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ABSTRACT

Microentrepreneurs' Gender Difference in Labor Demand

This paper empirically examines firm owners' gender difference in labor demand. We estimate the average treatment effect (ATE) of female ownership on employment of the firm using the 2007 Survey of Business Owners (SBO) Public Use Micro Sample (PUMS), provided by the U.S. Census Bureau. Because female microentrepreneurs potentially demand more labor so as to allocate time for household production, we hypothesize a condition under which female microentrepreneurs employ more, and that is, if they are free from financial constraints. We show first that the estimation of the ATE for female ownership can have a downward selection bias that may yield negative ATE estimates, and this downward selection bias comes from male owners being less financially constrained than female owners. We then perform the two-stage least squares (TSLS) estimation using two sets of instrumental variables (IVs), which are indicator variables for i) inheritance; and ii) loans from bank or family/friend. The estimation results present that the female owner effect on labor demand as local average treatment effect (LATE) is identified and consistently estimated by using the IVs. From the main model estimation, we find a positive and statistically significant female owner effect that female owners hire more employees than male owners by about 25.8%.

JEL Classification: G31, J16, J22, J23, L26, M13

Keywords: entrepreneurship, gender, labor demand, startups

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1 Introduction

One of the reasons women are unable to compete favorably with their male counterparts in the labor market is that they generally devote more time than men to household responsibilities (Bertrand, 2018). While men are more likely to cite making money as their motivation for starting a business, women are motivated more by the flexibility entrepreneurship affords, and pursue entrepreneurship to better manage the conflict between labor market and household responsibilities. These necessity-driven entrepreneurship activities are less growth-oriented than opportunity-driven entrepreneurship and are found more in sectors that have low entry barriers and provide services locally (Fairlie and Fossen, 2020).

Previous literature on gender focus mainly on showing gender disparities in many aspects such as female workers being less compensated and female entrepreneurs being less profitable. Also, they identify obstacles that prevent female entrepreneurs from performing as well as their male counterparts (Platt et al., 2022). Financial constraint is one of the obstacles that leads to female-owned enterprises being less profitable (de Mel et al. (2008), de Mel et al. (2009), de Mel et al. (2012)). From an efficiency standpoint, resources in an economy should be allocated to their most productive use, and it sounds reasonable that resources should not be committed to promoting female entrepreneurship because female entrepreneurs do not perform as well as their male counterparts. However, since increasing employment is another way to improve economic outcomes, then promoting female entrepreneurship becomes worthwhile if they employ more than their male counterparts. Our motivation is to explore this possibility. In other words, it is a good rationale to promote female entrepreneurship if we can find that female firm owners employ more in identical situations, not only to mitigate gender disparities in entrepreneurship but also to improve economic efficiency. To our knowledge, this emphasis on employment has not received much attention in the literature.

We empirically examine gender differences in labor demand. Specifically, we estimate a female-owner effect on employment in U.S. microenterprises. Using the 2007 Survey of

Business Owners (SBO) Public Use Micro Sample (PUMS), we create a data set for single-owner firms operating in the U.S. and estimate the average treatment effect (ATE) of female firm ownership. We demonstrate a counterfactual model for labor demand and show that the ATE cannot not be identified if interest cost assignments between female and male firm owners are endogenous. In other words, female owners might be financially constrained and pay higher capital (interest) costs than their male counterparts, if they attempt to utilize the same amount of capital input as the male owners. This gender difference in financial constraint is unobservable and can cause difference in labor demand. We use indicators for financing methods of startup capital as IVs and estimate the female ownership effect on employment as local average treatment effect (LATE).

From the main estimation result, we find that female firm owners are likely to hire more than their male counterparts. The OLS estimates report substantially smaller female owner effects, which could be an evidence of endogenous interest cost assignment that cause a downward bias of the estimate. This pattern is more clearly shown in the probability model estimates as the female-owner effect is positive in IV estimations but negative in OLS and probit estimations without IVs. We find the positive female-owner effect is robust with different model specifications and subsamples. The LATE estimate is significantly positive with the standard labor demand model, where it is widely used for wage elasticity estimations. The LATE estimates by firm owners' hours per week are either significantly positive or statistically irrelevant. The tradeoff between workers and hours is one of immediate concern in labor demand estimations, that firms are likely to hire more employees when each worker's hours are less and vice versa.[1] The 2007 SBO does not provide individual workers' hours,

[1] Hamermesh (1996) explains the hours-employment tradeoff problem in labor demand estimation. Assuming that effective labor input is multiplicative in employment and hours is unrealistic particularly along the hours of work dimension. Firms can increase their effective labor by increasing either employment or hours, not necessarily together. In most cases, labor demand estimation omits hours of work and estimates demand elasticity with respect to wage. And the labor demand elasticity estimate might be biased if wage and omitted hours of work are correlated. To check this issue, we separately estimate the model and LATE parameter by owners' hours of work, based on the assumption that owners' hours and employees' hours are highly correlated in microenterprises. We find no differences in the LATE estimate across different owners' hours. For details, see section 5.1.

but the owners' hours are available. Most sample firms in the 2007 SBO, in addition, are microenterprises with less than 5 employees. We thus use the owners' hours as a proxy for workers' hours and check whether the tradeoff is endogenous in our LATE estimations, under the assumption that workers' hours and owners' hours are strongly correlated. Our findings reveal no differences with and without owners' hours.

The LATE estimates by family related subsample show that female owners are likely to demand more employees in two ways. First, for non-homebased firms, female owners demand more employees than their male counterparts. Second, female firm owners running their business without a spouse/family demand more employees than their male counterparts. The LATE estimates by family-related workplace conditions report that the female effect is significantly positive if their businesses are i) non-homebased, ii) without spouse, and iii) non-family business, and the opposite cases are either statistically insignificant or even negative. These indicate that, in order to have workplace flexibility for family, female owners demand more employees. In other words, female owners are less likely to demand more employees than their male counterparts, if they have an alternative means of taking care of family at home, such as running businesses at home or with spouse and family.

Our paper contributes to the labor economics literature on gender differences in the demand for workplace flexibility. Goldin and Katz (2011), a seminal work in this strand of literature, finds that female workers in high-powered professions are penalized in their careers if they demand workplace flexibility because of family responsibilities. Wiswall and Zafar (2018) finds large differences between men and women in willingness to pay for favorable job characteristics, with females having a higher likelihood of accepting and staying on in jobs offering greater workplace flexibility. They find that gender difference in wages can be explained in part by women purchasing positive job attributes like workplace flexibility. Other studies in this line are Mas and Pallais (2017) who perform a field experiment on the employment process of a national call center and find that of all the workplace flexibility options they consider, working from home is the most valued, and that women are more

likely than men to select flexible work arrangements. Other works in this area include Goldin (2014), which finds that the gender pay gap would be considerably reduced if firms have no incentive to reward workers that do not demand flexibility; and Bertrand et al. (2010) which finds a larger discrepancy in labor market outcomes in sectors known to penalize for job flexibility.

Our work is also closely related to literature on microentrepreneurship, though the majority of existing studies in this area focus on developing countries where formalization is largely optional.[2] Jayachandran (2021) loosely defines microenterprises are businesses with less than 5 employees and surveys the literature on gender differences in several aspects of microenterprises' operations. The seminal work done by de Mel et al. (2008), de Mel et al. (2009), and de Mel et al. (2012) find that randomly assigned capital grants make for different returns to capital between female-owned and male-owned firms. Their field experiment conducted in Sri Lanka reports that male-owned firms made positive returns with respect to the random grants, whereas female owned firms did not. Many subsequent field experimental studies on developing countries report the same gender difference in returns to capital consistently (Fafchamps et al., 2014; Blattman et al., 2014; Berge et al., 2015; Fiala, 2018; Mas and Pallais, 2017).[3] Jayachandran (2021)'s review of the literature on hiring barriers for microenterprises provides that the majority of microentrepreneurs do not hire employees other than their family members. de Mel et al. (2019) conduct another field experiment on hiring barriers in Sri Lanka where wage subsidy offers are randomly assigned to microenterprise owners and they examine their responses on employment. They report a significantly positive effect on employment, but the effect does not extend beyond the end of the subsidy. Jayachandran (2021) points out that although a number of studies examine the hiring barri-

[2]Our research focus is single-owner firms in the U.S., and this makes a major difference from the literature on microentrepreneurship. As noted in Jayachandran (2021), most microenterprises in developing countries are not formally registered with the government. Several studies therefore examine the potential effects of formalization on these microenterprises in developing countries. Every firm in our dataset, however, is registered with the IRS and so the issue of formalization is not applicable. Also, we do not restrict our dataset to firms with less than 5 employees, but more than 95% of our sample are firms with less than 5 employees.

[3]See Bernhardt et al. (2019).

ers in many aspects, gender differences in hiring barriers have not been explicitly examined in the literature.

