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Female Entrepreneurship, Agglomeration, and a New Spatial Mismatch

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Abstract

Female entrepreneurs may be less networked than their male counterparts, and so derive less benefit from agglomeration. They may also have greater domestic burdens, and therefore have higher commuting costs. This paper develops a theoretical model showing that either of these forces can lead to the segregation of male- and female-owned businesses, with female entrepreneurs choosing locations farther from agglomerations of business activity and commuting shorter distances. The paper's empirical results are consistent with these predictions. Female-owned businesses are segregated, often to a degree similar to that observed for black-white residential patterns. Female-owned enterprises are also less exposed to agglomeration, with 10 to 20 percent less own-industry employment nearby. Further analysis is consistent with the presence of both mechanisms, less agglomeration benefit and greater domestic burdens.

JEL Codes: R0, J2, L0

Key Words: Agglomeration, Female Entrepreneurship, Spatial Mismatch

I. Introduction

This paper considers two forces that are known to be associated with growth. The first is the agglomeration of activities into cities and industry clusters. The second is entrepreneurship, especially female entrepreneurship. That agglomeration has a positive effect on productivity and innovation goes back to Marshall (1890). The many sorts of valuable local interaction that give rise to agglomeration economies are discussed in the surveys by Duranton-Puga (2004) and Rosenthal-Strange (2004). The idea that entrepreneurship is important for growth also has a long history, including analysis by Knight (1921) and Schumpeter (1934). The importance of female business activity for growth is discussed in Landes' (1999) far-reaching analysis of the determinants of cross-sectional differences in prosperity. More recent research on the importance of entrepreneurship for growth includes Baumol (2002), Acs and Armington (2006), and Phelps (2007).

In considering the geography of female entrepreneurship, we are guided by a simple theoretical model of business location and urban spatial structure.[1] Entrepreneurs benefit from interacting with each other, and this encourages agglomeration. However, the spatial concentration of production requires long commutes, limiting the degree of agglomeration in equilibrium. All of this is standard. The point of departure for the analysis is the observation that the circumstances of entrepreneurs may differ between men and women. The first possible difference is that female entrepreneurs might derive less benefit from agglomeration than would male entrepreneurs. Agglomeration economies can arise from a wide range of interactions, including interactions with similar firms, with physical input suppliers, and with business service providers, including bankers. Thus, there might be a tendency for female entrepreneurs to benefit less from agglomerated locations if female entrepreneurs had less rich professional networks on average than did male entrepreneurs. This effect would be amplified if less developed networks impaired female entrepreneur access to the credit necessary to gain entry to expensive, agglomerated locations.[2] The second possible difference is that the domestic division of labor might raise the cost of agglomerating for female businesspeople relative to male businesspeople.

There is evidence consistent with both differences. Regarding the benefits from interaction, Bates (2002) documents patterns of differential treatment of females by suppliers and clients. Renzulli et al (1999) show that female entrepreneurs are more likely to have networks that are dominated by kin rather than colleagues. Similarly, Roth (2006) describes Wall Street Bankers, and finds considerable evidence that there is a tendency for women to perceive themselves as being outside of the old boys

[1] See Costa and Kahn (2000) for an inter-city analysis of residential location, specifically how domestic circumstances and agglomeration economies interact in determining where different sorts of families live.

[2] This would be consistent with literature on small business lending, which has documented that relationships between lenders and business owners facilitates access to credit (see Elyasiani et al (2004) for a recent review). We comment further on these issues later in the paper.

network of bankers. The perception of a networking gap has led a number of associations of women business owners to include the enhancement of professional networks as part of their mission statements.[3] All of this suggests that it is worth considering the possible implications of female entrepreneurs enjoying less benefit from agglomeration.

There is also evidence consistent with the assumption that domestic burdens raise the effective commuting costs for female entrepreneurs. See Kohlhase (1986) on the general issue of the domestic division of labor and Madden (1981) and White (1986) on women's commuting patterns.[4] There is also clear evidence that working females engage in more home production than do working males. Ramey (2007) uses time diaries to calculate a working woman's average non-market work plus primary child and adult care at 29.55 hours in 2003. For men, the figure is 17 hours. See also Ramey and Francis (2006) or Aguiar and Hurst (2006) for a similar gender differential. Again, Roth (2006) finds evidence in the finance sector that female employees face greater domestic burdens.

Our model shows that the two assumptions of gender differences in the benefits of agglomeration and the domestic division of labor have important implications for the spatial allocation of female business. They imply first that there will tend to be segregation of female business activity from male business activity. This segregation will manifest itself in female businesses being less agglomerated than male business, choosing locations with less concentration of aggregate activity and also with less concentration of activity in the own sector. Finally, they imply that commutes will be shorter for female self-employed workers than for male self-employed workers. While there is a large literature on spatial segregation by race and another on occupational segregation by gender, this is the first paper of which we are aware that has considered spatial segregation by gender.[5]

We test these core spatial predictions of our model using Dun and Bradstreet and Census data. Initially, we examine location patterns for 35 2-digit industries covering a wide range of activities in Manufacturing, Wholesale Trade, Finance Insurance and Real Estate (FIRE), and Services. Data for this analysis are obtained from Dun and Bradstreet's (D&B) Marketplace files for 2005 and 2007.[6] From the D&B data we obtain zipcode-level information on establishment and employment counts by industry (Standard Industry Classification - SIC), and also whether companies satisfy Small Business Association

[3] These include the National Association of Women Business Owners (www.nawbo.org) and the American Business Women's Association (www.abwa.org).
[4] See also Turner and Niemeier (1997) for a review of previous literature on gender differences in commuting behavior.
[5] See Kain (1992) for analysis of the black-white segregation and Altonji and Blank (1999) for a survey of the impacts of race and gender on labor markets.
[6] The D&B MarketPlace data provide information on over 13 million establishments in the United States. This large size of the data file is sufficiently comprehensive to permit effective analysis of business patterns. It should also be noted that the D&B data involves a type of filter, including only companies sufficiently noteworthy to make it into the database. This will exclude, for example, many part-time Schedule C filers that would appear as businesses in Census data.

(SBA) definitions of whether an establishment is female-owned. We recode these data to year-2000 census tract geography, enabling us to control for tract-level socio-demographic attributes (from the 2000 Census). In characterizing the local economic environment faced by entrepreneurs when they choose locations, we further employ geographic information systems software (GIS) to construct three key variables. The first is the total employment across all industries within one mile of the establishment. This measures the degree of *urbanization*, which Jacobs (1969) and others have argued to be associated with productivity. The second variable is employment within one mile in the establishment's own 2-digit SIC industry. This allows for identification of *localization* effects, where the proximity to own-industry activity adds to productivity as in Marshall (1890). The third is the amount of employment within one mile in banking sectors, a variable that captures the proximity to crucial financial services. Individual-level data from the public use micro sample of the 2000 Census is also used to study worker commutes.

The results from a range of econometric models are strongly consistent with the model. In examining segregation, we focus on the widely used dissimilarity index. This index measures the share of the minority (or majority) group that would have to relocate if local minority shares were to equal that of the overall population. Using this statistic, we find a large departure from integration. In a number of industries, the index value exceeds 50 percent, implying a degree of segregation similar in magnitude to residential segregation experienced by African-American households.[7] Furthermore, we find that female-owned businesses are located in places with less overall activity (urbanization), with less activity in their own sector (localization), and with less banking activity. These gender disparities differ across industries. They are often in the 10 to 20 percent range, especially in Manufacturing, Wholesale Trade, and FIRE; differences are smaller in Services.

The results described thus far are consistent with either the presence of differential benefits from agglomeration or differential domestic responsibilities or both. They do not allow us to separate between the two forces governing the spatial pattern of female entrepreneurship. There are other patterns in the data, however, that can be used to confirm the existence of differential agglomeration benefits and commuting costs. First, we consider how productivity, as proxied by the ratio of sales to workers, differs between female-owned and other firms. We find a smaller benefit from agglomeration for female-owned companies in general, with the effect especially pronounced if nearby own-industry employment is found outside of female-owned companies. This latter result is particularly suggestive of gender-related differences in the benefits of agglomeration. Second, we consider the commuting behavior of male and female workers. Among full-time workers, we find commutes to be shorter for female workers in general

[7] See for example, measures of tract-level residential segregation as reported by the U.S. Department of Census at http://www.census.gov/hhes/www/housing/housing_patterns/tab5-2.html .

and for female self-employed workers in particular, especially when children are present in the household: among self-employed workers, when children are present, women commute roughly 5 minutes less 1-way relative to comparable male workers, a difference of roughly 20 percent. This is consistent with the domestic burdens force in our model.

Our findings on segregation, agglomeration, and commuting are new. Taken as a whole they imply a different kind of "spatial mismatch" than the sort that is usually considered. Originally, the term spatial mismatch referred to losses in economic opportunity for inner-city African-Americans caused by the combination of increasing suburbanization of jobs coupled with housing market discrimination that restricted African Americans to the city centers (Kain, 1968). Various papers have documented this phenomenon, studied its foundations, and considered its static and dynamic consequences. See Holzer (1991), Kain (1992), and Zenou (2007) for surveys. The new spatial mismatch that we have identified can also have important consequences for efficiency and equity. Densely developed locations and industry clusters are centers of interaction, innovation, and productivity (e.g. Audretsch and Feldman (1996)). They are, thus, important for the performance of the overall economy both for the ability to deliver prosperity and also for the ability to deliver opportunity. The smaller presence of female entrepreneurial activity in the densest locations and in clusters means that both the productivity and opportunity advantages of cities may not be enjoyed proportionately by female entrepreneurs.

