many complex decisions to become resilient. Danes (2006) defines resilience as the ability to adjust resources and processes to internal and external disruptions. Post-disaster business resilience is the result of a combination of family, business, community, and institutional functionality and resources (Stafford et al., 1999; Winter et al., 2004). The literature has given little attention to understanding the drivers of post-disaster small business resilience, and most of the studies are focused on a single period or macro-level analysis (Bolin, 1976; Berke et al., 1993; Webb et al., 2000; Bruneau et al., 2003; Brown et al., 2008; Cutter et al., 2008; Chang, 2010; Elliott et al., 2010; Haynes et al., 2011). For instance, Chang (2010) uses aggregated data to find that in Japan small businesses tend to experience recovery at a slower pace when compared to larger businesses.

Researchers can use quantitative or qualitative indicators to assess post-disaster business resilience (Chang, 2010; Hawkins and Maurer, 2010; Aldrich, 2011). Quantitative indicators are: gross revenue, return on assets, growth in sales, number of employees, and debt level; while subjective indicators can be customer satisfaction, personal development, owner's personal achievement, and owner's perceptions of the resilience of the business (Danes et al., 2008; Haynes et al., 2011). Quantitative indicators are effective at describing the measurable change between pre- and post-disaster. Alternatively, incorporating qualitative variables, such as perceptions and beliefs, can bring insight and more depth in disaster recovery research (Chang, 2010). This article uses business owner's perceptions to shed light on business owner behavior post-Katrina.

The determinants of small business resilience borrowed from the SFBT framework are individual, family, business, and community factors (Marshall and Schrank, 2014). Business owner characteristics correlated with small business recovery are gender, educational attainment, veteran status, and industry experience (Webb et al., 2002; Olson et al., 2003; Sorenson et al., 2004; Stafford et al., 2010; Haynes et al., 2011; Marshall et al., 2015). Women-owned small businesses tend to report lower profitability, be smaller in size, and represent a part-time occupation for women (Stafford et al., 2010). The literature on small business suggests that women struggle more at establishing and maintaining a business compared to men, which makes them less likely to experience economic recovery post-disaster (Webb et al., 2002). Human capital (i.e. education) offers higher access to information, capital, and managerial skills to recover post-disaster (Bourdieu, 1986; Haynes et al., 2011; Marshall et al., 2015). Accumulating industry

experience improves the likelihood of recovery as managerial skills are key to deal with a disaster (Haynes et al., 2011).

Following the SBFT, small business resilience is influenced by family and community factors such as family demands, goal conflict, securement of business loans, functional integrity of family, and family and community interactions (Stafford et al., 2010; Haynes et al., 2011). Having a healthy family-business interface and receiving support from family members can help a business to recover from exogenous shocks (Olson et al., 2003; Danes et al., 2005). On the other hand, a conflicting intersection between the business and the family can lead to additional sources of stress that may increase the likelihood of post-disaster demise. We expect that strong ties among family members are likely to improve the economic performance of small businesses. Many communities in the Mississippi Gulf Coast suffered from severe household displacement during Katrina (Runyan, 2006). Many of the displaced households are still geographically dispersed from their communities (Deryugina et al., 2014). It is expected that changes in the number of household members will play a role in the resources available to recover from Hurricane Katrina (Marshall et al., 2015).

Post-disaster resilience is linked to firm characteristics such as industry, size, age of business, emergency planning, pre-disaster success, disaster experience, and other business characteristics (Quarantelli et al., 1979; Drabek, 1995; Dahlhamer and Tierney, 1998; Stafford et al., 2010; Haynes et al., 2011; Marshall et al., 2015). Small business recovery varies greatly across industries. Businesses in industries such as manufacturing and wholesale and retail trade are the least likely to recover due to the disaster impacts on machinery and inventory (Chang, 2010). Business located in highly displaced

communities tend to be greatly affected by disasters due to dependence on local customers. The high mobility of service businesses allows them to relocate in less affected areas and be more likely to remain operating (Marshall et al. 2015). In other words, businesses able to reach markets beyond local channels may be able to decrease their risk of demise (Webb et al., 2002). The literature reports a higher likelihood of survival among bigger and older businesses (Drabek, 1995; Stafford et al., 2010; Haynes et al., 2011; Marshall et al., 2015). It is likely that losing employees due to disaster can affect the level of human capital needed to deal with recovery activities. Businesses that engage in pre-disaster preparedness are more likely to focus activities towards recovery and avoid demise (Webb et al., 2002).

Most recent studies have suggested the key role of social capital on business recovery (Aldrich, 2011). Elliott et al. (2010) report that small business owners tend to mainly obtain informal assistance from their networks to respond to disasters. According to Haynes et al. (2011) and (Besser, 2003), business-community linkages are synonymous of healthy locally-owned small businesses. Stafford et al. (2010) find that the economic vulnerability of the county where a firm operates is significantly correlated with business survival.

4.3.3   Social Capital as a Driver of Resilience

Social capital is related to the resources available through formal and informal networks (Elliott et al., 2010). These social linkages are useful for the achievement of various outcomes, especially after a disaster (Lin et al., 2001). Iyer et al. (2005) define social capital as "the institutions, relationships, attitudes and values governing

interactions amongst people and contributing to economic and social development". This form of capital can provide information, technological knowledge, market access, and complementary resources (Putnam, 1995; Danes et al., 2008). In the disaster context, social capital can be considered as the goodwill among agents that helps households, businesses, and communities to overcome shocks.

The social vulnerability framework, which criticizes the belief that disaster management can be done solely by financial and physical resources, illustrates how societal conditions are as important as physical circumstances in recovering from a natural disaster (Chang and Falit-Baiamonte, 2002). This concept is helpful to estimate how affected households and communities are able to pull resources to survive, recover, and build resilience post-disaster. The framework can also help researchers to understand the importance of societal interactions for building small business resilience. Aldrich (2012) reports that the level of recovery is significant correlated with social capital resources.

Following Aldrich (2011), the main categories of social capital are bonding, bridging, and linking. Bonding is related to the relationships amongst members of a network who are similar in some form. Bridging refers to the relationships amongst people who are part of a community but dissimilar in age, socio-economic status, race, ethnicity, or education. Lastly, linking is the extent to which individuals build relationships with institutions and other individuals who have relative power over them (Hawkins and Maurer, 2010; Aldrich, 2011). Common examples of social capital factors influencing small business recovery are: having the spouse employed (Marshall and Flaig, 2014), residing in a community with similar individuals (Kanas et al., 2009), ethnic

resources, family cooperation, pooled family resources, family unpaid labor, access to credit from the community (Sanders and Nee, 1996; Haynes et al., 2011), and information offered through social networks (Hawkins and Maurer, 2010).

Recent economic studies have supported the hypothesis that social capital can explain individuals' behavior at a micro level (Runyan, 2006). Using firm-level data, we assess how social capital affects the survival, recovery, and resilience of small businesses hit by Hurricane Katrina. This study also takes a step further and explains how the three main categories of social capital in terms of similar individuals (bonding), dissimilar individuals such as communities (bridging), and institutions (linking) can explain the resilience of small businesses after a natural disaster.