Studies on self-employed business owners in the U.S. are also closely related to our work. Fairlie and Miranda (2017) examine hiring decisions of U.S. start-ups and small businesses, and seek for the determinants of their first hirings. They find that start-ups are most likely to be nonemployers, but growth-oriented start-ups among them are more likely to hire first employees within 7 years of beginning their businesses. They report that female-owned start-ups are less likely to hire employees than their male counterparts. Fairlie and Krashinsky (2012) reexamine the liquidity constraint hypothesis that entrepreneurship is an increasing function of asset. In other words, potential entrepreneurs cannot open their businesses though they are willing to, because they do not own sufficient assets. Hurst and Lusardi (2004) point out that the positive relationship between business entry rate and asset level occurs only for extremely wealthy individuals, and the rest, or the most, are having no significant association. By separating the potential entrepreneurs into job losers and non-job losers, they find the positive relationship again. Fairlie and Robb (2007a) find that having self-employed in families increases likelihood of being self-employed, but very few small businesses were inherited. And, they examine gender differences and find no significant differences. Fairlie and Robb (2007b) relate the family composition to underperformance of minority business owners that minority business owners have much less likely had a self-employed family member and work for family business.

Our focus is microenterprises in the United States, a segment that has not been explored in the literature. We revisit employment of microenterprises by taking hiring barriers and gender differences in financial constraint into account. Although hiring frictions can exist for enterprises of any size, they are relatively more costly for microenterprises as they may be unable to match larger corporations in job quality and job security. This may result in less-motivated employees and consequently a concern about moral hazard and firing costs. Another barrier to hiring is that an employee's productivity might be initially low, and a

credit-constrained firm might be unable to bear this initial period of losses during which wages exceed productivity (Jayachandran, 2021). Due to these hiring barriers, many microenterprises have no employees outside the owner's family. However, to our knowledge, gender differences in hiring barriers have not been much explored in the literature. We therefore build on the literature on gender differences in returns to capital that is determined in part by gender differences in financial constraint (de Mel et al. (2008), de Mel et al. (2009), de Mel et al. (2012), Bernhardt et al. (2019)).

Following this introduction, in section 2 we present a background of how we came up with the idea that female owners can employ more. Section 3 is about identification that discusses a possible source of bias we may face and how we resolve it empirically. Our data is explained in section 4, and our empirical results in section 5. Section 6 is the conclusion.

2 Background

In this section, we provide a background for our main argument that female firm owners are likely to employ more labor than their male counterparts. In the standard neoclassical model of labor demand, both female and male firm owners should have the same demand for labor because they have the same goal of profit-maximization. Under the same conditions, female and male firm owners have the same optimal number of employees for their firms, and therefore the gender difference in labor demand does not exist. However, we hypothesize that female owners demand more labor because of their demand for workplace flexibility. The intrahousehold bargaining model explains how women usually are the ones that adjust their schedules and make compromises when the needs of other family members conflict with the demands of paid work outside the home. When women venture into entrepreneurship, the challenges of home production while somewhat mitigated, are however still present. Financial constraints differ by gender and might cause biased estimation of gender differences in employment. In other words, female firm owners are more financially constrained than

their male counterparts, and they have less resources to hire a sufficient number of employees. To appropriately estimate this gender difference in employment, we need to control for the endogeneity resulting from the gender difference in financial constraint.

2.1 Intrahousehold Bargaining Model

Households were viewed initially as a collection of individuals who agreed on how best to combine their time between household production and labor market production. The idea of time allocation was introduced by Becker (1965) in his utility-maximizing model of goods which are produced by both time and market inputs, and where the household is viewed as a collection of individuals with a single set of goals, who agree on how best to combine their time, goods purchased in the market, and goods produced at home. This unitary model allowed for different prices for household members (for example, individual wages) and the household members were believed to pool all their resources, have common preferences, and therefore act as one. Becker (1973) later extended this analysis to include household decisions about some other aspects of life like childcare and labor supply.

However, many early studies have shown that this unitary model does not always hold. Several factors, including the relative incomes of the household members, may affect the final allocation decisions (for example, labor supply) made by the household during the process of intrahousehold bargaining (Browning and Chiappori, 1998; Chiappori, 1999; Browning and Meghir, 1991; Blundell et al., 1992). Chiappori (1988) developed a collective model which assumes that each person in the household has their own preferences and that collective decisions are Pareto efficient.

According to Becker's analysis, comparative advantage and learning by doing may influence intrahousehold division of labor. Economic efficiency requires that if one household member must stay at home to attend to home production, it should be the one with the lowest wage relative to their productivity in domestic chores. In the labor market, women generally earn less than men and are significantly underrepresented in leadership positions

(Bertrand et al., 2010; Blau et al., 2010). One explanation for gender wage gaps is that these arise in part by women "purchasing" certain positive job attributes (for example, job flexibility, shorter hours and time off) by accepting lower wages, and men accepting higher earnings to compensate for negative job attributes. Wiswall and Zafar (2018) find that women have a higher WTP on average for jobs with greater flexibility and job stability, and men have a higher WTP for jobs with higher earnings growth. Their findings of large differences in WTP for job amenities are consistent with prior work noting that women are more likely to be found in jobs offering greater workplace flexibility (Goldin and Katz, 2011; Flabbi and Moro, 2012; Goldin, 2014; Wasserman, 2015).

Labor supply intrahousehold bargaining outcomes can also be subject to customs and social norms where household members are expected to perform the tasks assigned to them by society according to their sex and status. For all these reasons, women are likely to venture into entrepreneurship as a means of better managing the sometimes-conflicting demands of the labor market and the household. The challenges of managing home production while somewhat mitigated, are however still present when women venture into entrepreneurship, and hire employees while being present.

2.2 Demand for Workplace Flexibility

Our main argument is that female firm owners potentially demand more labor than their male counterparts. In order to allocate more time for household works, female firm owners have an incentive to hire more employees so as to be able to work less for their firms. Edwards and Field-Hendrey (2002) is one of the earliest studies on gender difference in labor supply behaviors. They find that women with young children, disabled, or living in rural areas prefer home-based work with lower fixed costs of working. Edwards and Field-Hendrey (2002) demonstrates a model for labor force participation and show that the reservation wage and hours for home-based works are different from that of on-site works. Further, home-based workers are more likely to be self-employed. These gender differences

in labor supply behavior are due to willingness to engage home production. Goldin and Katz (2011) examine gender difference in demand for workplace flexibility. They argue that having families for women incur pecuniary penalties, and these penalties lead to the women demanding workplace flexibility.

Following Goldin and Katz (2011), a number of recent studies come up with empirical evidences that women have greater fixed costs of labor force participation than men when they have families, especially children. Field experimental studies on WTP for flexible work report consistently that females have higher WTP for flexible work than males (Wiswall and Zafar (2018); Mas and Pallais (2017)). Commute time to work is another measure for examining gender differences in demand for flexible work, and it is shown that females prefer shorter commutes more than males (Le Barbanchon et al. (2021)). These gender differences in WTP for flexible work can turn out to be different fixed costs of labor supply between men and women. One of the main causes of the different fixed costs is "child penalty" that households need to allocate additional resources, especially time for childcare, and women are more likely to seek for spending less time for work (Adda et al. (2017); Kleven et al. (2019)). This women's earning penalty for bearing and caring for children can be explained by the intra-household bargaining model. Kleven et al. (2019) explains that the persistent female earning penalty comes from a family institution where women from traditional families with working fathers and stay-home-wife mothers are more likely to take the earning penalty.

2.3 Gender Differences in Financial Constraint

The field experimental studies on gender differences in investment returns suggest that the differences can be explained by endogenous capital allocation within households. In other words, female firm owners may not fully utilize capital for their businesses but may instead allocate the capital for their households, or husbands' businesses. de Mel et al. (2009) finds that female firm owners with greater bargaining power in their household and more cooperative husbands are likely to invest more in working capital and make positive investment

returns. Bernhardt et al. (2019) uses data from previously done field experimental studies to reevaluate the cause of gender differences in returns to business grants as exogenous capital gain, and finds that female microentrepreneurs are more likely to allocate the capital gain into their husband's business.

Studies on microenterprises in developing countries show that financial constraint is endogenous. de Mel et al. (2009) reports a field experimental evidence that female micro enterprise owners make lower investment returns than their males. The field experiment in Sri Lanka was designed to examine differences in income gain by micro enterprise owner's gender. About US $1,000 unconditional business grant were provided randomly among the participants. de Mel et al. (2009) finds that female-owned enterprises failed to make positive returns to the randomly assigned grant, whereas male-owned enterprises report significantly positive return. This finding is consistently reported by subsequent field experimental studies such as Fafchamps et al. (2014); Berge et al. (2015); Fiala (2018); Mas and Pallais (2017) done in different experiment site Ghana, Tanzania, Uganda, and Nigeria respectively. Blattman et al. (2014) reports a different result from their field experiment in Uganda, that both female and male micro enterprise owners make positive return with respect to random business grants. But their experiment targeted young adults, and the experiment samples are relatively young compared to the other studies.