The remainder of the paper is organized as follows. Section II presents the theoretical model of female entrepreneurship and discusses its implications. Section III describes the data and summary statistics. Section IV presents results on the degree to which private businesses tend to segregate by gender, and differences by gender in proximity to agglomerations of employment. Section V looks at the mechanisms that are potentially responsible for the patterns outlined in Section IV. This section first confirms that both female-owned and other private firms benefit from agglomeration, and then considers evidence of gender-related differences in benefits from agglomeration and differences in commuting patterns. Section VI concludes.

II. A simple model of entrepreneurship and urban spatial structure

A. Model

1. Primitives

This section will present a model of entrepreneurship an urban structure whose purpose is to motivate the empirical analysis of the location patterns of female entrepreneurs that will follow. The model is derived from Helsley and Strange (2007), with the principal difference being the inclusion of female entrepreneurs. The model will focus on two forces that impact the spatial pattern of women-owned business. The first is differences in the benefits of agglomeration that accrue to male and female

entrepreneurs. The second is differential domestic responsibilities, manifested in a greater cost of working far from home. At the heart of the model is the assumption of a central business district that is an attractor for entrepreneurs. The business district can be taken as a downtown or as an edge city. It is in this setting that we then solve for the spatial allocation of entrepreneurs in a competitive land market.

There are three types of agent in the model: female entrepreneurs, male entrepreneurs, and builders. Entrepreneurs choose whether or not to form businesses, choose locations if they have become active, and choose a degree of participation in community business activities. Builders develop land into commercial space. This determines building heights and densities throughout the city in which the agents are located. Entrepreneurs choose locations in a long, narrow city, with one unit of land at each location (Solow and Vickrey, 1971). Cities exist to facilitate interactions. Following Helsley and Strange (2007), we suppose that interactions occur at a single location. Locations are completely characterized by their distance from this point, given by x. Entrepreneurs are consumers of developed space, which is produced by builders using land and other inputs. For simplicity, we suppose that entrepreneurs consume one unit of commercial space inelastically. The markets for space and land are both perfectly competitive. We denote the rent for commercial space at distance x by r(x) and the rent for land by R(x).

As is well-known, there are two approaches to determining rents in a model of spatial structure like this one. The first is to assume that the economy is "closed" in the sense that there exist fixed populations of the two types of entrepreneur. In this sort of model, entrepreneurial participation is exogenous, and competition among entrepreneurs for space and land will simultaneously determine equilibrium entrepreneurial profit levels, space rents, and land rents. We have chosen instead to adopt a second approach where the economy is "open" in the sense that entrepreneurial participation is endogenous, with potential entrepreneurs having options available in other cities or activities.[8] In this situation, in equilibrium, all entrepreneurs of a given type (male or female) are assumed to choose between becoming an entrepreneur and pursuing their next best options. The next best options might be enjoyed in other cities or in other occupations or in home production. As is traditional in open city models, we suppose that the payoff is a constant. This means that entrepreneurs must earn payoffs equal to the exogenous payoff that would be available in other cities or activities. This will determine equilibrium space and land rents.[9]

[8] It is worth pointing out that in our model, the choice to become an entrepreneur is endogenous in two ways: business formation (whether or not to become an entrepreneur, based on the payoff in alternative activities or at other locations) and participation (hours worked as an entrepreneur, as captured by visits).

[9] In this model, we are treating entrepreneurs as identical except for gender. See Fonseca et al (2001) for a model of vertically differentiated agents who choose between becoming an entrepreneur or a worker on the basis of their individual talents and the start-up costs of becoming an entrepreneur.

2. Interaction

The literature on entrepreneurship has exhaustively documented the many sorts of interaction involved in business creation. These involve a long list of activities, including identifying entrepreneurial opportunities, hiring workers, obtaining credit and inputs, and marketing outputs. All of these activities are fundamentally social in that they require the entrepreneur to interact with his or her business community. These activities are closely related to the forces that Marshall (1890), Vernon (1961), Jacobs (1969) and others have argued to be fundamental to agglomeration and urban growth.

Our model will emphasize the spatial aspects of these interactions.[10] Specifically, we suppose that an entrepreneur chooses a number of visits v to make to the center, allowing interaction with the business community. The quality of the business environment, K, contributes to the value of these interactions.[11] These interactions are meant to capture a wide range of business activities. These include interacting with business service providers, lawyers, and bankers, as well as interacting with entrepreneurs in the same line of business. Male and female entrepreneurs differ in the degree to which they benefit from interaction. We capture differential benefits from interaction by the parameter α, where a higher value of α denotes an entrepreneur who benefits to a greater degree. Although there are certainly well-connected female entrepreneurs and poorly-connected male ones, we follow the entrepreneurship literature (e.g., Renzulli (1999) and Bates (2002)) by supposing female entrepreneurs to be less connected and so benefit less from interactions, $\alpha_w < \alpha_m$.[12]

All of these forces are represented by the function $u(v,K,\alpha)$ that denotes the incremental profit earned from an entrepreneur's interactions at the center. Based on the above discussion, it is natural to suppose that u(-) is increasing and strictly quasi-concave in v and K. We also suppose that $\partial^2 u/\partial v \partial K > 0$, $\partial^2 u/\partial v \partial \alpha > 0$, and $\partial^2 u/\partial K \partial \alpha > 0$. Finally, we suppose that entrepreneur revenues are given by $u^0 + u(v,K,\alpha)$, where u^0 is a fixed component of entrepreneur profit.

An entrepreneur's choice of visits will depend on the costs of the visits. There are two costs associated with a visit to the center: a fixed cost T and transportation cost tx, $t > 0$. The assumption of a positive fixed cost of a visit is necessary in order that agents at $x = 0$ not choose an infinite quantity of visits. We suppose for simplicity that all other costs are incorporated in u^0. For technical reasons (to be

[10] Our spatial model of interactions emphasizes the place where interactions occur and the attraction of agents to this location. We deliberately do not put much structure on the nature of the interactions, since the model is meant to capture a wide range of such interactions, including learning, matching, and sharing (to use the Duranton-Puga (2004) taxonomy). There is an active literature on networks that focuses instead on the social dimensions of networks. See Jackson (2008) or Goyal (2009) for excellent surveys.

[11] In this paper, K is taken as exogenous. See Helsley and Strange (2007) for how it can be endogenized.

[12] The difference in α is meant to capture a decrease in interaction value that can arise from a range of sources. It could arise as a result of differential access to general business networks. Or it could arise from credit constraints. We are not claiming to identify particular agglomeration economies. As noted by Glaeser and Gottlieb (2009), the microfoundations of agglomeration economies remain an open issue.

made clear shortly), we suppose that there exists a minimum level of interaction required to be in business, $\underline{v}$. We suppose that $\underline{v}$ is sufficiently low that entrepreneurs at all locations choose $v > \underline{v}$. Assuming the boundary condition $\lim v \to \underline{v}^{+} \partial u(v,K,\alpha)/\partial v \to \infty$ ensures that this is true.

Finally, entrepreneurs also incur opportunity costs associated with working outside the home. Denote the boundary of the business area of the city by x^B. We solve for this below. As noted above, we have for simplicity supposed that housing requires no land, with all households located at the point x^B. Suppose that an entrepreneur located at x incurs commuting costs $\tau * (x^B - x)$. This captures not just morning and afternoon commuting costs, but also the costs associated with day care pickups, meetings with teachers, and doctor appointments. Although there are certainly exceptions, these costs appear to fall more on females than on males (see Ramey (2007, Ramey and Francis (2006) or Aguiar and Hurst (2006)). We therefore suppose that female entrepreneurs incur greater "commuting" costs, $\tau_w > \tau_m$. In order to ensure that the business district occupies land at the center, and in that regard is bordered by a residential zone, we suppose that the attraction to home is weaker than is the attraction to the CBD. Assuming that $t\underline{v} > \tau_w$ ensures that this is true and so that bid-rent curves are always downward sloping.

B. Equilibrium interaction and urban spatial structure

1. Equilibrium interactions

In the above setup, the profits net of all opportunity costs of an entrepreneur located at x equal

$$u^0 + u(v,K,\alpha) - r - (T + tx)v - (x^B - x)\tau. \qquad (1)$$

The entrepreneur's choice of visit intensity satisfies the first-order condition:

$$-(T + tx) + \partial u/\partial v = 0. \qquad (2)$$

(2) implicitly defines the optimal number of visits for a type-α consumer located at x, $v(x, K,\alpha)$. By the implicit function theorem, one may obtain $\partial v/\partial x < 0$, $\partial v/\partial K > 0$, and $\partial v/\partial \alpha > 0$ (see Appendix A). The number of visits decreases with distance and increases with the quality of interactions as measured by either K or α.

2. Equilibrium rent for space and land

Let π^* represent the utility level available in other cities or activities. Rent must adjust to equate utility in entrepreneurship with the opportunity utility:

$$r(x,K,\alpha,\tau) = u^0 - \pi^* - (T + tx)v(x,K,\alpha) + u(v(x,K,\alpha),K,\alpha) - (x^B - x)\tau. \quad (3)$$

The implicit function theorem shows that the rent on space decreases with distance and that the bid-rent curve becomes flatter as commuting costs τ fall:[13]

$$\partial r/\partial x = - tv(x.K,\alpha) + (\partial v/\partial x)(- (T + tx) + \partial u/\partial v) + \tau = - tv(x,K,\alpha) + \tau < 0. \quad (4)$$

$$\partial r/\partial \tau = (x^B - x) > 0. \quad (5)$$

The allocation of entrepreneurs to locations depends on the slope and intercept of the bid-rent curves for the four types of entrepreneur. Differentiating (4) with respect to α gives:

$$\partial^2 r/\partial\alpha\partial x = \partial^2 u/\partial\alpha\partial v \, (\partial v/\partial x) < 0. \quad (6)$$

This is fundamental. A higher value of α is associated with a steeper bid rent curve for space. Similarly, (8) establishes directly that an increase in commuting costs results in a flatter bid rent curve.