4.4   Data and Methodology

This section discusses the data and estimation technique employed in this article. We analyze the role of social capital on the survival, recovery, and resilience of small businesses post-Katrina. We expect that businesses first survive, then recover, to finally become resilient. In other words, we assume that recovery is an ordered process and use ordered probit regressions[9] to assess each probability. The first probit regression assesses whether social capital can explain small business resilience after Hurricane Katrina. The second regression assesses which type of social capital (e.g. bonding, bridging, and

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[9] The article also uses a multinomial probit regression to assess the effect of social capital on small business resilience post-Katrina. We obtain similar statistically significant results between the ordered and the multinomial probit regressions. For the sake of simplicity, the study only presents the results from the ordered probit.

linking) has the greatest impact on small business resilience. This section provides a data discussion section followed by the model specification section.

4.4.1 Data Description

This study combines data from two waves of the Small Business Disaster Resilience Survey (SBSD). Mailing lists were obtained from the 2004 Dun & Bradstreet database for December 2004 for all small businesses from a 10 county area in southeastern Mississippi. A random sampling algorithm was applied to the total database of 17,060 businesses. From this population, a random sample of 4,000 businesses that had been in operation prior to Hurricane Katrina was drawn for interview purposes. The methodology used to draw the sample is described in Schrank et al. (2013).

Wave 1 is a 30-minute telephone survey conducted between August and September of 2013 to 2,610 small business owners operating before Hurricane Katrina. The cooperation rate for wave 1 is 19.12% providing a sample size of 499 businesses. Wave 2 is a mail survey sent between July and August of 2014 to the respondents who had completed wave 1. The response rate of wave 2 is 72.84% providing a sample size of 362 businesses. The survey includes small businesses located in 10 counties in southern Mississippi, which are Forrest, George, Greene, Hancock, Harrison, Jackson, Lamar, Pearl River, Perry and Stone. Figure 6 illustrates the location of small businesses in Mississippi. These ten counties are in the right front quadrant of Hurricane Katrina and represent a wide range of industries ranging from service businesses to manufacturing, agriculture, and forestry (Schrank et al., 2013).
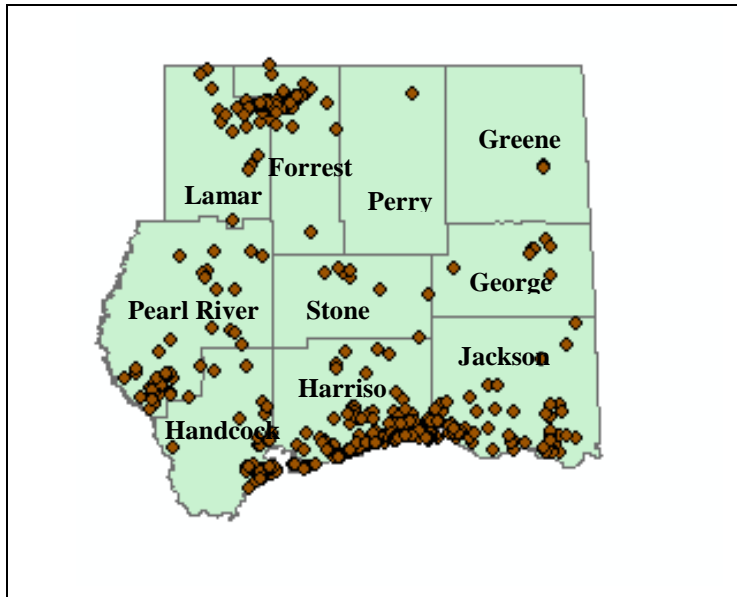
Figure 6. Map of Business Locations in 10 Mississippi Counties (McDonald, 2014)

The subsample for this study includes 373 small businesses operating at the time of wave 1 that remained operating in the second wave. Our subsample focuses only on businesses that were operating in wave 1 and wave 2. The primary sampling unit within the model is the small business. Following Schrank et al. (2013), this study defines small businesses as those that have 0-200 employees. Survey questions include business and owner demographics, hurricane preparations of both the business and the owner's family, financial information, post-disaster situation (e.g. damage, recovery or demise), and owner resilience and community linkages.

The study uses the SBDRF recovery framework to categorize the status of small businesses based on the comparison of revenues between pre-Katrina and post-Katrina. Out of 499 operating business in 2004, only 373 businesses remained operating at the time of wave 1 (2013). Of them, 186 reported their gross revenues went down (survived), 79 reported revenues stayed about the same (recovered), and 105 owners reported higher

revenues when compared to pre-Katrina levels (resilient) by 2013. When we track operating businesses in wave 2, we find that most of the businesses changed their resilience status.

We use firm-level data to answer how small businesses recover and what drives their resilience (Aldrich, 2011; Marshall and Schrank, 2014). Firm-level data allows us to investigate deeper the firm decision-making and social capital during Hurricane Katrina. The dataset includes questions that account for individual, family, business, community, and institutional factors.

4.4.2   Empirical Model Specification

The article uses two ordered probit regressions to assess how social capital affects small business resilience. The first model addresses the probability that any form of social capital (i.e. bonding, bridging, and linking) drives small business resilience. The second model answers what type of social capital has the greatest impact on small business resilience post-Katrina. These questions aim to shed light on the relevance of social networks to help small businesses face post-disaster situations.

The ordered probit is an appropriate framework to model ordinal survey responses where the observed dependent variable has an ordinal scale (Greene, 2008). For instance, post-Katrina gross revenues may be lower, the same, or higher than before Katrina. Since revenue is continuous the rating scheme follows a naturally ordered scale. This study assumes that small business recovery post-Katrina has a natural ordering (low to high) but the distances between adjacent levels of operating businesses are unknown (Greene, 2008).

The ordered probit model is based in the idea of a latent continuous variable y^* underlying the ordinal responses observed. The latent variable is a linear combination of some observables X and a disturbance term ε that has a normal distribution. Specifically, letting $i = 1,2,...,n$ index the business, and for the case in which there are three ordered outcomes (i.e. $y_i \in [0,1,2]$):

$$y_i^* = X_i\beta + \varepsilon_i \tag{1}$$

in which y_i^* is the unobserved latent variable and y_i is the observed ordinal variable

$$y_i = 0 \ \ if \ y_i^* \leq 0$$

$$y_i = 1 \ \ if \ 0 < y_i^* \leq \mu_1$$

$$y_i = 2 \ \ if \ \mu_1 < y_i^*$$

such that μ_1 and β are unknown parameters to be estimated. We then have the following probabilities:

$$\Pr(y_i = 0|X_i = x) = \Phi(-X_i\beta)$$

$$\Pr(y_i = 1|X_i = x) = \Phi(\mu_1 - X_i\beta) - \Phi(-X_i\beta)$$

$$\Pr(y_i = 2|X_i = x) = 1 - \Phi(\mu_1 - X_i\beta)$$

where $\Phi(\cdot)$ is the standard normal cumulative distribution function.

4.4.2.1   Does Social Capital Explain Small Business Resilience After Hurricane

Katrina?

Eq (2) depicts the first model specification. The dependent variable is the level of post-Katrina recovery that takes the value of $y = 0$ if the business survived, $y = 1$ if the business recovered, $y = 2$ if the business is resilient. To assess the level of post-disaster

business resilience this study uses the self-reported change in gross annual revenues pre-

and post-Katrina. For instance, a business may report that in 2013 its gross revenues

have gone down $y = 0$, stayed about the same $y = 1$, or have gone up $y = 2$ when

compared to pre-Katrina level. Following Marshall and Schrank (2014), the order of the

dependent variable is based on the standard criteria for operating businesses post-disaster.

$$\Pr(resilient_i = j | X_i = x) = \Phi(X_i\beta) = \Phi(\beta_0 + \beta_1 scapital_i + individual_i\beta_2 +$$

$$family_i\beta_3 + business_i\beta_4 + community_i\beta_5) \tag{2}$$

in which $X = (1, social\ capital, individual, family, business, community)$ is a

vector of covariates, and $\beta = (\beta_0, \beta_1, \beta_2', \beta_3', \beta_4', \beta_5')'$ is a vector of unknown constants.