3 Identification

We statistically identify the female owner effect on labor demand as a local average treatment effect (LATE), and estimate it using two-stage least squares (TSLS). Simply, LATE is an instrumental variable (IV) estimation of ATE with binary IVs. Consider the cost-minimization of a firm, as in Hamermesh (1996) to derive labor demand, denoted L. An observable form of the labor demand function is $L^* = L^d(w, r, Y)$, where w is wage, r is interest, and Y is output level. Consider a binary indicator variable $D_i = \{0, 1\}$ for the gender of firm i's

owner. We use D_i as a female owner indicator so $D_i = 1$ if firm i's owner is female. For any firm, there are two potential labor demand variables:

$$\begin{aligned} L_i &= \begin{cases} L_{1i} & \text{if } D_i = 1 \\ L_{0i} & \text{if } D_i = 0 \end{cases} \\ &= L_{0i} + (L_{1i} - L_{0i}) \cdot D_i. \end{aligned} \tag{3.1}$$

The observable labor demand for firm i consists of two potential labor demand. That is L_{1i} if firm i is managed by a female owner, and L_{0i} if the manager is male. Our causal effect of interest is $L_{1i} - L_{0i}$, the difference in labor demand by gender, but it is not directly observable. Instead, what we can observe with L_i and D_i is

$$\begin{aligned} \underbrace{\mathrm{E}[L_i|D_i = 1] - \mathrm{E}[L_i|D_i = 0]}_{\text{Observed difference in average}} = \underbrace{\mathrm{E}[L_{1i}|D_i = 1] - \mathrm{E}[L_{0i}|D_i = 1]}_{\text{average treatment effect on the treated}} \\ + \underbrace{\mathrm{E}[L_{0i}|D_i = 1] - \mathrm{E}[L_{0i}|D_i = 0]}_{\text{selection bias}}. \end{aligned}$$

We argue that the selection bias is negative because male owners are less financially constrained, and thus, for given wage w and output Y,

$$L_{1i}(w, r_1, Y) \leq L_{0i}(w, r_0, Y) \tag{3.2}$$

where r_1 and r_0 are the interest cost for female and male owner firms respectively. Male owners are less financially constrained than female owners and would have lower interest costs, so that $r_1 \geq r_0$. The $\mathrm{E}[L_{0i}|D_i = 1]$ is a counterfactual of an average labor demand for male owner firms under female owner firms' financial condition. Likewise, $\mathrm{E}[L_{0i}|D_i = 0]$ implies an average labor demand for male owner firms under male owner firms' financial condition. For financial institutions that firm i would like to borrow capital from, L_{1i} and L_{0i} are unobservable so that they apply r_1, and r_0 by looking at the treatment status D_i.

Therefore,

$$\begin{aligned} &\mathrm{E}[L_{0i}|D_i = 1] - \mathrm{E}[L_{0i}|D_i = 0] \\ &\qquad = \quad \mathrm{E}[L_{0i}|D_i = 1, r = r_1] - \mathrm{E}[L_{0i}|D_i = 0, r = r_0] \\ &\qquad \leq \quad 0 \end{aligned}$$

The interest cost assignment r_1, r_0 are useful for the LATE parameter to be identified and consistently estimated. Monotonicity is one of the four LATE assumptions to be a consistent estimator. It asserts that the treatment assignment is accepted in the same way by all individuals. That is $D_{1i} \geq D_{0i}$ or $D_{1i} \leq D_{0i}$ for all i. In our case, $D_{1i} \leq D_{0i}$ meaning that firm owners prefer to be treated as male because of financial constraints and interest cost $r_1 \geq r_0$.

We use indicator variables for start-up capital formation, bank loan and family/friend loan as IVs. Inheritance is another indicator variable that we use as an IV. It is 1 if a business owner was bequeathed the business as inheritance, and 0 otherwise. Thus it differentiates firms with and without financial constraints. Since the firm owners receiving the businesses as inheritance have no interest cost, the inheritance IV is strongly correlated with interest cost and uncorrelated with wage level and product demand shock. We argue that the IVs are valid for following reasons: i) the start-up capital formation is correlated with interest cost r, so with D_i; and ii) and it is uncorrelated with wage level and product demand shock.

With the IVs, the female owner effect on labor demand can be identified and consistently estimated as local average treatment effect (LATE). To show this, consider a simple linear regression model from (3.1)

$$\begin{aligned} L_i &= L_{0i} + (L_{1i} - L_{0i}) \cdot D_i \\ &= \mathrm{E}[L_{0i}] + (L_{1i} - L_{0i}) \cdot D_i + (L_{0i} - \mathrm{E}[L_{0i}]) \\ &= \alpha + \rho_i \cdot D_i + \eta_i, \end{aligned}$$

where ρ_i is a random coefficient representation of the ATE, and η_i is an error term.

LATE estimate with multiple instruments is a weighted average of Wald estimators for each instrument. In our case, the female owner effect on labor demand is estimated as the weighted average of two Wald estimates, one with bank loan indicator and the other with family/friend loan indicator. Let Z_{0i} be the inheritance indicator, and let Z_{1i} and Z_{2i} be the bank loan indicator and family/friend loan indicator variables respectively. For the inheritance IV, the LATE parameter, denote ρ as an average of the random coefficient ρ_i can be identified

$$\begin{aligned} \mathrm{E}[\rho_i | D_{1i} < D_{0i}] &= \frac{\mathrm{Cov}(L_i, Z_{0i})}{\mathrm{Cov}(D_i, Z_{0i})} \\ &= \rho \end{aligned} \tag{3.3}$$

For the ATE estimation of ρ_i, we have two IV estimands,

$$\rho_1 = \frac{\mathrm{Cov}(L_i, Z_{1i})}{\mathrm{Cov}(D_i, Z_{1i})}, \quad \rho_2 = \frac{\mathrm{Cov}(L_i, Z_{2i})}{\mathrm{Cov}(D_i, Z_{2i})}.$$

With the first-stage fitted value $\hat{D}_i = \pi_1 \cdot Z_{1i} + \pi_2 \cdot Z_{2i}$, the two-stage least squares (TSLS) estimand for ρ is then

$$\begin{aligned} \rho &= \frac{\mathrm{Cov}(L_i, \hat{D}_i)}{\mathrm{Cov}(D_i, \hat{D}_i)} \\ &= \psi \cdot \rho_1 + (1 - \psi)\rho_2, \end{aligned} \tag{3.4}$$

where

$$\psi = \frac{\pi_1 \cdot \mathrm{Cov}(D_i, Z_{1i})}{\pi_1 \cdot \mathrm{Cov}(D_i, Z_{1i}) + \pi_2 \cdot \mathrm{Cov}(D_i, Z_{2i})},$$

is a fraction. Intuitively, the inheritance status would be a stronger IV than the loan IVs but the number of firms with inheritance in the 2007 SBO is very small. We thus estimate

the female owner effect ρ using (3.3) and (3.4) with the inheritance IV and the loan IVs separately. To check the validity of the IVs, we will carefully examine the first-stage F-test and the endogeneity test.

4 Data

We make use of the 2007 SBO PUMS to create a dataset for the labor demand model estimation with owners' gender.[4] The SBO is a 5-year period survey for operating firms and companies in the United States, conducted by The Census Bureau. Firms in the survey are randomly selected from the list of firms that filed their tax report with the Internal Revenue Service (IRS). The Census Bureau obtains the sample firms' employment numbers, payroll, and receipts from their IRS tax reports. Other information related to the firm owners' demographics and their business operations are collected via mail. There are 663,385 single owner firms from a total of 2,165,680 firm records in the 2007 SBO sample. In our dataset, about 33% of the firms are female-owned.

[Table 1 about here.]

Table 1 reports descriptive statistics for the SBO data by firm owner's gender. The statistics in Table 1 are all weighted by the SBO tabulation weight. Start-up capital is originally given as a categorical variables but we calculate and report its descriptive statistics by assigning the middle value of each category. Inheritance, bank loan, and family loan are binary indicator variables to be used as IVs. In its questionnaires, the SBO has inheritance status and start-up capital formation method in its questionaries, which we use to create the three binary IVs. Differences between female and male owners in production related variables

[4] As of October 2022, the 2007 SBO is the most recent that has been made publicly available by the US Census Bureau, although it is already several years old. We agree that the circumstances for dividing women's time into market and nonmarket work changed significantly only due to technological aspects. Further, by looking at our robustness checks, we find consistent evidence that support the view that the underlying causal link between the demand for flexible work and firm performance is consistent under different conditions. We thank an anonymous referee for raising this point.

are clearly shown in Table 1, whereas differences in financial constraints or demographic variables are not. For male owner firms, the average employment and start-up capital size are about twice as large as female owner firms, though the standard deviations are way too big to confirm that the differences are statistically significant. Payroll expense of male owner firms, on average, are about three times bigger than for female owner firms. These are weak and insignificant evidences that female owner firms are smaller than male owner firms in terms of production inputs, capital and labor.

Our identification strategy is to use inheritance, and loan from bank or friend/family as IVs. The inheritance IV seems to have too few treatment observations, 1.1% female owner firms and 1.0% male owner firms, and this may cause inconsistent estimation due to weak instrument. This is one of the reasons that we consider the other set of instrumental variables, loan from bank or friend/family. About 19.54% of female owners have issued loans from either bank or friend/family. The fraction for male owners is 25.27%. There might be a trade-off between the inheritance IV which has much stronger correlation with unobserved interest cost but too few observations, and the loan IVs having not much strong correlation but relatively enough observations. We therefore estimate the female owner effect with inheritance IV and loan IVs separately, and carefully examine test statistics for their endogeneity and first-stage F-test.

5 Empirical Results

[Table 2 about here.]