Together with the assumptions on α and τ, (5) and (6) establish the following:

Proposition 1. In any city where both male and female entrepreneurs are active, male entrepreneurs will occupy more central locations.

Both types of entrepreneurs benefit from agglomeration in the sense that value accrues from visits. Male entrepreneurs benefit to a greater degree to the extent that they are more connected (a higher value of α). Moving further from the center reduces participation (the number of visits). This reduces value associated with interaction to a greater degree for male entrepreneurs. It is worth reiterating that the model's interactions are meant to capture a range of agglomerative forces, including knowledge spillovers that arise from interacting with peers, as well as the input sharing and matching that that involves with

[13] It also gives $\partial r/\partial K > 0$, $\partial r/\partial \alpha > 0$ and $\partial r/\partial \tau > 0$ (see Appendix A). The rent on space increases with the quality of interactions, while an increase in commuting costs makes the equilibrium rent function flatter. An entrepreneur is less willing to pay a premium to locate near the CBD when the costs of getting there are higher because the entrepreneur will not interact as much in this case.

physical input suppliers, and business service providers, including banks. Similarly, higher commuting costs for females (higher τ) result in a smaller net benefit from a central location.

In competitive space markets, space is allocated to the highest bidder. The next result places restrictions on the opportunity profit levels that must be achieved in order that an entrepreneur choose to be active.

Proposition 2. In any city where both male and female entrepreneurs are active, the reservation level of profits for female entrepreneurs must be lower than for male entrepreneurs, $\pi_w < \pi_m$.

Suppose not. Then by (3), bid rent is greater for male entrepreneurs at all locations. In our open model, Proposition 2 is a restriction on the exogenous parameters $\pi_w < \pi_m$. A closed model corollary – whether for a closed city or for a closed system of cities – would be that the equilibrium values of the reservation profit levels would exhibit $\pi_w < \pi_m$.[14]

Propositions 1 and 2 together describe a new kind of spatial mismatch. The first spatial mismatch, introduced by Kain (1968), argued that barriers to African-American residential decentralization coupled with the decentralization of employment resulted in persistent racial inequality. The new spatial mismatch suggested by this paper's model pertains instead to females and does not depend on the patterns of residential locations at all. The issue here is that either decreased benefit from agglomeration or differences in domestic burdens can result in a situation where female entrepreneurship takes place outside of agglomerations. Since these agglomerations are well-known to be centers of innovation, learning, and productivity, this location pattern can result in persistent inequality, a new spatial mismatch. Propositions 1 and 2 will be fundamental in our empirical work on the agglomeration of women-owned businesses. Before moving to that empirical work, we must complete the characterization of equilibrium urban spatial structure by solving for equilibrium land rents and densities.

3. Bid rent for land

The profit of a builder at location x is

$$\Pi(x,K,\alpha,\tau) = r(x,K,\alpha,\tau)\, n - c(n) - R, \qquad (7)$$

where c(n) is construction cost and, as noted previously, R is land rent. We assume that $c(\cdot)$ is increasing and strictly convex. The first-order condition for profit maximization implies

[14] Note that for both male and female entrepreneurs to be active in equilibrium, we must have $r(0,K,\alpha_m,\tau_m) > r(0,K,\alpha_w,\tau_w)$ and $r(x^b,K,\alpha_w,\tau_w) > 0$, where $r(x,K,\alpha,\tau)$ is given in (3).

$$r(x,K,\alpha,\tau) - c'(n) = 0, \quad (8)$$

and this implicitly defines the maximizing density $n(x,K,\alpha,\tau)$. Implicitly differentiating (8) gives $\partial n/\partial x < 0$, $\partial n/\partial K > 0$, $\partial n/\partial \alpha > 0$, and $\partial n/\partial \tau < 0$ (see Appendix A). Structural density increases with the quality of interactions and connectedness and decreases with distance and commuting costs.

Competition ensures that the maximum profit of a builder equals zero, and this condition defines the bid rent for land:

$$R(x,K,\alpha,\tau) = r(x,K,\alpha,\tau)n(x,K,\alpha,\tau) - c(n(x,K,\alpha,\tau)) \quad (9)$$

Like the rent on space and structural density, the bid rent on land increases with the quality of interactions and connectedness and decreases with distance: $\partial R/\partial K > 0$, $\partial R/\partial \alpha > 0$, $\partial R/\partial x < 0$, and $\partial R/\partial \tau < 0$.

4. Equilibrium land use

The last piece of the equilibrium is the characterization of equilibrium land use. This depends on R(-). Suppose that land not used by entrepreneurs commands a residential rent of 0.[15] Focusing on the case where the city contains both types of entrepreneurs, equilibrium land use will be characterized by two borders, x^b and x^B:

$$R(x^b,K,\alpha_m,\tau_m) = R(x^b,K,\alpha_w,\tau_w), \quad (10)$$

$$R(x^B,K,\alpha_w) = 0. \quad (11)$$

Land between the center ($x = 0$) and x^b is occupied by male entrepreneurs. Land between x^b and x^B is occupied by female entrepreneurs. Land at the point x^B is devoted to residential uses. These patterns are illustrated in Figure 1 where the relevant bid-rents are plotted.

This pattern of spatial segregation would be reinforced if female entrepreneurs faced binding credit constraints. Leasing costs, typically including first and last month rents as well as security deposits, are a significant element of startup costs. Without credit, entrepreneurs may not be able to incur these costs. Since these costs vary spatially, this could make it difficult for constrained entrepreneurs to locate in expensive centers of business activity. As noted in the Introduction, if female entrepreneurs are

[15]Setting residential bid-rents to zero in all locations does not affect the primary results but simplifies the discussion.

less networked, that could include weaker relationships with lenders. It is, therefore, possible that credit constraints might be more likely to be binding for female entrepreneurs. Amatucci and Sohl (2004) provide evidence consistent with stricter credit constraints for female entrepreneurs and review a large literature that draws a similar conclusion. Cavallucci and Cavallucci (1998, 2002) find evidence that female entrepreneurs are disadvantaged in more concentrated markets. Blanchflower et al (2003), in contrast, do not find a significant difference.

Credit constraints can be included in our model relatively easily. Suppose that a given entrepreneur has a maximum amount that can be paid as commercial rent, r^{max}. This constraint will bind when $r^{max} < r(x,K,\alpha,\tau)$ as defined in (3). This translates, in turn, to a bid-rent curve for land that will not be globally downward sloping, as drawn in Figure 1. It will instead have a notch, to the left of which the bid-rent will be horizontal. If female entrepreneurs faced such constraints to a greater degree than did male entrepreneurs, then some female entrepreneurs would be priced out of downtown real estate. Thus, credit constraints reinforce the patterns suggested in Figure 1. They contribute to spatial segregation of female entrepreneurs and to lower exposure to agglomeration.

C. Empirical implications

The analysis above distinguishes entrepreneurs by the benefits they receive from agglomeration (α) and commuting costs (τ). If α is low and τ is high for the typical female entrepreneur, then the model yields two sharp empirical predictions. First, there will be spatial segregation of businesses by the gender of the entrepreneur. Second, women-owned businesses will be less exposed to agglomeration. Both of these results can be obtained in a more general setting. For instance, if entrepreneurs were distinguished by the benefits from agglomeration (α) and commuting costs (τ), the downtown would contain those with the highest α and lowest τ. If there were disproportionately few female entrepreneurs in this group, then one would see both disproportionately low exposure to agglomeration for female entrepreneurs and segregation. The rest of the paper will consider evidence of the existence of these patterns.

III. Data and Summary Statistics

A. Data

The primary data used for the analysis were obtained from the Dun & Bradstreet Marketplace files for the first quarter of 2007.[16] The data are obtained in a form that allow us to calculate zipcode-level measures of aggregate economic activity (e.g. employment) for an extensive variety of identifiable groups of establishments. For these purposes, establishments can be grouped by industry (using the

[16] This section discusses the core data that are common to nearly all the paper's estimation. Additional data sources are described later.

establishment's primary Standard Industrial Classification, SIC), employment, years in business, sales, and dozens of other establishment attributes. In the analysis to follow, when we describe the local environments in which female and other companies are located (e.g., densely versus lightly developed), the ability to group establishments by type provides all the richness that would be obtained from establishment level data. When we consider the impact of exposure to different types of local environments on outcome measures (such as sales per worker), we are also able to obtain much of what might be gained from establishment level data, but with some caveats that are clarified later in the paper.

Central to our empirical work, the data identify whether an establishment is publicly- or privately-owned. In the latter case, the data identify whether the Small Business Association classifies a company as female-owned. In this regard, the Small Business Association definition of a female-operated business is:

> "Women-owned small business concern means a small business concern—(a) which is at least 51 percent owned by one or more women; or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and (b) whose management and daily business operations are controlled by one or more women." [17]

Throughout the paper, we describe companies that satisfy the SBA definition as "female-owned businesses." We will generally limit attention to privately-owned businesses, including partnerships and sole-proprietorships. Since the complement to female-owned businesses are those that are either less than 51% female owned or not managed by females, we do not refer to these businesses as male-owned, but instead label these businesses as "other private businesses." While this allows for some ambiguity in the classification of companies into female versus other private businesses, it is important to recognize that the SBA definition, because of its importance in government procurement, is the standard approach to defining female-owned business. Furthermore, to the extent that the SBA definition of female-owned excludes some businesses with significant female input, the patterns observed in our data may understate the impact of the entrepreneur's gender on business location decisions. The definition is, thus, unfavorable to our finding significant differences. Finally, in order to obtain a sharper female vs. male distinction, we estimate all of our key measures and models a second time using only one-worker firms. For such firms there is no ambiguity with regard to the gender of the owner and manager. Of course, one-worker companies are not representative of the broader population of companies, and that will also affect our results in a way that is difficult to sign, *a priori*. Nevertheless, as will become apparent, results based on 1-worker companies are very similar to those based on the more expansive samples, both on a

[17] http://app1.sba.gov/faqs/faqindex.cfm?areaID=11

qualitative and quantitative basis. This suggests that the SBA classification scheme is a reasonable way of identifying female-owned companies. [18]

The theory from Section II suggests that there will be two important spatial differences between female-owned and other establishments. These are the segregation of female- and non-female owned companies and differential exposure to agglomeration. In order to address these issues, we examine spatial patterns of business activity within cities.[19] To do this, we work with D&B business data coded initially to the zipcode level. These data were then converted to year-2000 census tract boundaries. Converting to census tract geography facilitates portions of the analysis that draw upon tract-level measures of the residential population's socioeconomic status from the decennial census (in a manner to be clarified).[20] Variation across tracts, of course, allows us to examine spatial variation in activity within metropolitan areas.