The key explanatory variable is the social capital received during Katrina

answered in wave 1 or wave 2. The variable *scapital* is equal to 1 if the business owner

relied on social capital from friends, family, community, or institutions. Table 11 displays

the covariates used in this study. A correlation analysis indicates that there is no

multicollinearity between variations of the independent variables.

The set of covariates *individual* corresponds to the set of control variables related

to the business owner demographics such as gender, educational attainment, veteran

status, and industry experience. Incorporating family variables when modeling business

resilience gives strong insight on the family-business interaction. The literature has

reported that family members tend to pool resources to assure business resilience,

especially in times of stress (Stafford et al., 2010; Haynes et al., 2011). Covariates related

to family demographics include the change in number of household members since

Katrina and an indicator of conflict between household and business.

The set of covariates *business* corresponds to variables related to the business demographics, mitigation, and disaster assistance. The study includes variables related to the number of years of business ownership, change in number of employees since Katrina, if business has experienced cash problems before or after Katrina, business success pre-Katrina, disaster experience, emergency plans pre-Katrina, business industry, and characteristics of the business model.

The study includes *community* variables such as business owner participation in the community and business location in coastal counties. The variable *compart* controls for how active the business owner is in the community. Iyer et al. (2005) find that highly participative communities tend to show higher generation of social capital. Marshall et al. (2015) find that businesses located in coastal counties are the most impacted by the hurricane due to the flooding and storm surges. A similar approach has been taken by Cutter et al. (2003), who measure the overall social vulnerability to natural disasters at the county level. This study controls for changes in revenue, *changerev*, between wave 1 and wave 2 to control for changes between surveys that may lead to change in social capital perceptions.

4.4.2.2 <u>What Type of Social Capital Has the Greatest Impact for Building Small</u>
<u>Business Resilience?</u>

The second model answers what type of social capital has the greatest impact on small business resilience post-Katrina. Following Aldrich (2011) and Hawkins and Maurer (2010), social capital is categorized as bonding, bridging, and linking. Bonding social capital is equal to 1 if the respondent received help from family and friends during

the recovery of Katrina (wave 1). Bridging social capital is equal to 1 if the business

owner agrees or strongly agrees that community leaders worked toward local business

during the recovery of Hurricane Katrina (wave 2). Linking social capital is equal to 1 if

the owner responded that he/she received help from business, social, religious,

government, or financial organizations (wave 2). The second model specification follows

Eq (2) and replaces *scapital* with each type of social capital: *bonding*, *bridging*, and

linking.

Table 11. Variables and Definitions.

Category	Variable	Description
Dependent Variable	resilience	Compared to before Hurricane Katrina, gross revenues have gone down (=0), stayed about the same (=1), or have gone up (=2)
Key Independent Variables	scapital	1=business owner received help from family, friends, community, and institutions to recover from Katrina
	bonding	1=business owner received help from family and friends during Katrina
	bridging	1=business owner agrees or strongly agrees that community leaders helped local businesses during the recovery of Katrina
	linking	1=business owner received help from business, social, religious, government, or financial institutions during Katrina
Individual	female	1=if owner is female
	college	1=business owner highest level of education is bachelor's degree, some graduate work or graduate or professional degree
	veteran	1=if business owner is a veteran
	experience	Number of years business owner has worked in the industry
	exp2	Squared term of experience
Family	Hhnumch	Change in number of people living in the household including respondent between pre- and post-Katrina
	noconflict	1=the needs of the household and family never conflicted with the needs of the business
Business	yearsown	Years of business ownership
	empch	Change in number of employees other than business owner between pre- and post-Katrina
	nocashprob	1=if business never experienced cash flow problems pre- or post-Katrina
	succespre	1=if business was very or extremely successful prior to Hurricane Katrina
	disasterexp	1=if business had ever gone through any major disaster that caused the closure of business for more than 24 hours or caused significant damage to business or residence
	emergency	1=if business had an emergency plan pre-Katrina
	custcame	1=if most customers came to the place of business before Katrina
	homebased	1=if business mostly operated from home at the time of Hurricane Katrina
	services	1=if line of business is services
	changerev	1=if level of revenues increased from wave 1 to wave 2
Community	compart	1=respondent participates in any business, social, special interest, sports or religious groups in the community
	coastal	1=if business is located in coastal counties such as Hancock, Harrison, and Jackson.

<center>4.5   Empirical Results</center>

The following section conveys sample statistics and regression results from each of the ordered probit models.

<center>4.5.1   Summary Statistics</center>

Table 12 displays means and standard deviations for continuous and categorical variables. The sample obtained from wave 1 is comprised of 373 small businesses that were operating at the time of the first survey. Small businesses are categorized as survived (186), recovered (79) and resilient (105) if revenues are lower, same, or higher than before Katrina, respectively. Thirty-one percent of small business owners are women, with the biggest proportion as survived (33%) and the smallest percentage as resilient (21%). The proportion of women in resilient businesses is significantly lower than survived businesses ($P < 0.05$). On average, resilient business owners have fewer years of industry experience (28) when compared to survived (31) and recovered (32) small business owners.

Most small businesses lost at least one household member during Katrina. Interestingly, the loss of household members is higher for resilient business owners than recovered businesses. Almost 35% of our sample report that the needs of the household never conflicted with the needs of the business. Forty-eight percent of recovered businesses report the lack of business-family conflicts, a significantly higher proportion than survived businesses ($P < 0.05$).

Resilient small businesses significantly increase the number of employees post-Katrina when compared to their survived and recovered counterparts ($P < 0.05$).

Resilient business owners also report a higher proportion that had an emergency plan at the time of Hurricane Katrina (49%) when compared to their counterparts. Interestingly, 63% of survived small business owners report that his/her business was very or extremely successful prior to Hurricane Katrina, while only 44% of resilient business owners report the same ($P < 0.05$). Both recovered and resilient businesses report the lack of cash problems before or after Katrina compared to survived businesses ($P < 0.05$).

Over 69% of small business are located in coastal counties and this proportion is larger for survived (72%) than recovered (63%) and resilient small businesses (63%). Most of the small business owners participate in business, social, special interests, sports, or religious groups in the community. This proportion is significantly higher for resilient business owners (87%) than survived business owners (71%) ($P < 0.05$).

Table 12. Descriptive Statistics of Characteristics of Small Businesses.