From the main model estimates, we find that the female owner effect is significantly positive on employment. The ATE estimates indicates that female owner firms are likely to hire about 25.8% more employees than male owner firms. The ATE estimates from the main model are reported in Table 2. The first two columns are the OLS estimates and the two in the middle are the IV estimates with the inheritance IV, and the two on the right panel

are the TSLS estimates with the loan IVs. We argue that the ATE estimate in column (4)—the inheritance IV estimate with the control variables—is the most reliable for several reasons. First, the endogeneity test F-statistic does not reject the null hypothesis that the IV is exogenous to the error term at the 5% significance level. Second, it's first stage F-statistic is greater than for any other estimates. The OLS estimate without the control variables in column (1), a naïve estimate of the ATE, is significantly negative. This result is consistent with our prediction that the ATE estimate can have a downward bias due to the endogenous interest cost assignment.

The main model estimation results, reported in Table 2, also suggest that the inheritance IV performs better than the loan IVs for unbiased estimation of the ATE. All of the four IV estimates from columns (3) to (6) are significantly positive, but their sizes are substantially different. This size difference might be the result of biased estimation due to weak instruments. By looking at the first stage F-statistics, reported in the last row in Table 2, we can see that the inheritance IV estimates have F-statistics well above 10, which is a well known threshold for IVs being free from the problem of weak IVs, as proposed by Stock et al. (2002). In contrast, the loan IV estimates have F-statistics around the threshold value 10, and the coefficients are much greater than those of the inheritance IV estimates. These first stage F-statistics indicate that weak IVs for the endogenous interest cost assignment cause upward bias, and overestimate the ATE of female owners.

[Table 3 about here.]

The first-stage model estimates of the IV estimates support also that the inheritance IV performs better for consistent estimation of the ATE. Table 3 reports the first-stage regression model estimation results using OLS and probit regression. Note that the dependent variable of the first-stage model is the female ownership indicator. We use both OLS and probit regression to check the validity of our IVs. Overall, the inheritance IV is more strongly associated with the female ownership than the loan IVs. The inheritance coefficients in columns (1), (2), (5), and (6) are all significantly positive. On the other hand, the loan IV

coefficients without any control variables, reported in columns (3) and (7) are significantly positive. However, they turn out to be insignificant when the control variables are included in the model estimation, reported in columns (4) and (8). This result also suggests that the loan IVs are weak IVs that can cause biased estimation of the ATE.

The control variables might play crucial role to estimate the ATE consistently. The log of payroll is one of the key control variables in the ATE estimation, and it seems to be an effective control for the endogenous female ownership effect.[5] This result indicates that the sign of the ATE estimate is corrected by including the labor cost variable. It is also consistent with our prediction about the selection bias in the estimation of the female owner effect on labor demand.[6] The source of the selection bias is the endogenous interest cost assignment between female and male owners. A firm's interest cost is not directly observable, but it affects the optimal factor (labor) demand for the firm. Therefore, the selection bias can be mitigated substantially by controlling for the firm's expenditure on labor. The OLS estimate from the full model specification, reported in column (2) in Table 2, is still only about half of the full model IV estimate reported in column (4). The validity of the IV estimates are confirmed at the 5% significance level. From this, the most reliable ATE estimate is 0.2295 from the IV estimation with the full model specification, and this implies that, on average, female owners hire about 25.8% more employees than male owners.

5.1 Wage Elasticity and Labor Demand

As summarized in Hamermesh (1996), the conventional labor demand model estimation focuses on obtaining a wage elasticity, and therefore the validity of an empirical framework can be evaluated by the sign and magnitude of the estimated elasticity. Controlling for

[5] In the appendix section, we report the model estimates with the log of payroll only, and all of the control variables in Table A1. By including the log of payroll variable, the ATE estimates, that is, the female ownership coefficients, are changed to the right direction with too big coefficients becoming smaller and negative coefficients becoming positive.

[6] As demonstrated in Hamermesh (1996), the standard labor demand model requires wage and output variables, not payroll as labor cost. We check the ATE estimation under the standard labor model specification with wage and output as control factors, and find no substantial differences in the ATE estimation. The detail will be discussed in the next section.

production output level is also important point to consistently estimate a labor demand model and the associated wage elasticity. However, we do not use firms' wage and output variables in the main model estimations reported in Table 2. Instead, we use the log of payroll as a proxy variable for labor cost because: i) the 2007 SBO data do not have any proxies for firm level wage, and ii) the inheritance IV with the log of payroll as a control variable yields the most reliable ATE estimate.

[Table 4 about here.]

The ATE estimation with the standard labor demand model specification suggests that the inheritance IV works well to consistently estimate the female ownership effect. Table 4 reports the labor demand model estimates with the log of firm level revenue and average wage. In the 2007 SBO data, the log of revenue variable is the log of total receipts, and the average wage variable is payroll divided by employment. The female ownership coefficients, the ATE estimates, are all significantly positive. The wage coefficients are all significantly negative and their sizes are relatively similar. In the same way, all of the revenue coefficients are significantly positive and their sizes are relatively similar to one another. By looking at F-statistics for both endogenous and weak IV tests, we can see that the inheritance IV estimates in column (3) and (4) are more reliable than the loan IV estimates in column (5) and (6).

The F-statistics for the endogenous IV test in Table 4 indicate that our results are robust and the inheritance IV performs better without control variables except revenue and average wage. Further, the F-statistic of the estimate without control variable, reported in column (3), is greater than the inheritance IV estimate with payroll and the other control variables, reported in column (4) in Table 2. This result indicates that in order to consistently estimate the ATE, the inheritance IV with payroll works better than with the standard labor demand model specification.

One possible explanation is that labor cost is endogenous, whereas wage and output are

exogenous to both male and female owner firms regardless of financial constraints.[7] Labor cost of a firm depends on how much capital is available, but individual worker's wage for the firm is determined by a labor market equilibrium. In the same way, the firm's revenue is determined by a product market equilibrium. Therefore, the endogenous but unobservable interest cost assignment is left over in the error term of the standard labor demand model with wage and output.

[Figure 1 about here.]

A descriptive evidence that supports this explanation can be found in the distributions of labor cost and wage elasticity by firm owners' gender and in heritance status. Figure 1 presents nonparametric distribution estimates of the log of payroll and calculated firm-level wage elasticity by owners' gender and inheritance status.[8] By looking at panel 1(a) and 1(b), we can see that the wage elasticity distribution does not significantly differ by either gender or inheritance status. All of the four kernel densities look identically distributed around the mean wage elasticity -0.43. In contrast, the labor cost distribution substantially differs by inheritance status. The kernel densities of the log of payroll with inheritance, presented in panel 1(c), look quite different from those without inheritance, presented in panel 1(d), though the gender differences do not seem to be substantial.

[Table 5 about here.]

The worker-hours trade off is another possible source of bias from the choice of the labor demand model specification. Hamermesh (1996) discusses about the issue of measuring

[7]The inheritance status plays a role to rule out the endogeniety caused by differences in financial constraints due to the firm owners' gender. Recall that firms with inheritance are free, at least in part, from financial constraints, and they have more available capital to spend for labor costs.

[8]Under Hamermesh (1996)'s specification, the wage coefficients in table 4 are the elasticity of substitution between capital and labor, not the wage elasticity of labor demand. Given that interest cost and output constant, we calculate the wage elasticity using the formula

$$\eta = -(1 - s) \times \sigma,$$

where s is the labor share in total revenue and σ is the elasticity of substitution. We calculate each firms' labor share using payroll divided by total receipts in the 2007 SBO. For σ, we use 0.6146, the absolute value of the wage coefficient in column (3) of Table 4.

quantity of labor as a factor input. A labor input consists of a number of workers and their hours of work, and therefore the quantity of labor might be endogenous to the choice of the components. In other words, the labor input can be differ by hours of work for the same number of workers, and vice versa. Further, Hamermesh (1996) shows that the ratio of workers to hours is determined by fixed employment costs and the elasticity of wages with respect to hours, given that choices of workers and hours are separable from capital. Increases in labor costs reduces the ratio, whereas increases in the wage elasticity raises the ratio.

To check the effect of this worker-hours trade off in our ATE estimation, we perform the inheritance IV estimation by owners' hours of work. The 2007 SBO data have owners' hours per week as a categorical variable, but the data do not have information about employees' hours. The variable for owners' hours consists of six categories: i) none; ii) less than 20 hours; iii) from 20 to 39 hours; iv) 40 hours; v) from 41 to 59 hours; vi) 60 hours or more. We estimate the ATE of female ownership using the subsets of each owners' hours category. Comparing the ATE estimate by owners' hours may not be a perfect way to examine the exact effect of the endogenous hours of work. However, it would be enough to check the presence of bias from the endogenous hours in the ATE estimation.[9]

The ATE estimates by owners' hours per week are reported in Table 5. We do not find substantial evidences that the endogenous hours of work cause inconsistent estimation of the ATE. As we can see, most of the coefficients are consistent with the main ATE estimate in Table 2 in terms of sign, significance, and coefficient size. The F-statistics for the endogenous IV test indicate that the ATE estimates in column (1), (4), (5), and (6) are reliable at 5% significance level. The ATE estimate for firms with owners' hours less than 20 hours in column (2) is an exception in that the coefficient is significantly negative. However, the endogenous F-statistic indicates that the estimate may not be consistent. Also, the majority

[9]The firm sizes in our dataset are relatively small. The average number of employees for female-owned firms is 0.848 and 2.144 for male-owned firms. Owners' hours of work are therefore substantial part of the firms' labor input.

of firms with owners' hours less than 20 are self-employed owners having no employees.[10]

5.2 Demand for Flexible Work

[Table 6 about here.]