One final feature of our data should also be emphasized. In all of the empirical work to follow, we restrict our analysis to MSAs with more than 25 census tracts present in 2000. With roughly 4,000 residents per tract, this targets our analysis on MSAs with at least 100,000 residents. We impose this restriction because if a town is sufficiently small, most residents and businesses will be in close proximity to each other, making assessments of segregation and differential exposure to local concentrations of employment somewhat irrelevant. By focusing on larger metropolitan areas, businesses in our data must choose their locations from among a large number of different neighborhoods spread across a significant geographic distance.

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[18] This U.S. Census takes a different approach than the SBA. It documents four classifications of companies by gender in the 2002 survey of business owners (http://www.census.gov/csd/sbo/index.html), male-owned, female-owned, equally male and female owned, and other, where the latter category includes publicly owned companies and other companies for which gender could not be determined. We are not able to use this alternative given our use of Dun and Bradstreet data, which is required for much of our within-city spatial analysis. As will be shown below, however, there is reason to believe that the two data sources are broadly consistent with each other.

[19] This differs from much of the literature on agglomeration that tends to rely on intercity comparisons of economic activity (recent exceptions include Rosenthal and Strange (2003, 2005, 2008) and Henderson and Arzaghi (2008)). While intercity comparisons allow the use of large, readily available datasets such as the PUMS data from the Census, they have the disadvantage of supposing that an entrepreneur in the suburbs confronts the same environment as one in the downtown or in a dense edge city. This is clearly inappropriate for the theory in Section II.

[20] Zipcodes were first matched to the Census zipcode tabulation area (ZCTA) geography and then further matched to the year 2000 census tract geography. U.S Postal Service zipcode boundaries are based on postal logistics while Census ZCTAs respect census tract borders and better reflect the socioeconomic concept of a neighborhood. Census has created a boundary file that approximates the geographic region associated with each US Postal zipcode based on the associated year 2000 census blocks found in that zipcode. The resulting geographic polygons correspond to an agglomeration of block-level geography and provide a close approximation to the US Postal zipcode boundaries. The corresponding ZCTA boundary file is available for download from Census. To further identify the location of a subset of postal zipcodes not covered by the ZCTA file we used a 1999 file available on the US Census website that reports the latitude and longitude of the US Postal zipcodes in the US in 1999. After merging those coordinates into the year 2000 ZCTA file, we were able to geocode all but a very small number of the year 2001 zipcodes obtained from D&B.

B. Summary Statistics

Summary statistics are displayed in Panels A through C of Table 1. All three panels convey the message that women-owned businesses account for a relatively small share of overall business activity. This is consistent with other data sources such as the Census. It implies that an agglomeration of economic activity will be largely an agglomeration of activity at firms that are not female-owned. This raises the possibility that female entrepreneurs will benefit differentially from agglomeration.

We begin with Panels A through C which present counts of employment, establishments, and sales, respectively, for businesses present in the D&B data in 2007:Q1. In each case, business activity is measured separately for Manufacturing, Wholesale Trade, FIRE, and selected industries within Services. These industries, and their 35 two-digit sub-classifications, are the focus of the empirical work to follow. To streamline the discussion, Table 1 presents summary measures only for activity aggregated to the 1-digit industry level. Summary measures for the 2-digit sub-industries are provided in Appendix B and display broadly similar patterns but with more variation, as would be expected.[21]

In Panel A, it is apparent that for a sample based on establishments of all sizes and age (the left side of the panel), total employment among private plus public establishments in the industries considered is roughly 51.7 million. Of this amount, Services account for 25.5 million, Manufacturing 12.9 million, FIRE 8.1 million, and Wholesale Trade another 5.3 million. Among privately owned companies, the share of employment in female-owned establishments is roughly 6.15 percent in both Wholesale Trade and Services, 3.6 percent in FIRE, and 3.7 percent in Manufacturing. For these four industries combined, female-owned companies account for 5.16 percent of employment at privately owned establishments. A similar value is obtained for privately owned companies with fewer than 10 employees that were created in the previous year (the right side of the panel). These patterns are also consistent with the 2002 Census Survey of Business Owners, where female-owned companies account for 6.45 percent of employment.[22]

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[21] As an example, at the 2-digit level, industries with the highest shares of female-owned enterprises include Textiles (SIC 22), Apparel (SIC 23), Business services (SIC 73), and engineering/management services (SIC 87) at 18.8 percent, 27.7 percent, 14.4 percent, and 12.8 percent, respectively. Industries with the smallest female shares included depository institutions (SIC 60) and Security and Commodity Brokers (SIC 62), at 1 percent and 3.6 percent, respectively. Although this range is greater than for the 1-digit industries in Panel B, it is still clear that female-owned businesses account for a relatively small share of overall business activity.

[22] Both in Panel A (employment) and in Panel B (establishment counts) our female owned share of business activity is lower than in the 2002 Census Survey of Business Owners (see http://factfinder.census.gov/servlet/IBQTable?_bm=y&-geo_id=D&-ds_name=SB0200A1&-_lang=en). In the case of employment counts, the difference is small as noted above. When considering counts of establishments the differences are larger. The 2002 Census data report 25 percent female ownership for all companies in the United States and 16 percent for companies that hire workers. In comparison, Panel B reports roughly 10 percent female ownership in the D&B data. It is worth emphasizing, however, that the 2002 census measures take into account companies in all industries. Ours, in contrast, exclude certain industries such as retail and segments of the service sector where female ownership is more common. In addition, the census data include all Schedule C filers, including individuals that operate only part time businesses. Such part time companies are largely not present in the D&B MarketPlace file. Because women workers are disproportionately likely to work part time relative to male

Together, these data indicate that female owned businesses account for a relatively small share of overall employment.

Panel B reinforces this message. The panel presents counts of establishments for privately owned companies. Among private companies of all ages and size (the left side of the panel), there are roughly 511,000 manufacturing establishments in the database, 529,000 Wholesale Trade establishments, just shy of 1 million FIRE establishments, and nearly 2.8 million Service establishments. Of these companies, women-owned businesses account for roughly 11 percent in Manufacturing, 10 percent in Wholesale Trade, 10.6 percent in Services, and 7 percent in FIRE. Similar although slightly lower numbers are evident for the sample of small, newly created establishments (the right side of the panel). Once again, female-owned companies account for a relatively small share of business activity.

Panel C reports total sales in millions of 2007 dollars for the same sample of small, newly created, private establishments as in the first two panels. Aggregating across industries, sales at female-owned enterprises are roughly 6.0 percent of sales at all privately owned companies, similar to the share of workers employed at female-owned enterprises reported in Panel A. More precisely, sales per worker at companies not owned by women equal 0.0970 in millions of 2007 dollars, or $97,000. Sales per worker at female-owned companies are $92,800, a difference of roughly 4.3 percent. Thus, not only are total sales at female-owned businesses lower than at other privately owned companies – as would be expected given the smaller number of women owned businesses – but sales per worker also are lower. The question then is, why?

IV. Equilibrium Patterns: Segregation and Agglomeration

A. Overview

The model in Section II implies that female-owned business will be segregated and will be less exposed to agglomeration. This section will test these predictions. We conduct this analysis separately for 1- and 2-digit industries. In doing so, both here and elsewhere in the paper, we take as given an entrepreneur's choice of industry. It is important to note, however, that women may respond to perceived disadvantages by selecting into industries in which they have easier access to business networks, or greater opportunities to vary the timing of their work hours so as to reduce their commuting costs. This will tend to mitigate disadvantages faced by women entrepreneurs, and will likely reduce the tendency for within industry segregation and differential exposure to agglomeration. Evidence of differences in location patterns for female versus male business owners, therefore, should be interpreted as occurring

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workers (see Altonji and Blank (1999), for example), this also helps to account for the greater presence of female-owned businesses in the census data.

despite possible attempts by women to select into more female-friendly industries. We begin with segregation.

B. Segregation

To consider segregation, we focus primarily on a sample that includes establishments of all sizes and ages as reported by D&B for 2007:Q1. Segregation is measured based on variation across census tracts. Separate measures are calculated for each industry in each city.