Variable	Operating N=373 Mean	SD	Survived N=186 Mean	SD	Recovered N=79 Mean	SD		Resilient N=105 Mean	SD	
female[a]	0.31	0.46	0.33	0.47	0.30	0.46		0.21	0.41	*
college[a]	0.38	0.49	0.37	0.48	0.47	0.50		0.48	0.50	
veteran[a]	0.19	0.40	0.17	0.37	0.22	0.42		0.21	0.41	
experience	29.27	12.40	30.60	11.90	31.86	10.90		28.24	11.90	
HHnumch[b]	-0.37	1.13	-0.36	1.36	-0.30	0.74		-0.37	1.01	
noconflict[a]	0.35	0.48	0.26	0.44	0.48	0.50	*	0.28	0.45	
yearsown	22.18	10.43	22.46	10.39	24.95	10.52		20.13	9.95	
empch[b]	-0.52	11.82	-1.84	6.45	-1.11	4.22		2.22	19.86	*
nocashprob[a]	0.24	0.43	0.19	0.39	0.39	0.49	*	0.37	0.48	*
successpre[a]	0.56	0.50	0.63	0.48	0.57	0.50		0.44	0.50	*
disasterexp[a]	0.49	0.50	0.49	0.50	0.42	0.50		0.50	0.50	
emergency[a]	0.48	0.50	0.45	0.50	0.48	0.50		0.49	0.50	
custcame[a]	0.54	0.50	0.49	0.50	0.62	0.49	*	0.51	0.50	
homebased[a]	0.31	0.46	0.35	0.48	0.22	0.41	*	0.30	0.46	
services[a]	0.34	0.47	0.41	0.49	0.43	0.50		0.30	0.46	*
changerev	0.80	0.40	0.83	0.38	0.70	0.46	*	0.82	0.39	
compart[a]	0.76	0.43	0.71	0.46	0.76	0.43		0.87	0.34	*
coastal[a]	0.69	0.46	0.72	0.45	0.63	0.49		0.63	0.49	

[a]The mean value for dummy variables represents the percentage of individuals showing that characteristic.
[b]Indicates an index variable that denotes the change in variable from pre-Katrina to the time of the survey
*The difference of the variable mean of the group and the variable mean of survived small businesses is statistically different from zero (P < 0.05)

4.5.1.1 Does social capital explain small business resilience after Hurricane Katrina?

Figure 7 depicts the correlation between social capital and small business resilience post-Katrina. Fewer survived businesses (61%) relied on social capital during Katrina than recovered (71%) and resilient businesses (76%). In other words, the higher the change between 2004-2013 gross revenue, the higher the percentage of business owners that reported social capital was key to recuperating from Hurricane Katrina. Following Aldrich (2011), maintaining linkages with friends, community, and institutions

seem to be as important as physical and financial resources to survive, recover, and succeed after natural disasters.
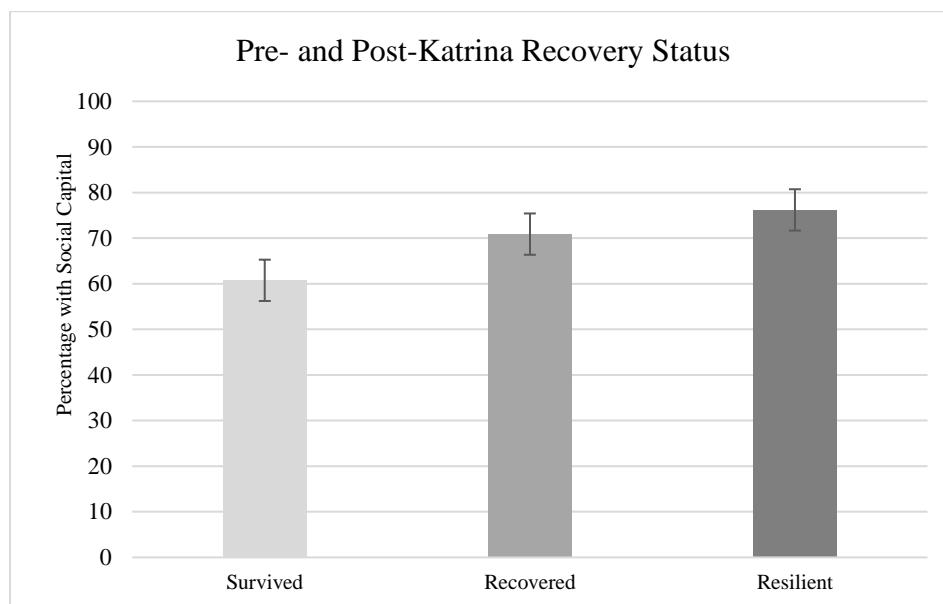
Figure 7. Correlation of Social Capital and Recovery Status.

4.5.1.2 <u>What type of social capital has the greatest impact for building small business resilience?</u>

Figure 8 shows the correlation between bonding, bridging, and linking social capital and the level of survival, recovery, and resilience of small businesses in our sample. One of the most interesting correlations is the trend between bridging social capital and the level of small business resilience. The higher the level of bridging, the higher the increase in gross revenues post-Katrina. Thus, it seems that business owners that build connections with business, social, religious, and sports groups in the community may be able to use formal or informal social resources during the recovery process.
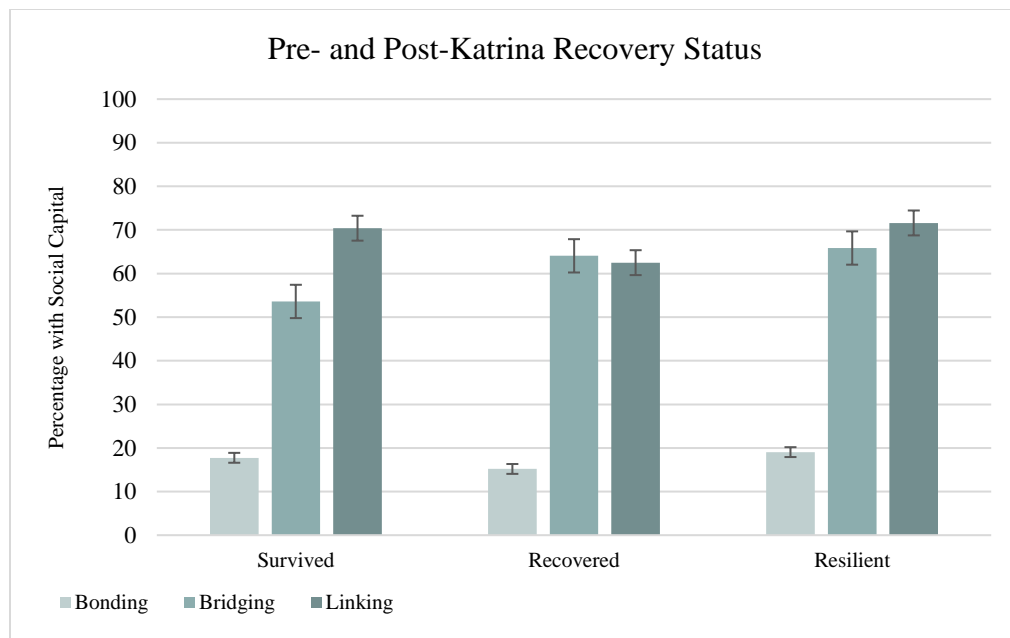
Figure 8. Correlation of Bonding, Bridging, and Linking Social Capital and Recovery Status.

4.5.2   Regression Results

Table 13 and 15 display the results of the two ordered probit regressions. The dependent variable is the business recovery status measured by the change of gross revenues pre- and post-Katrina. The table depicts the coefficients and the marginal effects in percentages for survived ($y = 0$), recovered ($y = 1$), and resilient small businesses ($y = 2$).

4.5.2.1   Does social capital explain small business resilience?

The ordered probit analysis provides intuitive results with respect to the effect of social capital on small business resilience. Table 13 shows that the probability of being resilient is positive and statistically significantly correlated with social capital ($P <$ 0.05). Small businesses that used social capital for post-Katrina aid are 14% more likely

to be resilient ($P < 0.1$). Recent studies have addressed the role of social capital on community resilience indicators (Iyer et al., 2005; Norris et al., 2008; Adger, 2010; Elliott et al., 2010; Aldrich, 2011). These studies indicate that social capital linkages provide key resources useful to build resilience. This article provides empirical evidence that following a disaster, small business resilience can be determined by the linkages with family, friends, community, and institutions. These results demonstrate the importance of social capital on the resilience of small business, households, and community in the context of natural disasters. An explanation is that the interdependence of these agents allows small business owners to utilize these social linkages to allocate resources to succeed after a natural disaster.