The positive female owner effect cannot be explained by the endogenous interest cost assignment alone. Rather, the effect would be insignificant, since firms seek to hire optimal number of employees for profit maximization, and the optimum cannot be different by owners' gender. We thus empirically examine the role of demand for flexible work as a possible channel through which female owners are likely to demand more employees. In labor economics literature, female workers' preference for flexible work is discussed in a number of papers such as Wiswall and Zafar (2018), but these are not necessarily focused on labor demand.

Table 6 reports IV estimates of the female owner effect by six subsets for different household labor demand condition. The left panel (columns (1) and (2)) reports the estimated female owner effect by home-based status. We find that the female owner effect is significantly positive for non-home-based business, while insignificant for home-based business. The remaining model estimates in the middle and right panels (columns (3) through (6)) have the same pattern as the home-base subset estimates. The female owner effect is positive with strong statistical significance if the owner runs the business with husband or family, and if not, the female owner effect becomes insignificant. For these six model estimates, the inheritance IV works well to control for the endogeneity without weak instrument bias. The endogeneity F-stats yield p-values greater than 0.05, and the first-stage F-stats are well above 10.[11]

Our finding of the positive female owner effect could be an indirect evidence in support of

[10] In the 2007 SBO data, only 3.08% of female owner firms and 6.29% of male owner firms have owners' hours of work less than 20, and employ at least one worker.

[11] Note that the null hypothesis of an endogeneity F test is that the IVs are exogenous, so the greater the p-value the stronger the validity of the IVs.

intrahousehold bargaining literature where females bear greater responsibility in a marriage for household production and childcares. In Table 6, the female owner effects are insignificant for home-based, and businesses with spouse or family. These are the conditions under which female owners can spend less time and cost for the household production. On the other hand, the female owner effects are positive with strong statistical significance for non-home based, or without spouse and family. A number of papers on female labor supply have discussed about the effect of family factors. Especially, our finding is consistent with Edwards and Field-Hendrey (2002) that female labor force are willing to lower "the fixed costs of working (e.g., time costs associated with commuting, out-of-pocket commuting expenditures, and clothing costs)", which imply that they have bear additional cost to allocate more time for household production and other family matters.

5.3 Size of Start-up Capital

[Table 7 about here.]

Table 7 reports the IV estimation of female owner effect on the log of employment. By looking at the top panel of Table 7, we can see that there are no consistent patterns of the female owner effect estimate along start-up capital size. The estimates in the first and third columns are positive and significant at 5%. significance level, and the estimate in the second from the right is significantly negative at 10% significance level. But the estimate with stat-up capital between $10K-25K report an acceptable p-value for the endogenous IV test at 5% significance level.

[Figure 2 about here.]

To further examine the positive female owner effects for firms with smaller start-up capital, we present the start-up capital distribution by gender and inheritance status in Figure 3. The distribution of start-up capital size by gender and inheritance status are presented on the top of Figure 3. Firms with inheritance have an almost identical distribution

of start-up capital for female and male owners, whereas firms without inheritance have smaller start-up capital for female than male owners.

The largest difference in start-up capital size between male and female owners comes from the smallest category, less than $5,000. In this category, the fraction of female owners with inheritance is 35.3 percent and 55.1 percent for female owners without inheritance. The other categories do not appear to have a sizable difference by owner's gender and inheritance status. This is a descriptive evidence that female owners are more likely to be financially constrained, and inheritance status is a valid IV that can rule out the difference in financial constraint.

5.4 Probability Model Estimation for Employers

We then estimate a model for probability of being an employer. The main rationale for this is to check for a possible selection bias from ruling out nonemployer firm owners. In our dataset, 11.51% of female owners and 22.43% of male owners are nonemployers. These nonemployer firms are excluded in our previous analysis of the labor demand model estimation with the log of employment as a dependent variable. The probability model specification is similar to that in Fairlie and Miranda (2017), and the gender effect on probability of hiring the first employee is estimated. They estimate that female-owned firms are about 10 percent less likely to hire their first employee, whereas our estimates are consistently positive. The concern here then is that our exclusion of nonemployer firms may have caused the opposite way of selection bias. We can thus check whether the female owner effect estimation is affected by the omitted observations, and compare to the result of Fairlie and Miranda (2017).

[Table 8 about here.]

Estimation results for the probability model are reported in Table 8. The negative female owner effect shown in Table 8 seems to be a result of selection bias due to the endogenous interest cost assignment. We estimate the model using four different estimations, and find

that the female owner effect is negative in OLS estimations without control variables, but becomes positive with strong significance in IV estimations. In Table 8, the first two panels are the non-IV estimates. The OLS estimations with linear probability model (LPM) in columns (1) and (2) yield a female owner effect of about around -0.2 and the maximum likelihood estimations (MLE) with probit model specification in columns (3) and (4) result in a female owner effect of about around -0.6. The two panels on the right, columns (5) through (8), in Table 8 are IV estimation results. All of four female owner effects are positive with strong statistical significance, but the sizes differ by the presence of control variables. The IV estimations with LPM specification yield female owner effect estimates of 8.31 without control variables, and 0.751 with control variables as the female owner effect estimates. In the same way, the two-step MLE with probit specification estimate 23.15 and 2.21 with and without control variables respectively.

Overall, we can see that there is a downward bias in estimating the female owner effect on the probability of being an employer. The negative ATE estimate is thus a result of the bias, and its main source seems to be the endogenous interest cost assignment between female and male owners. The evidence for this is that the inheritance IV estimates a positive female owner effect as in Table 2. Obtaining a precise estimate of the effect is, however, invalid with our dataset, since there is a control for production or labor cost.

Fairlie and Miranda (2017) estimate the model for probability of hiring the first employee by one, two, and seven years following start-up to examine the dynamic patterns of hiring employees among startups in the first seven years of operation. They find that the probability decreases over time that most of the firms in their sample hire the first employee in the first year, and very few firms hire the first employee after that year. We find a different pattern that older firms are more likely to hire employees. The second row in Table 8 reports firms' years of operation coefficients. They are significantly positive in all four model estimates. This difference might come from differences in sample characteristics. Fairlie and Miranda

(2017) report that the majority of the sample firms exited without ever hiring employees.[12]

5.5 Educational Attainment

[Table 9 about here.]

As noted in Fairlie and Miranda (2017), firm owners' education reportedly plays a significant role in employment. We thus examine the female owner effect by educational attainment. Table 9 reports the ATE estimates by owners' education using the inheritance IV estimation. An interesting pattern is found in that only owners' education at or above bachelor's degree have statistically significant ATE coefficients. The coefficients in columns (6) and (7) are the ATE estimates for owners' education up to undergraduate and graduate degrees respectively. They are positively significant at 1% significance level. However, the endogenous F-statistic for the bachelor's degree sample in column (6) indicates that the inheritance IV does not control for the endogeneity, so that its coefficient might be a result of biased estimation.

Our finding from Table 9 that female owners with college education or above are likely to hire more employees than their male counterpart is different from Fairlie and Miranda (2017). In their analysis, owners' education has no significant effect on employment. Our different result might come from female owners' demand for flexible work. Goldin and Katz (2011) and Edwards and Field-Hendrey (2002) show that women demand more flexible work to allocate more time for home production such as child care. This demand increases as women have more education because of the opportunity costs of working or earning penalty.

[Figure 3 about here.]

[12] Another difference between our results and Fairlie and Miranda (2017) is in their finding that female-owned businesses are less likely than male owners to hire the first employee over the first seven years. In contrast, we find that female-owned firms are more likely to hire employees when they have longer years of operations. The estimates of the ATE by years of operations are reported in Table A10 in the appendix section.

Goldin and Katz (2008) find further that this female workers' earning penalty from taking time off differ by occupation or educational attainment. This might apply to our dataset and the ATE estimates in Table 9. Figure 3 presents the fractions of firms' industries by owners' gender and education. The distribution shown in panel 3(a) is quite different from that of in panel 3(b). The industry with the highest fraction of firms with high school or less educated owners, in panel 3(a), is different for female and male owners—Construction is the highest fraction for male, and for female owners it is Other Services. In contrast, the highest fraction industry is the same for both gender of firm owners with college education, shown in panel 3(b).

5.6 Industry

[Figure 4 about here.]

Next, we estimate the female owner effect by industry. The 2007 SBO data provide each firm's 2-digit North American Industry Classification System (NAICS) code. We tabulate the weighted fractions of female/male owners by industry, presented in Figure 4. No other industries have more female owners than male owners. "Educational Services" and "Health Care and Social Assistance" (NAICS codes 61, 62 respectively) are the only industries that have more female owners than male. No other industries have more female than male owners. 57.80% of business in the Education Service industry and 56.77% for Health Care and Social Services.

[Table 10 about here.]