A variety of different statistics have been used to measure spatial segregation in past studies, often with applications to racial segregation in the housing market. We use what appears to be the most common measure, and one that strikes us as having the most intuitive interpretation, the dissimilarity index.[23] Let x_i^f be the number of female-owned establishments in census tract i and X^f be the number of female-owned establishments in the entire MSA. Let X_i be the total number of establishments in census tract i and X be the total number of establishments in the MSA. Then the dissimilarity index is defined as

$$DIS = (1/2)\, \Sigma_{i=1}^{I} | x_i^f / X^f - (X_i - x_i^f) / (X - X^f)|. \qquad (12)$$

The dissimilarity index measures the degree to which the spatial distribution of female entrepreneurship within a city mirrors the spatial distribution of all entrepreneurial activity within the city. It takes on values between 0 and 1. A value of p means that p-percent of female entrepreneurs would have to change census tracts in order that there be no segregation and the distribution of female entrepreneurship would be exactly the same as the overall distribution.[24]

Table 2 presents average values of the dissimilarity indices across MSAs for 1-digit industries. In this table, the dissimilarity index ranges from 10 to 20 percent. For Manufacturing and Wholesale Trade, the dissimilarity index is roughly 20 percent. For FIRE it is 17 percent, while for Services it is 10.5 percent.[25] As a reference point, the value for African-American housing segregation throughout MSAs in the United States is 65 percent. At the 1-digit level, therefore, segregation of female- and non-female owned establishments is important, but not nearly as dramatic as well known patterns of racial segregation in U.S. housing markets.

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[23] See Massey and Denton (1988) for a discussion of the dissimilarity index.

[24] We also estimated segregation using an alternate segretation statistic, the isolation index. It is calculated as

$$ISO = \Sigma_{i=1}^{I} (x_i^f / X_i)(x_i^f / X^f),$$

where the notation is as above. The isolation index also takes on values between 0 and 1 and can be interpreted as the probability that an entrepreneur randomly encountered by a female entrepreneur is also female. Our estimates using ISO were qualitatively similar, and they have been suppressed to save space.

[25] Estimates based on 1-worker establishment are roughly 50 percent higher and of the same ordinal ranking across industries.

Table 3 presents average values of segregation across MSAs for 2-digit industries. The results here are striking. In particular, there are many industries that have values of the dissimilarity index near 50 percent. For some industries, the value is above 65 percent. This means that controlling for activity at the 2-digit industry level, there is considerable segregation between female-operated business and the rest of business activity.[26] The magnitude approaches and sometimes exceeds the level of segregation experienced by African-American households in housing markets.[27]

In sum, we have identified a previously unknown pattern in the spatial structure of business, with a fairly strong tendency for female-owned businesses to be segregated. It is easy to understand why this pattern has escaped notice previously. Gender ratios in the population are much closer to constant across space than are ratios defined by racial composition. It is, thus, natural to overlook spatial patterns of differentiation for men and women. The next section will show that segregation manifests itself in female entrepreneurs being less exposed to agglomeration, and this will suggest the importance of the segregation documented above.

C. Agglomeration

The prediction of Section II's model is that female entrepreneurs will tend to choose locations where there is less activity nearby. In the agglomeration literature (e.g. Rosenthal and Strange (2004)), there are often two senses in which a location may be less agglomerated. It may have less overall activity (urbanization), and it may have less activity in the entrepreneur's own industry (localization). In both instances, positive spillovers from nearby employment arise because of opportunities to share intermediate inputs, access common pools of skilled labor, and learn from one's neighbors. These activities all involve interactions that are enhanced by access to business networks and proximity to other enterprises.

The literature on small business finances offers a third sense in which a location may be agglomerated. Small businesses often develop a close working relationship with a local bank that holds

[26] This pattern is not a mechanical consequence of having few female entrepreneurs in some industries, and those industries exhibiting segregation. This can be seen from inspecting the segregation statistics in Table 3 and the establishment counts in Appendix Table B-2. To check this more systematically, we have regressed the 2-digit dissimilarity index values (from Table 3) on a constant and the female share of establishments (from the sixth column of Appendix Table B-2). The coefficient on percent female is 0.078, with a t-ratio of just 0.13. Similar results are obtained when we instead regress the dissimilarity index on the number of female and non-female privately owned establishments.

[27] The difference in the intensity of segregation registered for 1- versus 2-digit industries is also consistent with the possibility that women may select into more female-friendly industries. One-digit industry groupings, by construction, are comprised of a larger number of industry sub-categories as compared to 2-digit groupings. This allows for greater possible substitution of women into female-friendly industry sub-categories, and likely helps to explain the lesser degree of segregation observed at the 1-digit level. Nevertheless, the patterns in Table 2 indicate that substantial levels of segregation persist even at the 1-digit level.

the originated loans in portfolio. This differs from financing for larger corporations whose bank loans are often sold in a secondary market.[28] In part, this is because risks associated with a given small business loan application are difficult to assess unless the lender has close knowledge of the entrepreneur, or what is sometimes referred to as "soft" information (e.g. Petersen and Rajan (2002), Agarwal and Hauswald (forthcoming)).[29] Access to such information may decay with distance. Consistent with this, Agarwal and Hauswald (forthcoming) suggest that proximity to lenders increases the likelihood that a small business receives credit.[30] Such patterns are indicative of a particular type of important business network that in this case can affect access to essential credit. Accordingly, our measures of the local environment facing an entrepreneur include proximity to aggregate employment (urbanization), own-industry employment (localization), and banking sector employment.

As noted in Section 2.4, our spatial approach to the access to financial services for female entrepreneurs is parallel to a large literature that has considered the possibility that female entrepreneurs face credit constraints. If female entrepreneurs are disproportionately subject to credit constraints then they may derive less benefit from the various forms of agglomeration in general and from proximity to banking services in particular. This would reduce incentives for women to locate their businesses in agglomerated areas.

In the analysis to follow, urbanization is calculated by adding up employment across all industries. Localization is calculated by adding up employment in a given establishment's own industry, based either on the 1-digit or 2-digit SIC classification depending on the exercise. Banking sector employment is calculated by adding up employment in SIC 60 and 61, depository and non-depository credit institutions, respectively. Throughout the paper, each of these agglomeration measures is always calculated including employment at both private and publicly owned establishments of all sizes and age.

We must also define the geographic scope used to measure our agglomeration variables. Previous literature indicates that entrepreneurs are far more sensitive to the environment within one mile as compared to just a few miles away (e.g. Rosenthal and Strange (2003), Arzaghi and Henderson (2008)). We therefore use mapping software to draw 1-mile radius circles around the geographic centroid of each census tract. The level of a given type of employment contained within a given circle is then calculated by constructing a proportional (weighted) summation of the employment for those portions of

[28] See, for example, Carlstrom and Samolyk (1995), Demsetz (2000), and Drucker and Puri (2008).
[29] For related discussion, see Berger and Udell (1993), Berger, Klapper, Udell (2001), Brevoort and Hannan (2004), Carlstrom and Samolyk (1995), Demsetz (2000), Drucker and Puri (2008), and Laderman (2006).
[30] See also, Berger and Udell (1993), Berger, Klapper, Udell (2001), Brevoort and Hannan (2004), and Laderman (2006) for further discussion of the relationship proximity to lenders and small business access to credit. Somewhat in contrast, Petersen and Rajan (2002) suggest that innovations in communication have allowed the distance between small businesses and their lenders to increase.

the tracts intersected by the circle.[31] This is done separately for aggregate, own-industry, and banking sector employment. Our agglomeration measures, therefore, always refer to activity within one mile.

Given the measures just described, we determine the average exposure to different types of nearby employment for two different samples of individual establishments. The first sample is comprised of privately owned companies of all sizes and age. The second is restricted to one-worker privately owned companies of all ages. For each sample, estimates of the mean value of nearby employment are calculated by forming $E_q = (1/n)\Sigma_{i=1}E_{i,q}$, where $E_{i,q}$ is the amount of type-q employment within one mile of establishment i (i = 1, ..., n), and q denotes aggregate employment, own-industry employment, or banking sector employment depending on the agglomeration measure in question.

The percentage difference from this mean for female owned companies is obtained in two steps. First, we run the following semi-log regression,

$$\text{Log}(E_{i,q}) = b_0 + b_1\text{Female}_i + e_i \qquad (13)$$

where Female_i is a dummy variable equal to 1 if the individual business owner is female as defined above. Next, we calculate the percentage difference in exposure to agglomeration for female-owned versus other privately owned enterprises by forming $100\cdot(\exp[b_1 - V(b_1)/2] - 1)$. In this expression b_1 is the coefficient on the Female dummy and $V(b_1)$ is its estimated variance (see Halvorsen and Palmquist (1980) and Kennedy (1981) for details). Note that the t-ratio on b_1 provides a convenient way of assessing the statistical significance of the difference in local activity around female- versus other privately owned companies.[32]

Table 4 presents estimates of nearby employment with industries aggregated to the 1-digit level. Results based on 2-digit industry sub-groups are qualitatively similar and are presented in Appendix B. Panels A through C present estimates for nearby urbanization, localization, and banking sector employment, respectively. Values on the left side of each panel are for privately owned businesses of all sizes; those on the right are for one-worker companies. In all cases, the data used to obtain the estimates is based on employment and companies present in 2007:Q1.

Consider first Panel A, which deals with urbanization. Focusing on all private companies (the left side of the panel), for Manufacturing, Wholesale Trade, and FIRE, female entrepreneurs choose locations with significantly less aggregate activity. In the Service sector, the difference between female-

[31] For example, if a circle includes all of tract 1 and 10 percent of the area of tract 2, then employment in the circle is set equal to the employment in tract 1 plus 10 percent of the employment in tract 2.

[32] Because (13) relies only on establishment type and location, we estimate (13) using establishment-level information by replicating each establishment group-location observation by an amount equal to the number of establishments in the group and location.

owned and other private establishments is also negative, but the difference is small. In percentage terms, the degree to which female entrepreneurs are exposed to less agglomeration is roughly 9.4 percent in Manufacturing, 4.5 percent in Wholesale Trade, and 24.1 percent in FIRE. These differences are highly significant. In Services the point estimate is just 1 percent. With relatively minor differences, these patterns are largely repeated among 1-person companies (in the right portion of the panel).