Financial managerial skills are important during a crisis. Table 13 illustrates that business owners that do not experience cash flow problems are 23% more likely to be resilient post-disaster ($P < 0.01$). Runyan (2006) reports that cash flow problems can exacerbate the effects of an external shock. It is likely that disasters disrupt the money inflow due to market contraction, time to resume operation, and loss of assets and inventory. Managerial skills and long-term vision that balances business finances with family needs can help small business owners to avoid cash flow problems during the aftermath of a natural disaster.

Industry experience is a key factor for small business resilience. For instance, for each year increase in industry experience, the probability of being resilient decreases by 3% ($P < 0.1$). Yet, the probability of resilience starts to increase at an increasing rate ($P < 0.1$). This result leads us to consider that older business owners may face more difficulty to succeed after natural disasters. The positive sign in the coefficient of *exp2 –*

the square of experience – may be a sign that as business owners gain more experience and are able to establish more contacts with suppliers and community. These businesses may be able to pull more resources to undertake disaster aid. This is especially true as we find that business owners that participate in business, social, sports, or religious groups in the community are 20% more likely to be resilient post-Katrina ($P < 0.05$). Similarly to Marshall et al. (2015), this study finds that owner's perception of business success pre-Katrina lead to a 17% decrease in the probability of being resilient ($P < 0.01$). The data suggest that service-oriented businesses are less likely to be resilient ($P < 0.05$).

Table 13. Ordered Probit Regression Results for Small Business Resilience as the Result of Social Capital. Marginal Effects are Percent Points.

	Ordered Probit			Survived		Recovered		Resilient	
	Coef.	Std. Err.		Marg. Eff.		Marg. Eff.		Marg. Eff.	
scapital	0.38	0.20	**	-15.06	**	1.68	*	13.38	*
female	-0.18	0.22		6.99		-0.78		-6.21	
college	-0.03	0.19		1.21		-0.13		-1.07	
veteran	0.05	0.25		-2.13		0.24		1.89	
experience	-0.08	0.04	**	3.00	**	-0.33		-2.67	**
exp2	0.01	0.01	*	-0.04	*	0.00		0.03	*
HHnumch	-0.02	0.09		0.87		-0.10		-0.77	
noconflict	-0.25	0.21		9.73		-1.08		-8.65	
yearsown	-0.01	0.01		0.36		-0.04		-0.32	
empch	0.01	0.01		-0.15		0.02		0.13	
nocashprob	0.65	0.20	***	-25.75	***	2.87		22.89	***
successpre	-0.48	0.19	***	18.79	***	-2.09		-16.70	***
disasterexp	0.06	0.19		-2.54		0.28		2.26	
emergency	0.07	0.18		-2.64		0.29		2.35	
custcame	0.01	0.19		-0.15		0.02		0.13	
homebased	-0.22	0.26		8.76		-0.97		-7.79	
services	-0.35	0.18	**	13.81	**	-1.54		-12.28	**
changerev	0.15	0.23		-6.05		0.67		5.37	
compart	0.60	0.24	**	-23.73	**	2.64		21.09	**
coastal	-0.25	0.20		9.77		-1.09		-8.68	

N = 199

Pseudo-R^2 = 0.11

Log likelihood = -183.419

4.5.2.2 What Type of Social Capital Has the Greatest Impact for Building Small Business Resilience?

Table 14 displays the coefficients and marginal effects of the ordered probit regression that analyzes the impact of bonding, bridging, and linking on small business resilience. The results suggest that bridging social capital is what drives small business resilience post-disaster. Small businesses located in Mississippi that are able to bridge

between networks and connect with the community are 14% more likely to be resilient ($P < 0.1$). One explanation is that communities with strong collective action are able to effectively adjust resources in the aftershock of natural disasters. We expect that these communities provide sufficient resources, clientele, and support to keep small businesses resilient. Our findings are consistent with the community resilience literature that proposes that collective action can bring the necessary means to successfully overcome disasters (Norris et al., 2008; Adger, 2010; Aldrich, 2011). We propose that collective action, which builds community resilience, may have spillover effects that foster small business resilience during crisis.

Table 14 shows that the other forms of social capital, bonding and linking, are not significantly linked to small business resilience. It is likely that Hurricane Katrina equally stressed family and business due to the family-business interconnection. After a disaster, households may not be able to prioritize business over family needs, and family resources may be directed toward family recovery. Our data shows that over 62% of business owners prioritized taking care of family over business during Katrina. Similarly, business, social, religious, government, or financial institutions resources may be insufficient to foster small business resilience. It is likely that institutions failed to build resilience during Katrina. Only 18% of small business owners received long-term temporary shelter or any volunteer labor to help rebuild their homes, and only 50% of those who completed a SBA loan actually received financial assistance.

Table 14. Ordered Probit Regression Results for Small Business Resilience as the Result of Bonding, Bridging, and Linking Social Capital. Marginal Effects Are Percent Points.

	Ordered Probit			Survived		Recovered		Resilient	
	Coef.	Std. Err.		Marg. Eff.		Marg. Eff.		Marg. Eff.	
bonding	0.11	0.30		-4.02		0.13		3.92	
bridging	0.38	0.22	*	-14.53	*	0.50	*	14.19	*
linking	-0.10	0.23		3.89		-0.15		-3.80	
female	0.09	0.28		-3.44		0.16		3.36	
college	-0.06	0.23		2.43		0.04		-2.37	
veteran	0.27	0.28		-10.34		0.36		10.10	
experience	-0.02	0.05		0.83		-0.02		-0.81	
exp2	0.01	0.01		-0.01		0.01		0.01	
HHnumch	0.06	0.11		-2.09		0.07		2.04	
noconflict	-0.11	0.26		4.16		-0.09		-4.06	
yearsown	-0.01	0.01		0.43		-0.02		-0.42	
empch	0.01	0.02		-0.48		0.02		0.47	
nocashprob	0.74	0.24	***	-27.84	***	0.98		27.19	***
successpre	-0.69	0.23	***	26.14	***	-0.95		-25.53	***
disasterexp	0.16	0.23		-5.91		0.25		5.78	
emergency	0.21	0.22		-8.04		0.27		7.85	
custcame	0.11	0.24		-4.29		0.13		4.19	
homebased	0.28	0.33		-10.46		0.37		10.22	
services	-0.26	0.22		9.98		-0.34		-9.74	
changerev	0.04	0.25		-1.68		0.07		1.64	
compart	0.78	0.30	***	-29.48	**	1.00		28.79	***
coastal	-0.27	0.24		10.14		-0.33		-9.90	

N = 145

Pseudo-R^2 = 0.12

Log likelihood = -134.10

4.6 Conclusions and Implications

Resilience is the capacity of individuals, households, businesses, and communities to adjust to external shocks. Based on studies on East Asian communities, Stiglitz (1996) suggests that one of the most important features for business recovery is the ability to adapt and respond to disruptions. During Hurricane Katrina, most of the disaster

management focused on providing the infrastructure, physical assets, and monetary assistance to recover affected communities. While it is common to foster post-disaster resilience through the lens of the physical and financial resources, the emphasis is shifting towards developing strong community-based networks that can promptly respond to disasters.