The female owner effect differs in great deal by industry. Table 10 reports the inheritance IV estimates of the ATE by NAICS 2-digit industry. The estimated coefficients are significantly positive in "Wholesale Trade", "Transportation and Warehousing", "Information", "Professional, Scientific, and Technical Services", "Health Care and Social Assistance", and "Arts, Entertainment, and Recreation". In contrast, the coefficients are significantly

negative in "Mining, Quarrying, and Oil and Gas Extraction", and "Accommodation and Food Services".

This heterogenous female owner effect by industry is similar to Goldin and Katz (2011)'s analysis on female labor supply behavior for different professions. Similar to the discussion in the previous section on education. they argue that certain occupations require overseeing works more because of the classical agency problem. Different intensity of required oversight by occupation lead to self-employed women having different workplace flexibility. In the same way, female owners in different industries might have different labor demand due to the agency problem and different workplace flexibility.

6 Conclusion

A lot of effort has gone into making inclusionary policies for minorities. Some of these policies are designed from a position that views minorities as inherently less capable and in need of support to be competitive with their majority counterparts. Our view instead is that minorities are as capable as the majority but have unique circumstances that hinder their competitiveness. We began our study with this premise and we believe that we successfully find a supporting empirical evidence in microentrepreneurship. Inclusionary policies are approached usually from a humanitarian perspective, and in scarce resource allocation, emphasize equality above efficiency. But we tried to find a way to achieve the former without sacrificing the latter. Just to fulfil quotas, the desire of the government to be seen as non-discriminatory has resulted in allocations made to minorities. If minorities are able to outperform under certain conditions, the society would be better off by providing them those conditions. Viewed this way, allocating resources equally would not be antithetical to allocating them efficiently.

To achieve our goal, we conducted research on female microentrepreneurs, a category that has been considered to be less capable in many aspects than their male counterparts. We

focus specifically on their labor demand, motivated by the finding from previous literature that: i) females allocate more time than males to household production; and ii) females are more financially constrained, even after they leave the position of paid employees in the labor force to start their own businesses. To our knowledge, there are no papers directly focused on estimating gender differences in labor demand. However, the consensus from the literature would suggest that female microentrepreneurs may not employ as many workers as their male counterparts. Our work takes a different approach. We examine a hypothesis that might counter the predominant view that women employ less. Because female microentrepreneurs potentially demand more labor to allocate time for household production, we find a condition under which female microentrepreneurs employ more, and that is, if they are free from financial constraints.

Our paper suggests a possible way for policymakers to design inclusionary policies for minorities that satisfy the important twin goals of efficiency and equality. We expect that future research will build on this by starting from the premise that female microentrepreneurs, like other minority segments, are equally capable and when supported, can outperform.

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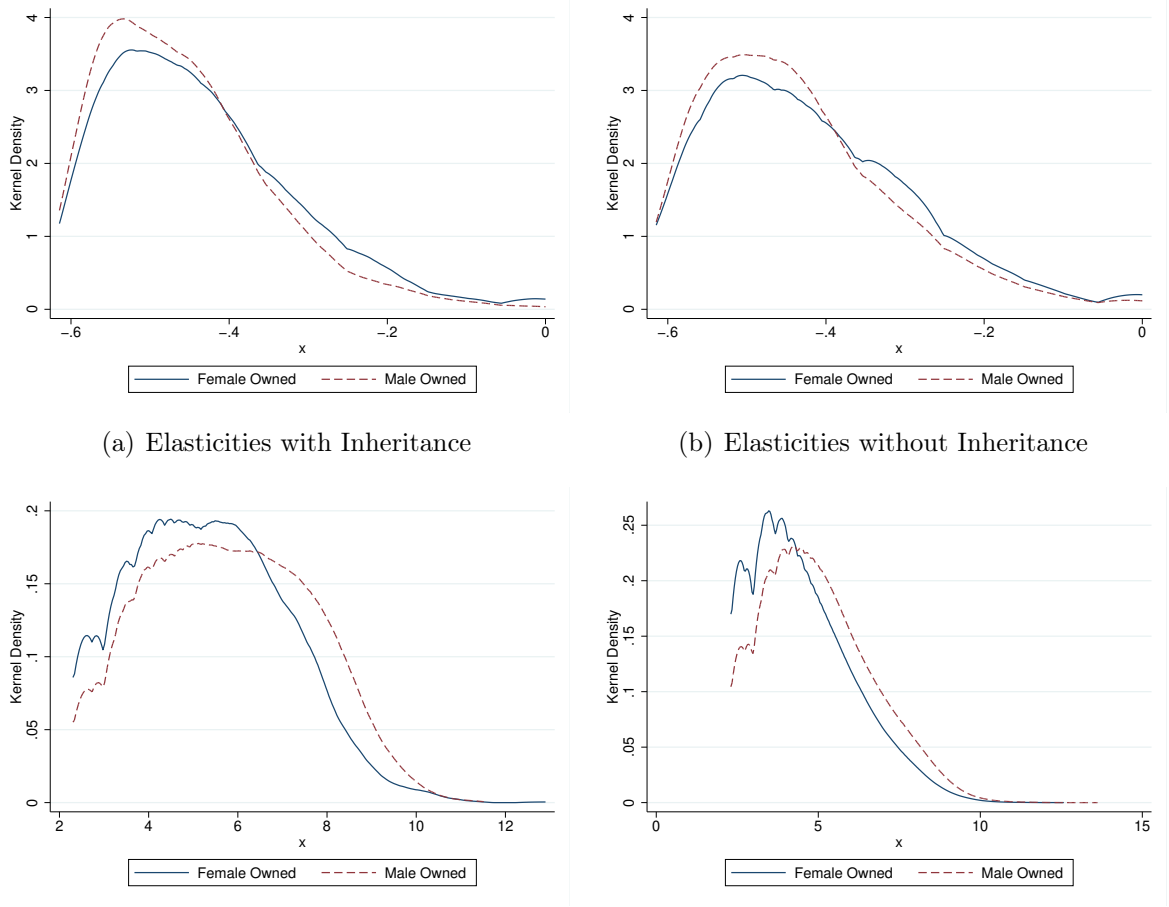


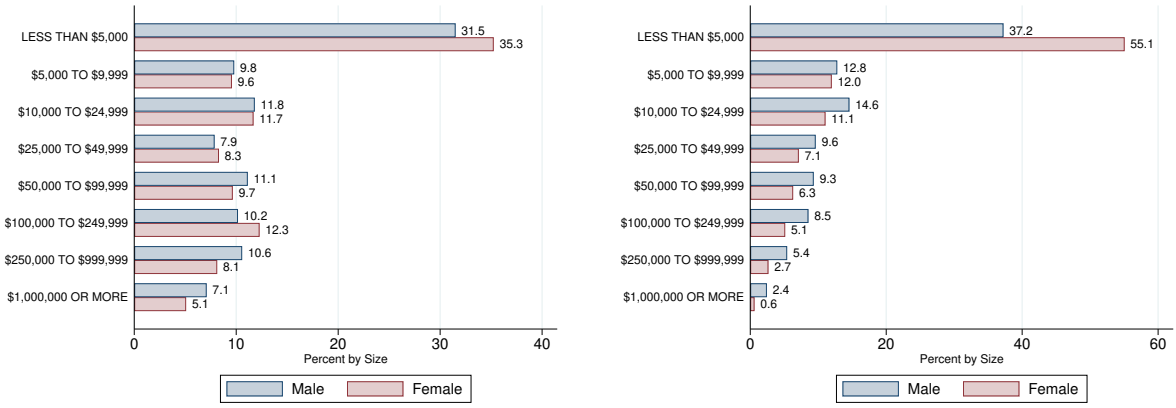
(a) Elasticities with Inheritance

(b) Elasticities without Inheritance

(c) (Log of) Payroll with Inheritance

(d) (Log of) Payroll without Inheritance

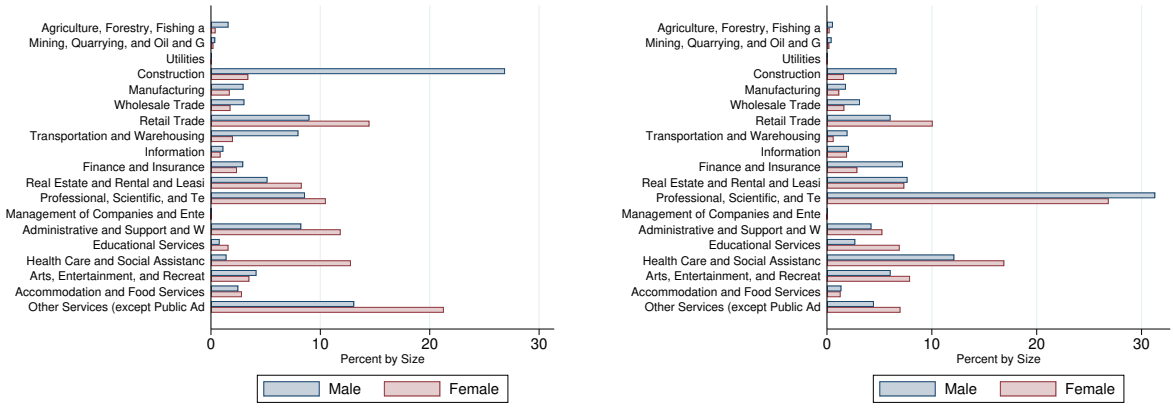
Figure 1: Wage Elasticity and Labor Cost Distributions