Panel B repeats this exercise for localization. Focusing on private establishments of all sizes (the left side of the panel), for Manufacturing, Wholesale Trade, and FIRE, female entrepreneurs choose locations with significantly less activity in their own industry; in Services there is no apparent difference. In percentage terms, the differences are nearly 22 percent in Manufacturing, 11 percent in Wholesale Trade, and 29 percent in FIRE. Once again, patterns for 1-worker companies are broadly similar, although in the service sector female-owned business are located in areas with 6.7 percent *more* own-industry activity.

Panel C considers differential proximity to banking services. Results here echo those in the first two panels. Once more, it is clear that female entrepreneurs in Manufacturing, Wholesale Trade, and FIRE choose locations with significantly less banking sector employment within one mile, but this does not carry over to the Services sector. For companies of all sizes, in percentage terms, the differences are 8.3 percent in Manufacturing, 2.6 percent in Wholesale Trade, 27.9 percent in FIRE, and just 0.34 percent in Services. Patterns are qualitatively similar for 1-worker companies except for Services for which female-owned business are located in areas with 5 percent more banking sector employment. Overall, there is a pattern of female entrepreneurs being more distant from banking activity. Given the Agarwal and Hauswald (forthcoming) result on the importance of distance, this finding is noteworthy.

Looking across the three panels, the service sector stands out as the one industry for which female- and other privately owned establishments are similarly exposed to agglomeration. This is broadly consistent with the patterns in Tables 2 and 3. In those tables, segregation is clearly present in the service sector. However, the degree of segregation is somewhat smaller in the service sector than in the other industries. Together, these estimates suggest that there are smaller differences in location patterns between female and male entrepreneurs in the service sector as than elsewhere. In the context of our model, this could arise if the service sector is more accommodating of the needs of female entrepreneurs, either by providing better access to business networks, or by allowing for more flexibility in commute patterns.[33]

[33] It is noteworthy that the service sector accounts for roughly half of employment (see Panel A of Table 1). While the large size of the service sector does not by itself ensure more opportunity for female business owners, the service sector is far more ubiquitous across locations within individual cities than other industries (see Rosenthal and Strange (2005), for example). This may help to explain the smaller difference in location patterns for female versus male entrepreneurs.

A different pattern emerges for Manufacturing, Wholesale Trade, and FIRE. Looking across the three panels in Table 4, it is clear that in addition to being farther from centers of activity like downtowns and edge cities, female entrepreneurs are also farther from centers of their own industry and also from banking services, two features of the local environment that previous literature indicate are important. This is exactly the pattern that the model predicts and it tends to reinforce the evidence of substantial segregation documented earlier. As with segregation, these patterns of differential exposure to agglomeration have not previously been documented.

The new patterns described here of segregation and low exposure to agglomeration for female enterprise are similar to the pattern of spatial mismatch between African American households and jobs that has been received a great deal of attention from economists (e.g.., Holzer (1991), Kain (1992), and Zenou (2007). In this literature, the outcomes for African Americans have been shown to be related to the spatial decentralization of jobs and the continued centralization of household location. The segregation and low exposure to agglomeration documented here are qualitatively similar. The difference is that here the spatial gap is between where female entrepreneurs do business relative to other entrepreneurs and relative to centers of activity rather than between home and work locations.

As with the older spatial mismatch based on race, the new spatial mismatch in entrepreneurship can have important consequences for efficiency and equity. Agglomeration is associated with both high productivity (Rosenthal and Strange (2004) and innovation (e.g. Audretsch and Feldman (1996)). If segregation results in decreased exposure to agglomeration, this has the potential to impact both productivity and innovation. Of course, how one interprets such effects depends crucially on the source. We will now turn to this issue.

V. Mechanisms

A. Overview

The focus of our empirical effort thus far has been to document an important and previously unrecognized pattern of entrepreneurial locations: there is substantial segregation of female- and other privately owned businesses, and female owned businesses tend to be located further from valuable concentrations of economic activity. The model shows that this sort of spatial mismatch can arise from either a decreased benefit from agglomeration for female entrepreneurs or from a domestic division of labor that raises commuting costs for female entrepreneurs. This section will present evidence suggesting that both of these mechanisms are at work.

B. Benefits from agglomeration

Two empirical issues must be addressed when considering the benefits that entrepreneurs derive from locating in agglomerations. The first is how to measure such benefits given the nature and limitations of our data. The second is to control for unobserved factors that could cause our measures of agglomeration to be correlated with the model error term, resulting in biased estimates. Before outlining our responses to these challenges it is useful to briefly revisit some key features of our data.

Recall that we do not have access to establishment level data. Instead, we compute census tract level measures of aggregate activity for different identifiable groups of establishments. As earlier, establishments are grouped by industry, ownership type (e.g. public, female, non-female), and number of workers. Measures of activity include counts of establishments, employment, sales, and sales per worker, as in Table 1. Sales and sales per worker are only measured for privately owned single-site companies with fewer than 10 workers, and which were created in the 12 months prior to 2007:Q1.[34] These restrictions exclude multi-site companies and other firms for which the matching of sales to individual establishments may not be well defined. Given the nature of these data, in the analysis to follow, our unit of observation is an establishment group-tract record.

We measure the benefits from agglomeration by considering impacts on sales per worker. This is analogous to previous literature that has considered the impact of agglomeration on individual worker wage rates (e.g. Glaeser and Mare (1999), Rosenthal and Strange (2008), Combes, Duranton, Gobillon, and Roux (2010)). Our assumption is that if agglomeration enhances productivity, this will be reflected in a higher level of sales per worker for a given group of local companies, all else equal. Accordingly, our primary estimation strategy is to regress group-tract observations of sales per worker on various indicators of agglomeration.

We estimate variants of the following regression model,

$$\text{Log}(S/W_{i,2007}) = \lambda_{SIC} + a_1\text{Log}(E_{i,U,2005}) + a_2\text{Log}(E_{i,L,2005}) + a_3\text{Log}(E_{i,B,2005}) + a_4 SES_i + \lambda_{MSA} + e_i \quad (14)$$

where S/W_i denotes sales per worker at establishment group-tract observations i = 1, ..., n. The term λ_{SIC} is a vector of fixed effects that control for the establishment group's industry at the 2-digit SIC level. These fixed effects difference away factors common throughout a given industry regardless of location. Such factors would include capital to labor ratios and the ratio of purchased inputs per unit of production, attributes that vary widely across industries and which affect sales per worker. The terms $E_{i,U}$, $E_{i,L}$, and

[34] Note also that a twelve month window is wide enough to allow for new establishments in the data, but narrow enough to limit the number of new companies that fail prior to 2007:Q1 and which do not appear in data.

$E_{i,B}$ are the primary variables of interest. They reflect aggregate employment (urbanization), own-industry employment (localization), and banking sector employment (SIC 60 and 61) within one mile of the establishment, respectively. Specified as above, in double log form, the coefficients on these variables are interpreted as elasticities.[35]

In estimating variants of (14), several strategies are used to control for unobserved local factors that might be correlated with the agglomeration variables. First, in all specifications, the agglomeration measures are computed exactly as for Table 4 with one important difference. In this instance, we measure the agglomeration variables using data from the 2005:Q4 MarketPlace file, two years prior to the period in which the sales/worker variable is measured. Lagging the agglomeration variables helps to control for contemporaneous shocks that may drive both the local level of employment at existing plants as well as the arrival of new companies and their sales per worker. This accounts for the 2005 and 2007 subscripts in (14).

To further control for unobserved local attributes, the specification in (14) also relies on an extensive set of regressors that describe the local environment apart from agglomeration. These include 14 socio-demographic attributes of the tract residents from the year-2000 Census (SES), and also MSA fixed effects (λ_{MSA}). The SES variables help to proxy for local residential and commuting opportunities, in addition to other features of the local environment.[36] The MSA fixed effects allow for MSA-wide attributes common to all establishments within the metropolitan area (e.g. MSA size, city fiscal policies, composition of the broader population, etc.). Later in the paper we consider a model that uses a much more aggressive form of differencing as a way of stripping away the influence of these and possibly other local unobserved attributes. For now, however, we consider the specification outlined in (14).

Estimates of the model in (14) are presented in Table 5. Panel A reports estimates based on private companies with fewer than 10 workers. Panel B presents estimates based just on one-worker establishments. In both panels, estimates are presented for three samples: all privately owned establishments, female-owned companies, and other privately owned companies. For each sample, three sets of regressions are also presented. The first controls for just urbanization, the second includes localization, and the third controls for nearby concentrations of banking activity.

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[35] To avoid having to drop locations from the sample in which there was no 2005:Q4 employment in a given category (e.g. companies in a given 2-digit industry, such as SIC 27), we added 1 to the employment counts before taking logs of the agglomeration variables. We must, however, drop industry-tract combinations without measured sales.

[36] The SES controls were obtained at the census tract level from the 2000 decennial census. They include the percent of the tract population that is Hispanic, percent African American, average age of the tract population, percent of adults that are male, average income and income squared, percent of adults with high school degree, percent with some college, percent with college or more, unemployment rate, poverty rate, percent of female headed households with children, average age of the housing stock, and percent of housing stock that is single family. As a group, and individually, the SES variables are highly significant but their omission has little impact on the agglomeration elasticities.