The major contribution of this article is the evidence that social capital is a key asset for long-term resilience at the small business level. Our findings are consistent with the recent wave of literature that highlights the importance of community-based resources to face disasters. The results illustrate how small business owners connected to their communities are more likely to overcome disaster and build resilience. The more links business owners have to the community—the more social capital they have—the better off they will be when they go through a natural disaster. In other words, self-reliance alone cannot assure long-term post-disaster recovery.

Social networks are key to build resilience. We propose a proxy for small business resilience by comparing pre- and post-disaster revenues. Eight years after Hurricane Katrina, small businesses that relied on social capital are financially stronger relative to pre-Katrina. This study uses a disaggregated measurement of social capital to carefully identify the mechanisms in which social capital drives small business resilience. We incorporate several social capital indicators to categorize the mechanisms of bonding, bridging, and linking social capital (Aldrich, 2012).

Our results suggest that bridging, rather than bonding and linking, significantly drive small business resilience post-Katrina. During disaster recovery, households may prioritize family over business, while institutions may fail to allocate resources to aid

small businesses. However, community leaders may be able pool resources across sectors and organizations to keep small businesses alive. A major policy implication is that policymakers should consider strategies that encourage multi-sector partnerships between businesses, community organizations, and government. These partnerships can foster social capital, which would result in improved communication and coordination efforts during crisis. Building resilient communities is especially important as natural disasters become more frequent and federal aid tends to be insufficient to cover the economic aftermath. Community-oriented policies are especially important to assist vulnerable groups, when federal resources may not be enough relief for low-wealth families, minorities, and small businesses.

We propose that fostering social linkages can improve the well-being of individuals, households, businesses, and the entire community. Small business owners, community leaders, scholars and policy makers can use this information to target assistance that builds social capital and increases resilience. Incentives and interventions should support the creation and strengthening of community linkages through civic participation and leadership development. An approach to foster social capital is to develop campaigns that strengthen communities' ties and improve the dialogue and trust among community, households, and institutions.

We also contribute to the literature by shedding light on what it takes for small businesses to thrive after a natural disaster. We expect that the combination of social capital with other types of capital enables communities to respond and recover promptly from disruptions. Management skills are key to cope with a disaster. Small businesses with a healthy financial trajectory are more likely to identify sources of capital to

promptly respond to crises. Similarly, managerial skills are vital to strategically allocate resources that serves both family and business post-disaster recovery. This article sheds light on the drivers of post-disaster small business resilience. Further research should investigate additional metrics that measure and evaluate the role of social capital on small business resilience.

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CHAPTER 5. CONCLUSIONS

5.1   <u>Conclusions</u>

The three essays of this dissertation explore individual and firm economic behavior through the lens of social capital. Social capital theory explains how social closeness changes the environment in which individuals perform and influences their decision making (Iyer et al., 2005). The essays analyze how social interactions between individuals, families, communities, and institutions enables the exchange of social resources (Elliott et al., 2010). Each essay measures a different dimension of social capital and utilizes various econometric procedures and databases. We enhance the literature by studying different mechanisms that social capital impacts firm and individual economic decision making. We contribute to the literature by providing empirical evidence that social networks influence the economic performance of organic farmers, Hispanic entrepreneurs, and small businesses. These interactions create new market linkages and lead to collaboration among individuals, households, and communities.

The three essays apply strong econometric techniques to address the lack of identification in the social capital literature. The identification strategy of each essay allows us to control for the possible endogeneity of social interactions on individual and firm

economic behavior. The econometric procedures in the first and second essays address the potential endogeneity between social interactions and individual economic behavior mentioned by Manski (2013). The goal of this identification strategy is to find causal conclusions on the adoption of technology (essay 1) and Hispanic entrepreneurship (essay 2). The third essay empirically tests the SBDRF, a conceptual framework by Marshall and Schrank (2014). While the literature is scant on the mechanisms of social capital and economic performance, the third essay follows Aldrich (2011) to disaggregate social capital and fill the gap in the literature by explaining post-disaster small business resilience.

The first essay uses a simultaneous framework to model marketing choices and adoption of new technologies. Our study – the first one to test for this endogeneity explicitly – supports the presence of endogeneity in the farmer's decision making. The results suggest that social interactions in the market place matter. The mechanism in which social capital affects the adoption of organic certification may be as follows: direct market channels can create strong ties between consumers and producers, which enables agents to exchange information and build new market linkages. The rationale is that when producers and consumers create social ties, there is an interplay between economic (price premium) and social aspects (trust) that serve both the consumer and the farmer.

Organic noncertified producers may be using grower-customer relationships obtained through direct-to-consumer channels to capitalize on price premiums. Thus, noncertified farmers selling directly to consumers may not have economic incentives to certify. It is likely that the grower-customer relationship may be more important than the

organic certification label in local food markets. This finding also highlights the importance of local food systems for organic agriculture and the organic national program.

The second essays investigates the economic implications of social capital on Hispanic entrepreneurship. The results suggest that the communities where Hispanics live shape their labor choices. In other words, Hispanic entrepreneurship significantly depends on the clustering of Hispanics. Low- and high-concentrated Hispanic communities encourage Hispanics to start their own business. These communities may be bringing social resources or offering niche markets that encourage Hispanics to create businesses. Institutions that support communities by trainning and supporting immigrants to achieve economic mobility are key to sustaining long-term economic growth. Policies that assist Hispanic entrepreneurs through the strengthening of ethnic communities, access to resources, and bilingual information could improve the socioeconomic status of Hispanics and their communities.

It seems that entrepreneurship is the way out of poverty for many Hispanics but also a source of employment for many low-wage workers. Hispanic-owned businesses, which tend to be located in low-income inner-city communities, may be a way to reduce unemployment and poverty at the community level. Targeted policies and incentives that provide training and information to low-income immigrant entrepreneurs may be one way of helping immigrant entrepreneurs to succeed, while shrinking poverty and expanding prosperity in economically-depressed communities.

The second essay also tackles Hispanic heterogeneity. Using census data, the second essay provides insight into the intergenerational differences of Hispanic labor choices. Before designing policies, decision-makers should first understand the diversity among

Hispanics and how policies may affect them differently. This study proposes that generational differences across immigrants is not merely an ethnic control factor, but rather an important aspect for the design of strategies and incentives at the federal, state, and local level. Effective policies should focus on these generational differences to accurately promote success among Hispanics.

The second essay uses a series of robust econometric techniques on census data to test our hypotheses. We provide a strong econometric procedure to address the potential endogeneity between social interactions and individual economic behavior mentioned by Manski (2000). Our identification strategy addresses several sources of potential endogeneity such as macro, individual, and peer unobserved characteristics that may affect the probability of self-employment and Hispanic clustering. This econometric procedure yields consistent results and allows us to draw causal conclusions on the main drivers of Hispanic entrepreneurship. Researchers and policymakers can use our findings to increase the availability and efficiency of community-based programs to encourage immigrant entrepreneurship.

The third essay provides empirical evidence that social networks are key to small business resilience. Building resilience in small businesses is especially important as natural disasters become more frequent and federal aid tends to be insufficient to cover the economic aftermath. This study follows Marshall and Schrank's (2014) proposed definition of small business resilience by comparing pre- and post-disaster revenues. Eight years after Hurricane Katrina, small businesses that relied on social capital are financially stronger relative to pre-disaster. This study also uses a disaggregated measurement of social capital to carefully identify the mechanisms of social capital that drive small business

resilience. Our findings are consistent with the recent wave of literature that highlights the importance of community-based resources to face disasters. The results illustrate how small business owners that are connected to their communities are more likely to overcome disaster and be resilient.