(a) Start-up Capital with Inheritance

(b) Start-up Capital without Inheritance

Figure 2: Size of Start-up Capital and Firm Owners' Gender



(a) High School or below

(b) Bachelors or above

Figure 3: NAICS 2-digit Sectors by Gender and Education

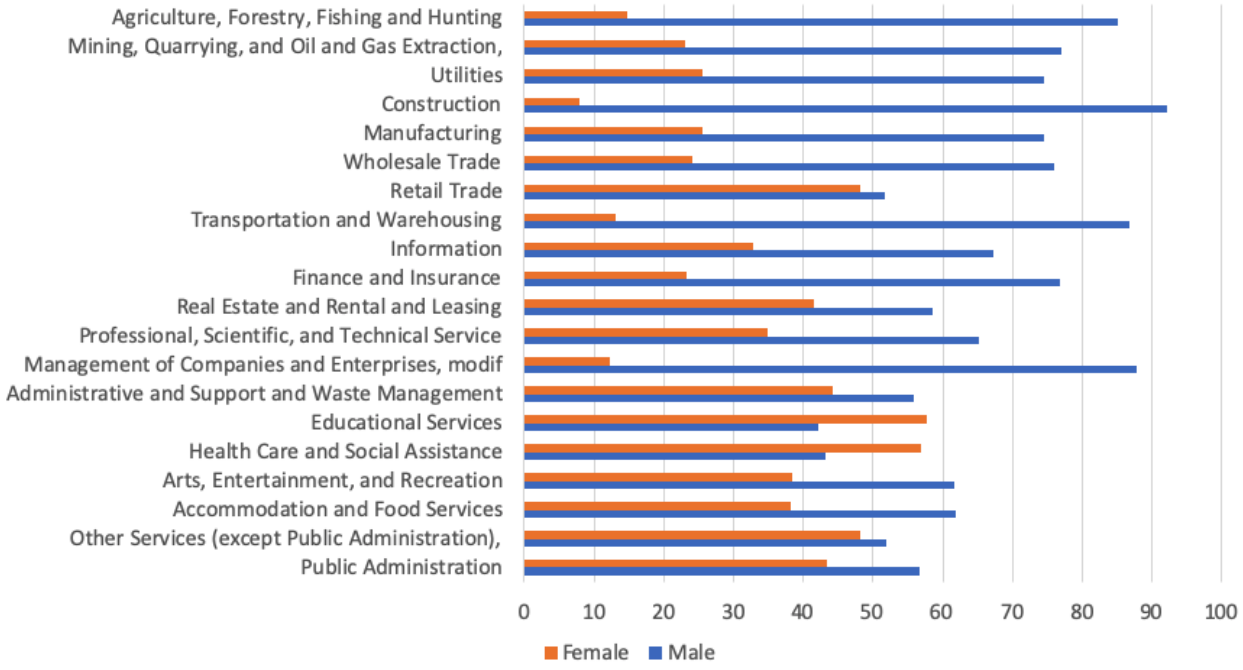


Figure 4: Fraction of Business Owners' Gender by Industry

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Table 1: Descriptive Statistics by Gender and Homebase

	Female Owner					Male Owner				
	# of Firms	Mean	Std	5^{th}	95^{th}	# of Firms	Mean	Std	5^{th}	95^{th}
Employment	220,625	0.848	15.73	0	4	442,760	2.144	31.26	0	8
Start-up Capital	135,847	25,631	91,728	2,500	77,500	301,479	46,130	133,121	2,500	175,000
Payroll	220,625	21.145	430.57	0	70	442,760	70.249	864.63	0	270
Inheritance	211,872	0.011	0.10	0	0	433,136	0.010	0.10	0	0
Bank Loan	220,625	0.150	0.36	0	1	442,760	0.188	0.39	0	1
Family Loan	220,625	0.014	0.12	0	0	442,760	0.021	0.14	0	0
With Spouse	218,177	0.0393	0.194	0	0	438,123	0.0579	0.234	0	1
Family business	219,511	0.0180	0.133	0	0	440,766	0.0258	0.159	0	0
Education	215,284	4.557	1.92	2	7	431,534	4.475	2.03	1	7
Age	215,915	3.827	1.27	2	6	434,257	3.980	1.29	2	6
Nonwhite	220,625	0.136	0.34	0	1	442,760	0.102	0.30	0	1
Years of Operation	201,699	4.009	2.64	0	8	416,507	4.669	2.63	0	8

[#] The reported statistics are weighted by the SBO tabulation weight. Education is an ordinal categorical variable 1 = less than high school, 2 = high school, 3 = technical school, 4 = some college, 5 = associate degree, 6 = bachelor degree, 7 = masters or above. Age is another ordinal categorical variable: 1 = under 25, 2 = 25 to 24, 3 = 35 to 44, 4 = 45 to 54, 5 = 55 to 64, 6 = 65 or over. Years of operation is also ordinal categorical variable: 1 = from 2007, 2 = from 2006, 3 = from 2005, 4 = from 2004, 5 = from 2003, 6 = from 2000 and 2002, 7 = from 1990 and 1999, 8 = from between 1980 and 1989, 9 = from before 1980.

Table 2: Main Model Estimates: Log of Employment

	OLS		IV Estimation and TSLS			
			Inheritance IV		Loan IVs	
	(1)	(2)	(3)	(4)	(5)	(6)
Female Owner	-0.2063***	0.1244***	5.3204***	0.2295***	20.9104***	9.3862***
	[0.019]	[0.005]	[0.412]	[0.053]	[4.772]	[2.741]
Control Variables	No	Yes	No	Yes	No	Yes
State Fixed	No	Yes	No	Yes	No	Yes
Industry Fixed	No	Yes	No	Yes	No	Yes
# of Obs	267,826	242,910	264,584	242,021	267,826	242,021
Adjusted R^2	0.0035	0.7492	NA	0.7484	NA	NA
F-Test (df_n, df_d)			386.89(1,42)	3.39(1,42)	337.75(1,42)	126.67(1,42)
(P-value)			(0.0000)	(0.0726)	(0.0000)	(0.0000)
F-stat {First-stage}	123.65	NA	{162.08}	{326.65}	{11.78}	{6.83}

Notes: Heteroskedasticity robust standard errors clustered by state are reported in square brackets. The symbols, *, **, and *** indicate respectively that the estimated coefficient is statistically significant at 10%, 5%, and 1% significance levels.

Table 3: First-Stage Model Estimates

	OLS				Probit Regression			
	Inheritance IV		Loan IVs		Inheritance IV		Loan IVs	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female Owner	0.0233**	0.6803**	0.0247**	0.0233*	-0.0112	-0.6449	-0.0126	-0.0112
	[0.012]	[0.304]	[0.012]	[0.013]	[0.016]	[1.000]	[0.018]	[0.018]
# of Obs	272,563	242,021	275,908	242,910	272,563	242,021	275,908	242,910
Adjusted {Pseudo} R^2	0.0025	0.0571	0.0001	0.0519	{0.0023}	{0.0611}	{0.0001}	{0.0557}
F{LR}-stat	694.98	213.25	16.95	191.07	{615.93}	{15k}	{33.69}	{13k}

Notes: Standard errors are reported in square brackets. The symbols, *, **, and *** indicate respectively that the estimated coefficient is statistically significant at 10%, 5%, and 1% significance levels.

Table 4: Labor Demand Model Estimates: Wage and Payroll

	OLS		IV Estimation and TSLS			
			Inheritance IV		Loan IVs	
	(1)	(2)	(3)	(4)	(5)	(6)
Female Owner	0.0918***	0.0774***	0.3219***	0.4766***	1.2043***	4.6348***
	[0.006]	[0.006]	[0.096]	[0.067]	[0.410]	[1.437]
Revenue	0.7696***	0.8157***	0.7746***	0.8221***	0.7943***	0.8886***
(Log of)	[0.004]	[0.003]	[0.004]	[0.003]	[0.008]	[0.022]
Average Wage	-0.6231***	-0.6735***	-0.6146***	-0.6609***	-0.5821***	-0.5292***
(Log of)	[0.005]	[0.004]	[0.006]	[0.004]	[0.017]	[0.043]
Control Variables	No	Yes	No	Yes	No	Yes
State Fixed	No	Yes	No	Yes	No	Yes
Industry Fixed	No	Yes	No	Yes	No	Yes
# of Obs	258,521	240,081	255,428	240,081	258,521	240,081
Adjusted R^2	0.7232	0.7779	0.7190	0.7656	0.6234	NA
F-Test (df_n, df_d)			5.53(1,42)	39.15(1,42)	5.77(1,42)	66.73(1,42)
(P-value)			(0.0234)	(0.0000)	(0.0207)	(0.0000)
F-stat {First-stage}	16,378.08	NA	{236.38}	{342.63}	{17.31}	{5.64}

Notes: Heteroskedasticity robust standard errors clustered by state are reported in square brackets. The symbols, *, **, and *** indicate respectively that the estimated coefficient is statistically significant at 10%, 5%, and 1% significance levels.