We begin with the urbanization-only model in Panel A. When all industries are grouped together (the first column) the urbanization elasticity is 0.49 percent. For female-owned companies (the second column) the corresponding elasticity is 0.32 percent (with a t-ratio of 0.92), and for other privately owned companies 0.46 percent (with a t-ratio of 3.89). Several points are worth highlighting here. First, the positive coefficients are consistent with prior literature that routinely finds evidence of a positive association between urbanization and indicators of labor productivity, as with higher nominal wages in larger cities (e.g. Glaeser and Mare (1999), Rosenthal and Strange (2008)). Second, the point estimate for female-owned companies is smaller in magnitude than the estimate for other private companies. However, given the wide confidence band on the female-owned sample coefficient, we really cannot discern a difference from the coefficient for the other-private sample. In addition, for the 1-worker sample in Panel B, the corresponding urbanization elasticity is actually larger for the female-owned sample (0.46 percent) in comparison to the other-private sample (0.26 percent). While these results show a positive association between urbanization and productivity, they do not provide much support for the idea that such a relationship is necessarily weaker for female-owned companies.

Adding controls for localization (the middle three columns) does not change the gender dimension of the pattern. Consistent with additional previous studies in the agglomeration literature (e.g. Rosenthal and Strange (2003, 2005, 2008)), the coefficients on urbanization are now negative, while the coefficients on localization are positive and comparatively large. Grouping all private companies together, the localization elasticity is roughly 1.2 percent (with a t-ratio of 6.16). The corresponding coefficient is 0.87 percent for female owned companies and 1.1 percent for other private companies. However, once again, the wide confidence band around the coefficient for the female-owned sample makes it difficult to confirm a difference in magnitude relative to that of other private companies. These results are mirrored in the 1-worker sample in Panel B, for which the elasticity for the female-owned sample is 0.41 percent (with a t-ratio of 1.86) while the elasticity for the other-private sample is 0.57 percent (with a t-ratio of 3.51).

Adding controls for banking activity (the last three columns) allows us to consider the possible influence of proximity to banking services. In Panel A, the elasticity with respect to nearby banking activity is negative, small and not significant for the sample of all private companies with fewer than 10 workers and also for non-female owned companies. For the female-owned establishments, the corresponding elasticity is negative 1.6 percent with a t-ratio of 2.61. For the 1-worker sample in Panel B, the elasticity with respect to nearby banking services is nearly zero for the female-owned sample, but positive with a t-ratio of 1.69 for the other-private sample. In both panels, therefore, the coefficient for the female-owned sample implies a less positive association with nearby banking activity. This is

consistent with the view that female owned enterprises may suffer from more limited access to banking related contacts and local networks, as implied by the credit constraints literature discussed above.

Summarizing, there are two patterns in Table 5 that appear to be relevant for both female- and non-female-owned companies: controlling for other forms of agglomeration, elasticities of sales per worker with respect to urbanization are relatively small and mostly negative, while elasticities with respect to localization are positive, significant, and large enough to be economically important. We do not see parallel evidence of a positive influence of proximity to banking sector employment. Although there is a hint that localization effects may be slightly muted for female-owned companies, it is difficult to take the estimates as establishing compelling evidence of a gender differential. One possible explanation for this last result is that there simply may not be any gender-based differences in productivity effects of nearby agglomeration. If true, our model from Section II would point towards differences in domestic responsibilities and commuting costs as the primary driver of the patterns of segregation and differential exposure to agglomeration. However, the possibility remains that unobserved factors might still be obscuring underlying gender based patterns even despite the extensive set of local controls variables included in the model. Accordingly, we turn now to a specification that goes further to address such possibilities.

C. Differential benefits from agglomeration

In this section, we re-specify our model in (14) to allow for a more rigorous form of differencing as a way of controlling for unobserved attributes of the local business environment. In addition, as will be apparent, we focus only on localization effects, consistent with the dominant role of localization as documented above.

A key part of the strategy in Table 5 was to include direct controls for a number of variables that vary across census tracts but not across industries. These variables included MSA fixed effects, tract SES attributes, nearby urbanization, and local banking activity. Their inclusion helped to characterize the local business environment. Although defensible, this approach suffers from two limitations. Most obviously, it does not control for unobserved local factors that are common across industries and which are not directly specified in the model. In addition, it does not control for unobserved local factors that may vary across industries within a given census tract. Our next model addresses both of these concerns.

We begin with the following expressions for sales per worker at female- and male-owned establishments,

$$Log(S/W_{i,2007})_{female} = \lambda_{SIC,f} + a_{1,f}Log(E_{i,L,2005}) + \lambda_{Tract,f} + \lambda_{SIC*Tract} + e_{i,f} \quad (15a)$$

$$Log(S/W_{i,2007})_{male} = \lambda_{SIC,m} + a_{1,m}Log(E_{i,L,2005}) + \lambda_{Tract,m} + \lambda_{SIC*Tract} + e_{i,m} \ . \quad (15b)$$

The first two terms in (15a) and (15b) are as before, and denote industry fixed effects and localization employment. The coefficients on these variables are allowed to differ for female- versus other privately owned companies, which is also as in Table 5 ($\lambda_{SIC,f}$ may differ from $\lambda_{SIC,m}$ and $a_{1,f}$ may differ from $a_{1,m}$).

In contrast to our prior estimation, (15a) and (15b) include tract fixed effects, $\lambda_{Tract,f}$ and $\lambda_{Tract,m}$, the influence of which is also allowed to differ for female- versus non-female owned companies. This causes the previous controls for MSA fixed effects, SES attributes, urbanization, and banking activity to drop out of the model, but the localization variable remains. In addition, and importantly, the tract fixed effects go much further to control for unobserved features of the local environment that might bias estimates of the localization elasticity. This includes proximity to transportation services (e.g. subway stops, port facilities, airports), local zoning regulations that may restrict the type of allowable activity, the size and shape of the census tract, and any other unobserved local factors that are common across industries. A further consequence of the tract fixed effects is that identification is now based exclusively on within-tract variation across establishment groups (e.g. industries) as opposed to variation across tracts.

The models in (15a) and (15b) also include a set of industry-tract fixed effects, $\lambda_{SIC*Tract}$. These terms control for unobserved factors that may be specific to a given industry-tract combination, such as reliance on skilled labor and proximity to local universities (e.g. Andersson et al, 2004 and 2009). Estimation of these terms – and indeed the models outlined in (15a) and (15b) – is not possible given that our data are organized into industry-tract observations. On the other hand, differencing (15a) and (15b) removes the unobserved $\lambda_{SIC*Tract}$ effects and yields an estimable model that highlights differences in sales per worker at female- versus male-owned establishments,

$$Log\{(S/W_{i,2007})_{female} / (S/W_{i,2007})_{male}\} = \lambda_{SIC} + a_1Log(E_{i,L,2005}) + \lambda_{Tract} + e_i \ , \quad (16)$$

where $\lambda_{SIC} = \lambda_{SIC,f} - \lambda_{SIC,m}$, $a_1 = a_{1,f} - a_{1,m}$, $\lambda_{Tract} = \lambda_{Tract,f} - \lambda_{Tract,m}$, and $e_i = e_{i,f} - e_{i,m}$. In this model, a_1 captures the differential effect of proximity to own-industry employment on sales per workers at female- versus other privately owned companies. While multiple layers of differencing do not guarantee that all relevant unobserved factors are taken into account, the model is more rigorous than the specification in Table 5, and estimates of the difference in localization elasticity are likely more robust.

Estimates of (16) are provided in the first two columns of Table 6, for the sample based on companies with fewer than 10 workers (column 1) and for the 1-worker sample (column 2). The reported elasticity in the broader sample is -1.03 percent with a t-ratio of 3.18. A similar, although somewhat smaller, estimate is reported for the 1-worker sample. In conjunction with the positive localization effects documented in Table 5, this indicates that a doubling of nearby own-industry employment would increase sales per worker at female owned companies by roughly 1 percent less than at other private establishments. This pattern is consistent with female entrepreneurs on average deriving lesser benefits from proximity to own-industry employment within a given industry.

There are many reasons why benefits from localization might be lower. As is well known, the question of which of the many potential microfoundations of agglomeration economies are actually at work remains an open one. Unfortunately, a comprehensive answer to this question is beyond the reach of this paper. However, a further empirical exercise is feasible. Suppose that women business owners face barriers that limit access to male-dominated business networks but do not face similar barriers when interacting with female-owned enterprises. Under such circumstances, the localization elasticity associated with nearby employment at female-owned businesses would not be lower for female entrepreneurs than the corresponding elasticity for their male counterparts. In contrast, the localization elasticity associated with employment at businesses not owned and operated by women would, under these circumstances, tend to be lower for female entrepreneurs. This implies yet another layer of differencing.

The last two columns of Table 6 test these ideas. In these models, we decompose the localization variable into nearby own-industry employment at female-owned companies (as identified by the SBA and D&B), other privately owned companies, and publicly owned companies. We believe that publicly owned companies are closer to the other private category than to the female owned firms. For this reason we expect the localization elasticity to be smaller for female entrepreneurs when considering nearby employment at other (non-female) private and publicly owned companies, but we do not anticipate such a result for nearby employment at female-owned companies.

The results of this differencing exercise are striking. For the sample of companies with fewer than 10 workers (column 3), the difference in localization elasticity (female versus other private business owners) based on employment at female-owned companies is negative 0.37 percent with a t-ratio of 1.09. As anticipated, that difference is larger for employment housed outside of female-owned establishments. For employment at other privately owned companies, the difference is negative 0.5 percent with a t-ratio of 1.49, while for employment at publicly owned companies the difference is negative 1.37 percent with a t-ratio of 4.71. Results for the 1-worker sample reinforce these patterns and are even more dramatic. For nearby employment housed outside of female-owned enterprises, the female-male difference in

localization elasticities is nearly identical to estimates for the broader sample (- 0.50 percent with a t-ratio of 1.66 based on employment at other privately owned establishments and -1.58 percent with a t-ratio of 5.38 based on employment at publicly owned establishments). For nearby employment at female-owned companies, the female-male difference in localization elasticity is *positive* 0.47 percent with a t-ratio of 1.57. This is suggestive that female entrepreneurs may actually derive greater benefits than do male entrepreneurs from proximity to employment at female-owned businesses.