The third essay follows Aldrich (2012) and incorporates indicators to categorize the mechanisms of bonding, bridging, and linking social capital. Our results suggest that bridging, rather than bonding and linking, significantly drive small business resilience post-Katrina. During disaster recovery, households may prioritize family over business, while institutions may fail to allocate resources to aid small businesses. In contrast, community leaders can pool resources across sectors and organizations to keep small businesses alive. A major policy implication is that policymakers should consider strategies that encourage multi-sector partnerships between businesses, community organizations, and government. These partnerships can foster social capital, which would result in improved communication and coordination efforts during crisis.

This dissertation provides evidence that social capital is a major determinant of individual and firm decision making. The three essays demonstrate that communities where individuals and firms interact matter. Family, friends, community, and institutions are an important asset to create new market linkages, for economic mobility, and to call upon in a crisis. We propose that fostering social linkages can improve the well-being of individuals, households, businesses, and the entire community. Major policy implications include the creation of strategies that boost social and economic linkages in communities and the availability of community-based programs to encourage participation and leadership development.

Future research should focus on the role of government-sponsored and community based organizations to understand the direct effects of social capital on the economic performance of individuals and firms. Many strategies can emerge from the interaction of local organizations and individuals and firms to provide the resources needed for economic growth.

The effect of social interactions on individual and firm economic behavior cannot be fully analyzed in this dissertation due to data limitations. Primary data used in the first and second essay proxy social capital via use of direct-to-customer market channels and Katrina relief, respectively. However, it is likely that the identification issues of social interactions were not entirely addressed during data collection. Secondary data in the second essay proxy social capital via ethnic clustering. Future work should look into the testing the effects of social networks on individual and firm economic performance using primary data and carefully addressing identification issues.

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Marshall, M. I. and H. L. Schrank (2014). "Small Business Disaster Recovery: A Research Framework." <u>Natural Hazards</u> **72**(2): 597-616

VITA

VITA

FIELDS OF CONCENTRATION
Agribusiness, Entrepreneurship, Production Economics, and Population and Spatial
Economics

DISSERTATION TITLE: Three essays on social capital and entrepreneurship
    Principal advisor: Maria Marshall
    Other references: Michael Delgado, Ken Foster, Brigitte Waldorf

PRE-DOCTORAL STUDIES

Purdue University	Master of Science	2010	Horticulture
Zamorano University	Bachelor of Science	2006	Agronomy
Universidad Catolica Quito	2 years	2002	Business School

ACADEMIC EXPERIENCE
MANUSCRIPTS
Torres, A.P., M.I. Marshall, and M. Delgado. 2016. The Economic Implications of Social
    Capital on Hispanic Entrepreneurship. Journal of Regional Analysis & Policy (*in
    revision*)
Torres, A.P., M.I. Marshall, C.E. Alexander, and M. Delgado. 2015. Are Local Market
    Relationships Trumping Organic Certification? (*submitted to Agricultural
    Economics*)
Currey, C.J., A.P. Torres, R.G. Lopez, and D.F. Jacobs. 2013. The Quality Index: A New
    Tool for Integrating Quantitative Measurement to Assess Quality of Young
    Floriculture Plants. Acta Hort. 1000, ISHS:385-392
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    Propagation of Tecoma stans Influences Seedling Rooting and Growth.
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    Responses and Morphology of Tecoma stans. HortScience 46(3):416—419.
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    Photosynthetic Daily Light Integral on Acclimation, Growth, and Flowering of
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    Electrical Conductivity Measurements in Containers Obtained Using the Pour-
    through Method. HortTechnology 20(3):608–611.

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RESEARCH

Research Assistant for Prof. Maria Marshall, Agricultural Economics, Purdue University, Aug 2012 - present

Research Assistant for Prof. Maria Marshall and Prof. Corinne Alexander, Agricultural Economics, Purdue University, Jan 2011 - Aug 2015

Research Assistant for Prof. Roberto Lopez, Horticulture, Purdue University, Jan 2009 - Dec 2010

Visiting Researcher for Prof. Clifford Sadof, Entomology, Purdue University, May 2008 - Oct 2008

Undergraduate Research Assistant at Zamorano University, Jan 2003 - Dec 2006.

TEACHING

Instructor: Principles of Marketing and Management for Horticultural Businesses, designed and developed to give senior students the skills to entrepreneur. Purdue University, Fall 2015.

Co-Instructor: Economic Impact Analysis for Water Supply for Development Countries, International Service Learning course, Purdue University, Fall 2014 to present

Teaching Assistant and Lab Coordinator: Plant Propagation, Horticulture, Purdue University, Spring 2011

Teaching Assistant: Mathematics, Zamorano University, Spring 2004

Instructor: Spanish Grammar for Adult Farmers, Radio Escuela Francisco Morazan, Honduras, Spring and Summer 2003

PARTICIPATION IN THE UNDERGRADUATE PROGRAM

Ariana Torres taught *Principles of Marketing and Management for Horticultural Businesses* (HORT 435) in Fall 2015. HORT 435 is a three-credit senior level course. Student ratings are as follows: 5=Excellent, 4=Good, 3=Fair, 2=Poor, 1=Very Poor.

Year	Semester	Course Title	Students	Course Rating	Instructor Rating
2015	Fall	HORT 435	10	4.6	4.6

OUTREACH

Presenter: Abriendo Puertas, Leadership Training Program for Latino Parents. Lafayette, IN

Presenter: The New Agriculture, Benefits and Challenges. FENAPROFE Plantain Producers Association. El Carmen, Ecuador, January 2016

Panelist, IMAGINE Middle School Program Workshop. Indianapolis, November 2015.

Co-presenter USDA-RD Training Webinar: The Community Capitals Framework. Purdue Center for Regional Development, August 2015.

Building Resilient Small Business: A webinar. Extension Program Developed for the Agricultural Economics Conference, San Francisco 2015

International Service Learning in Dominican Republic: Water Treatment Solutions for Rural Communities. Agricultural Economics, Purdue University, Fall 2014 - present

Bimonthly Workshops to Greenhouse and Nursery Growers: Field Trips and Extension Meetings in Indiana, Horticulture, Purdue University, Jan 2009 - Oct 2010

USDA-ARS Virtual Grower Software Translation to Spanish: Decision Support Tool for Greenhouse Growers
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RESEARCH ABSTRACTS

Torres, A.P., M.I. Marshall and Michael S. Delgado. 2016. The Economic Implications of Social Capital on Hispanic Entrepreneurship. AAEA Meeting –Agricultural and Applied Economics Association, 31 July – 2 August. Boston, MA.

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Torres, A.P., M.I. Marshall and Michael S. Delgado. 2015. Hispanic Entrepreneurship and Ethnic Clustering. ASBE – Association for Small Business and Entrepreneurship, 23-26 September. Orlando, FL

Torres, A.P., M.I. Marshall and M. S. Delgado. 2015. Does Social Capital Explain Small Business Resilience? A Panel Data Analysis Post-Katrina. AAEA Meeting – Agricultural and Applied Economics Association, 26-28 July. San Francisco, CA

Torres, A.P., M.I. Marshall, and C.E. Alexander. 2013. Does Proximity Determine Organic Certification? AAEA Meeting – Agricultural and Applied Economics Association, 4-6 August. Washington D.C.