Table 5: Main Model Estimates by Owner's Hours per Week

	None	Less than 20	20 to 39	40 hours	41 to 59	60 or More
	(1)	(2)	(3)	(4)	(5)	(6)
Female Owner	0.0981	-0.0957*	0.3029***	0.3400***	0.2404**	0.5533*
	[0.064]	[0.057]	[0.092]	[0.125]	[0.117]	[0.313]
State Fixed	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed	Yes	Yes	Yes	Yes	Yes	Yes
# of Obs	4,342	18,598	29,871	40,946	86,652	60,738
Adjusted R^2	0.7977	0.7649	0.7596	0.7581	0.7426	0.7269
F Test (df_n, df_d)	1.10(1,42)	4.65(1,42)	5.43(1,42)	4.00(1,42)	0.68(1,42)	1.55(1,42)
(P-value)	(0.3013)	(0.0369)	(0.0246)	(0.0521)	(0.4134)	(0.2196)
F-stat {First-stage}	{153.18}	{257.57}	{166.83}	{125.45}	{79.60}	{28.52}

Notes: Heteroskedasticity robust standard errors clustered by state are reported in square brackets. The symbols, *, **, and *** indicate respectively that the estimated coefficient is statistically significant at 10%, 5%, and 1% significance levels.

Table 6: Model Estimates: Log of Employment by Factor Demand

	Homebase Firms		Firms with Spouse		Firms with Family	
	Homebased	Non-Homebased	With Spouse	Without Spouse	Family Businss	Non-family Businss
	(1)	(2)	(3)	(4)	(5)	(6)
Female Owner	-0.0813	0.1694***	-0.0681	0.2387***	0.1595	0.2359***
	[0.127]	[0.053]	[0.186]	[0.053]	[0.134]	[0.054]
State Fixed	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed	Yes	Yes	Yes	Yes	Yes	Yes
# of Obs	48,890	194,900	11,400	231,372	8,073	235,721
Adj R^2	0.4023	0.7610	0.7101	0.7498	0.7560	0.7479
F-Test (df_n, df_d)	2.25(1,42)	0.38(1,42)	0.86(1,42)	4.01(1,42)	0.06(1,42)	3.78(1,42)
(P-value)	(0.1410)	(0.5406)	(0.3604)	(0.0516)	(0.8053)	(0.0586)
F-stat {First-stage}	{98.51}	{331.33}	{35.80}	{293.06}	{137.18}	{299.36}

Notes: Heteroskedasticity robust standard errors clustered by state are reported in square brackets. The symbols, *, **, and *** indicate respectively that the estimated coefficient is statistically significant at 10%, 5%, and 1% significance levels.

Table 7: Model Estimates: Female Effect on Employment by Start-up Capital

	Less than $5,000	$5,000 to $9,999	$10,000 to $24,999	$25,000 to $49,999	$50,000 to $99,999	$100,000 to $249,999	$250,000 to $999,999	$ 1,000,000 or more
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female Owner	0.6529***	-0.3803	0.6662**	-0.1107	-0.3641	-0.2912	-0.6465*	-0.0290
	[0.190]	[0.353]	[0.290]	[0.299]	[0.294]	[0.196]	[0.344]	[0.282]
State Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of Obs	43,367	19,999	26,522	19,772	21,606	21,563	14,395	6,533
Adj R^2	0.6317	0.6524	0.6575	0.6673	0.6703	0.7025	0.7037	0.8105
F Test (df_n, df_d)	8.2274	2.2005	3.2515	0.8895	3.9437	4.3922	7.1188	0.3357
(P-value)	(0.0064)	(0.1454)	(0.0785)	(0.3510)	(0.0536)	(0.0422)	(0.0108)	(0.5654)

Notes: Heteroskedasticity robust standard errors clustered by state are reported in square brackets. The symbols, *, **, and *** indicate respectively that the estimated coefficient is statistically significant at 10%, 5%, and 1% significance levels.

Table 8: Main Model Estimates: Probability of being Employer

	OLS		Probit		IV Estimation with Inheritance		IV Probit with Inheritance	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female Owner	-0.2534***	-0.1835***	-0.6845***	-0.5477***	8.3079***	0.7510***	23.1498***	2.2100***
	[0.004]	[0.004]	[0.013]	[0.012]	[2.774]	[0.096]	[3.487]	[0.149]
Years of Operation		0.0531***		0.1612***		0.0785***		0.2360***
		[0.001]		[0.002]		[0.003]		[0.004]
Control Variables	No	Yes	No	Yes	No	Yes	No	Yes
State Fixed	No	Yes	No	Yes	No	Yes	No	Yes
Industry Fixed	No	Yes	No	Yes	No	Yes	No	Yes
# of Obs	642,194	571,651	642,194	571,651	624,334	571,651	645,008	571,651
Adj R^2	0.0585	0.1900	NA	NA	NA	NA	NA	NA
χ^2 Test (df)					732.82	281.06	3371.02(1)	603.12(1)
(P-value)					(0.0000)	(0.0000)	(0.0000)	(0.0000)
F-stat {First-stage}	3,223.91	NA			{10.05}	{191.39}		

Notes: Heteroskedasticity robust standard errors clustered by state are reported in square brackets. The symbols, *, **, and *** indicate respectively that the estimated coefficient is statistically significant at 10%, 5%, and 1% significance levels.

Table 9: Main Model Estimates by Educational Attainment

	Less than High School	High School	Technical School	Some College	Associate's Degree	Bachelor's Degree	Master's or Above
	(1)	(2)	(3)	(4)	(5)	(6)	(6)
Female Owner	-0.0517	-0.0245	-0.0433	0.1407	0.1573	0.5162***	0.4892***
	[0.151]	[0.059]	[0.198]	[0.104]	[0.237]	[0.148]	[0.177]
State Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of Obs	8,060	43,307	11,480	38,540	10,719	69,610	60,305
Adjusted R^2	0.7446	0.7644	0.7456	0.7622	0.7432	0.7677	0.6883
F Test (df_n, df_d)	0.85(1,42)	2.20(1,42)	1.13(1,42)	0.35(1,42)	0.12(1,42)	9.03(1,42)	3.79(1,42)
(P-value)	(0.3613)	(0.1456)	(0.2939)	(0.5586)	(0.7348)	(0.0045)	(0.0585)

Notes: Heteroskedasticity robust standard errors clustered by state are reported in square brackets. The symbols, *, **, and *** indicate respectively that the estimated coefficient is statistically significant at 10%, 5%, and 1% significance levels.

Table 10: Model Estimates by NAICS 2-digit Industry

	Agriculture, Forestry	Mining, Quarrying, and Oil	Utilities	Construction	Manufacturing	Wholesale Trade	Retail Trade	Transportation and Warehousing	Information	Finance and Insurance
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Female Owner	-0.1219	-0.5597**	-0.2196	0.1972	0.0395	0.3510***	0.1296	0.4737**	1.0759**	0.1927
	[0.415]	[0.284]	[1.022]	[0.138]	[0.094]	[0.127]	[0.130]	[0.204]	[0.423]	[0.196]
State Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of Obs	801	1,069	158	33,376	13,753	16,633	27,956	9,079	3,274	12,970
Adj R^2	0.7164	0.8240	0.7203	0.7830	0.8688	0.7700	0.7623	0.7887	0.6587	0.6349
F Test (df_n, df_d)	0.52(1,42)	4.31(1,42)	0.05(1,42)	1.52(1,42)	0.43(1,42)	5.89(1,42)	0.02(1,42)	5.43(1,42)	8.01(1,42)	0.90(1,42)
(P-value)	(0.4729)	(0.0381)	(0.8162)	(0.2175)	(0.5096)	(0.0152)	(0.9437)	(0.0199)	(0.0047)	(0.3415)

	Real Estate and Rental	Professional, Scientific	Management	Administrative and Support	Educational Services	Health Care	Arts, Entertainment	Accommodation	Other Services	Miscellaneous
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Female Owner	-0.2336	0.8272***	-0.4677	-0.3660	0.3233	1.4223*	1.1853**	-0.4490*	-0.0137	-0.7344*
	[0.194]	[0.278]	[0.427]	[0.232]	[0.335]	[0.762]	[0.500]	[0.242]	[0.178]	[0.414]
State Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of Obs	10,261	40,710	1,806	14,644	2,295	25,446	3,735	10,539	13,412	104
Adj R^2	0.6890	0.5931	0.6950	0.7911	0.6974	0.5082	0.4150	0.8134	0.7108	0.2514
F Test (df_n, df_d)	1.79(1,42)	7.54(1,42)	1.89(1,42)	3.95(1,42)	0.07(1,42)	3.34(1,42)	7.09(1,42)	3.71(1,42)	1.72(1,42)	2.04(1,42)
(P-value)	(0.1810)	(0.0060)	(0.1692)	(0.0469)	(0.7858)	(0.0674)	(0.0078)	(0.0542)	(0.1899)	(0.1582)

Notes: Heteroskedasticity robust standard errors clustered by state are reported in square brackets. The symbols, *, **, and *** indicate respectively that the estimated coefficient is statistically significant at 10%, 5%, and 1% significance levels.