Torres, A.P. and R.G. Lopez. 2010. Propagation Photosynthetic Daily Light Integral Influences Morphological Plasticity, Rooting, Growth, and Quality of *Tecoma stans* seedlings. ISHS Meeting, 22-27 Aug. Lisbon, Portugal. XXVIIth International Horticultural Congress.

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SCIENTIFIC, EXTENSION AND OUTREACH ORAL PRESENTATIONS

Torres, A.P. 2016. El Emprendedorismo Latino en US. Abriendo Puertas Meeting – Leadership Training Program for Latino Parents. 23 March. Lafayette, IN

Torres, A.P. 2016. La Agricultura del Siglo XXI. FENAPROFE Meeting – Federacion Nacional de Productores de Platano en El Carmen. 29 January. El Carmen, Ecuador

Torres, A.P., M.I. Marshall, C.E. Alexander, and M.S Delgado. 2016. Is Local the New Organic? The Marketing Decision of Small Food Businesses. USASBE Meeting –

United States Association of Small Business and Entrepreneurship. 9-12 January. San Diego, CA

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Torres, A.P. and M.I. Marshall. 2013. Does Proximity Determine Organic Certification? AAEA & CAES Joint Annual Meeting, 4-6 August. Washington D.C.

Gibson, K.D., J.M. Gomez, and A.P. Torres. 2013. Do Certified and Uncertified Fresh-market Organic Tomato Farmers in the Midwest Manage Weeds Differently? ASHS Meeting – American Horticultural Annual Congress. 22-25 July. Palm Desert, CA.

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Torres, A.P. 2010. Measuring pH and Electrical Conductivity in Large Containers. Indiana Green Expo – January 7. Indianapolis, IN

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Torres, A.P. 2010. Measuring pH and Electrical Conductivity in Large Containers. Indiana Flower Growers Association – October 6. West Lafayette, IN.

Torres, A.P. 2009. *Tecoma stans* a New Tropical Floriculture Crop for Indiana. Indiana Flower Growers Association – 5 October. West Lafayette, IN

SCIENTIFIC POSTER PRESENTATIONS

Torres, A.P., M.I. Marshall and Michael S. Delgado. 2016. The Economic Implications of Social Capital on Hispanic Entrepreneurship. AAEA Meeting –Agricultural and Applied Economics Association, 31 July – 2 August. Boston, MA.

Torres, A.P., M.I. Marshall and Michael S. Delgado. 2015. Does Social Capital Explain Small Business Resilience? A Panel Data Analysis Post-Katrina. AAEA Meeting – Agricultural and Applied Economics Association, 26-28 July. San Francisco, CA

Torres, A.P. and M.I. Marshall. 2013. Does Proximity Determine Organic Certification? Small Farm Conference, 1-2 March. Danville, IN.

Torres, A.P. and M.I. Marshall. 2013. Determining the Barriers to Organic Certification: An Explanatory Analysis of Information. Indiana Horticultural Congress. 22-24 January. Indianapolis, IN.

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Torres, A.P. and R.G. Lopez. 2010. Photosynthetic daily light integral during propagation affects growth and quality of *Tecoma stans* seedlings. Latino Scholars Forum – Latino Faculty and Staff Association at Purdue University. September. West Lafayette, Indiana.

FELLOWSHIPS, AWARDS, AND GRANTS

2016	Outstanding Paper – Jarvin Emerson Student Paper Competition for Mid-Continent Regional Science Association Conference
2016	Bilsland Dissertation Fellowship – Purdue University
2016	Primary Collection Data Grant, Latino Cultural Center at Purdue University
2015	Finalist, Graduate Student Extension Program Competition at AAEA 2015
2015	Primary Collection Data Grant, Purdue University
2015-2014	International Learning Service Projects, H2O International
2015	US Borlaug Summer Institute on Global Food Security Fellow
2015	StartOut Entrepreneurship Scholar
2015	USASBE Doctoral Consortium Scholar
2012	AAHHE USDA Graduate Fellowship
2011	Graduate Research Scholarship Agricultural Economics Department
2010	Virtual Grower Software Translation, USDA-ARS
2009	Allen Hammer Scholarship, Indiana Flower Growers Asso.
2009	Graduate Research Scholarship Horticulture Department
2006	Cum Laude Bachelor of Science Zamorano University
2003-2006	Dean's List of High Honor Students Zamorano University
2003	Undergraduate Scholarship Zamorano

INDUSTRY EXPERIENCE

Founder, Association of Plantain Producers of El Carmen, Manabi Ecuador, May 2007 – Dec 2008

Owner and CEO, Finca las 3 Marias, plantain production, Manabi Ecuador, May 2007 - Apr 2008

Owner and CEO, The Game Center, console renting company, Manabi Ecuador, Dec 2006 – Apr 2008

Undergraduate Field Researcher, Zamorano University, Honduras, Jan 2003 – Dec 2006

Ornamental production field assistant of plant propagation and pest management

Dairy production and nutrition assistant of probiotic usage and field experiments

Fruit propagation and production field assistant for citric and mango

Vegetable production field assistant in transplanting, harvesting, and distribution of lettuce, jalapenos, sweet peppers, onions, sweet potatoes, asparagus, melons, and carrots.

Marketing and sales assistant: investigated customer profile of Zamorano Produce Store

Sales Coordinator, GIFTCO, online gift delivery company, Quito Ecuador, Nov 2001 - Dec – 2002

Assistant Manager, Huaira Gourmet Restaurant, Quito Ecuador, Jun 2000 – Oct 2001

Intern Human Resources, XEROX Corporation Ecuador, Quito Ecuador, May 1999 - Aug 1999

Intern Marketing, XEROX Corporation Ecuador, Quito Ecuador, Feb 1999 – Apr 1999

OTHER INFORMATION

Skills	Core curriculum design and development, grant proposal writing and budgeting, Service-Learning experiential class, data collection techniques (survey, focus groups, interview), econometrics analysis, working across disciplines, leadership, team work, community service involvement, software knowledge (R, Stata, SAS, GAMS, Phyton, GeodaSpace, SPSS, Sigmaplot), working with print and television media
Affiliations	USASBE - United States Association for Small Business and Entrepreneurship AAEA - Agricultural & Applied Economics Association SACNAS -Society for Advancement of Chicanos/Hispanics and Native Americans in Science ASHS - American Society for Horticultural Science ISHS - International Society for Horticultural Science Zamorano Alumni Association at Purdue GAMMA SIGMA DELTA Zamorano Chapter Bicycle Lafayette Advocacy Group
Languages	Spanish (native) English (fluent) Portuguese (intermediate) Italian (beginner)

Other	Poster Judge for the Undergraduate Research Poster Symposium, April 2016 Communications Director for Minority and Women and Entrepreneurship Group at USASBE, 2015 Poster Judge for the Summer Undergraduate Research Fellowships SURF Symposium at Purdue University, 2015 Midwest Organic and Sustainable Education Service Workshop, 2012 OFA Ohio Floriculture Association Short Course, 2009 Vice-president Horticulture Graduate Student Organization, 2009 Assistant Coach for Greater Lafayette Soccer Association U-8, 2009-2010 Innovation and Creativity ESEN Workshop, El Salvador, 2005 Central American Congress of Pesticides and Organic Fertilizers, Nicaragua, 2005.
Citizenship	Ecuadorian F-1 visa