In sum, the patterns in Table 6 offer two important insights. The first two columns in the table provide compelling evidence that female-owned companies tend to benefit less from nearby employment as compared to other privately owned establishments. The second two columns provide compelling evidence that this effect is especially apparent when nearby own-industry employment is housed in companies not owned by female entrepreneurs. In the context of our model from Section II, this suggests that differential access to business networks may be a contributing factor to the patterns of segregation and differential exposure to agglomeration established earlier.

D. Commuting

The model in Section II also predicts shorter commutes for female workers. This is similar to predictions in Madden (1981), White (1986), and Turner and Niemeier (1997), all of whom emphasize differences in domestic burdens. In our model, shorter commutes for female workers is a consequence of both the lower value of traveling to agglomerated work sites and also the greater opportunity cost of agglomerating because of more burdensome domestic responsibilities. The former reduces the reward from a long commute, while the latter actively penalizes a long commute.[37]

To examine commuting patterns, we use individual-level data from the 5 percent sample of the 2000 Decennial Census. These data were obtained over the web from the Integrated Public Use Micro Sample (IPUMS) website. The basic specification will be an OLS regression of commuting minutes on various socio-economic and demographic characteristics. The key variables for our purposes relate to gender. We include a dummy for a female worker, another for whether children are present in the home, and a third interactive dummy for both being female and having children in the home. The models are

[37] Madden (1981) uses data from the Panel Survey of Income Dynamics to examine gender differences in commute times. White (1986) uses data for New York city from the 1980 Annual Housing Survey. Turner and Niemeier (1997) use roughly 19,000 observations from the 1990 National Personal Transportation Survey. As will be apparent, our empirical analysis of commuting behavior differs from these earlier studies in two important respects. First, we use more recent year-2000 data from the public use micro sample of the Census. The more recent data better matches the time period of our D&B data (2007) and allows for changes in commuting behavior that may have occurred in the last few decades. In addition, the PUMS sample contains millions of individual records and this allows us to focus only on full-time workers while also including extensive controls in the regression model. Those controls include most measures typically found in wage regressions, in addition to roughly 16,000 MSA/Occupation fixed effects. The extensive set of controls helps to address possible unobserved worker and location attributes that could otherwise obscure gender differences in commuting behavior.

estimated for a sample of workers with strictly positive commute time (not working at home) and for a sample including all workers. The latter includes individuals who work out of their homes and report zero commutes. Within these two samples, the commuting models are estimated separately for self-employed workers (a standard way to capture entrepreneurs in Census data), for non-self-employed, and for all workers. In all cases, we restrict our samples to those individuals who work full time, defined here as 35 hours or more per week.[38] All of the models also control for a standard range of socio-demographic worker attributes (e.g. education, race, age, etc.). In addition, we further control for roughly 11,000 to 16,000 MSA/occupation fixed effects depending on the model specification.

Table 7 presents the results. The sign on the female dummy is always negative and very strongly significant. For the three models of workers not working at home, the values are quite similar, with female workers commuting between 1.3 and 1.5 minutes less per trip to work. The numbers are slightly larger for the all-workers sample, while the commuting difference is much larger for self-employed. This reflects the presence in this sample of many self-employed workers who work at home, and so have zero commute time. Having a child present in the home is associated with an increase in commuting time in the range of 0.6 to 0.7 minutes. This should be interpreted as the effect on a male worker. Importantly, the interaction of female dummy and the presence of a child is negative, large, and highly significant. Among self-employed workers, that term implies that for individuals not working at home, women commute 1.2 minutes less (1-way) relative to comparable men when children are present. Among all self-employed workers, the presence of a child reduces the women's commute 2.3 minutes relative to a comparable male worker. The combined impact of these estimates can be obtained by adding together the relevant coefficients. Among self-employed workers who do not work at home, women with children commute roughly 2.5 minutes less than men. Among all self-employed workers, women with children commute just over 5 minutes less than comparable men. Considering that the average commute for a typical full-time worker in the United States is roughly 25 minutes, these are very large effects.

This pattern of results is consistent with predictions of the model. If women workers incur higher commuting costs because of the domestic division of labor the coefficient on *Female* should be negative. The same would be true if women derive less value from business networks found in agglomerated areas. The negative coefficient on *Female*, therefore, is consistent with the idea that women workers face constraints relative to their male counterparts. Note, however, that differential access to business networks would not explain the negative coefficient obtained on the interacted variable, *Female*Child*

[38] This is identified in the IPUMS by the usual hours worked per week variable.

Present. Instead, that result provides evidence that women workers with children have larger domestic burdens than their male counterparts, and as a consequence, shorter commutes.[39]

VI. Conclusion

Despite the high costs involved, entrepreneurs continue to be drawn to cities and to industry clusters. This is because agglomeration can contribute to business success by allowing firms to draw on local business networks and other features of the local economy. We emphasize two reasons, however, why female entrepreneurs may be less strongly attracted than their male counterparts to cities and industry clusters. The first is that women often bear disproportionate responsibilities at home, and, as a result, incur greater costs from lengthy commutes. This can discourage women from locating their businesses in densely developed areas, which are often far from attractive residential opportunities. The second is that businesswomen may be less networked than their male counterparts, and as a result, may benefit less from agglomeration. These forces will tend to be reinforced if less developed networks also impair female entrepreneur access to credit, since this would make it more difficult for female business owners to afford the startup costs in highly productive but expensive centers of business activity.

This paper has presented a model incorporating these forces. We also test the model's predictions by comparing the location patterns of companies classified by the SBA as female-owned to those of other privately owned businesses. Segregation measures indicate that for most 2-digit industries, there is extensive spatial stratification of female- and non-female owned businesses, often to a degree roughly comparable in magnitude to white-black residential segregation. In addition, for a wide range of industries, female-owned companies are located in less agglomerated areas. This is true for the overall level of business activity, the level of nearby employment in the own industry, and nearby banking activity. Previous literature has indicated that all of these dimensions of agglomeration are important for new businesses. All of these patterns are consistent with the conceptual model, but none have been previously documented.

To consider the mechanisms responsible for these patterns, the paper has carried out two further sorts of analysis. The first examines the impact of different forms of agglomeration on sales per worker at female- and male-owned private establishments. Consistent with prior literature, we confirm that proximity to own-industry employment is most important, with a positive and highly significant elasticity of roughly 1.2 percent. Further analysis applies multiple layers of differencing and obtains compelling evidence that women entrepreneurs derive significantly less benefit from proximity to own-industry

[39] It is worth noting that these interpretations are consistent with findings by Madden (1981) who analyzed data from the Panel Survey of Income Dynamics. The key result there is that domestic roles impact commuting times for women.

employment as compared to their male counterparts. This pattern is most evident for own-industry employment in publicly traded companies; for own-industry employment in female-owned companies a reverse pattern is found. These patterns suggest that differential access to business networks likely contributes to the patterns of segregation and differential exposure to agglomeration that are documented earlier in the paper.

Our second sort of analysis examines commuting. Consistent with several early studies (e.g. Madden (1981) and White (1986)), the paper finds that women commute shorter distances, an effect that is magnified if children are present in the home. This is consistent with the idea that women entrepreneurs (and workers in general) face higher implicit commuting costs because of their greater domestic demands. This suggests that differential home burdens and related commuting costs also likely contribute to segregation and differential exposure to agglomeration.

Our finding that women entrepreneurs agglomerate less is important. There is a large body of work establishing that densely developed locations and industry clusters confer both static and dynamic advantages on those who locate there. This paper shows that these benefits are not proportionately enjoyed by the female business sector. Instead, because women entrepreneurs face constraints relative to their male counterparts they tend to operate their companies in less advantageous locations. We characterize this as a new sort of spatial mismatch.

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Table 1: Selected Summary Statistics for Establishments in the First Quarter of 2007[a]

PANEL A: Employment at Different Types of Establishments[a]

		Public and Private All Ages and Size				Private, New (< 1 year), and Small (< 10 Workers)			
Industry Name	Industry SIC	Private Plus Public	Other Private	Female-Owned Private	Percent at Female-Owned Private	Total Private	Other Private	Female Owned	Percent Female Owned
Manufacturing	20-39	12,908,676	11,806,672	478,844	0.0371	53,485	48,788	4,697	0.0878
Wholesale Trade	50, 51	5,257,851	4,898,385	322,815	0.0614	62,054	57,070	4,984	0.0803
FIRE	60-65, 67	8,112,456	7,630,573	293,279	0.0362	126,792	122,403	4,389	0.0346
Services	73, 80, 81, 86, 87, 89	25,503,650	23,692,583	1,577,183	0.0618	256,052	238,967	17,085	0.0667
TOTAL	All Industries Above	51,782,633	48,028,214	2,672,121	0.0516	498,383	467,228	31,155	0.0625

PANEL B: Privately Owned Establishment Counts[a]

		All Ages and Size				New (< 1 year) and Small (< 10 Workers)			
Industry Name	Industry SIC	Total Private	Other Private	Female Owned	Percent Female Owned	Total Private	Other Private	Female Owned	Percent Female Owned
Manufacturing	20-39	510,717	454,568	56,149	0.1099	24,872	22,537	2,335	0.0939
Wholesale Trade	50, 51	529,261	475,156	54,104	0.1022	27,756	25,315	2,441	0.0879
FIRE	60-65, 67	958,226	890,481	67,745	0.0707	56,440	54,410	2,030	0.0360
Services	73, 80, 81, 86, 87, 89	2,759,019	2,467,024	291,995	0.1058	139,904	130,598	9,306	0.0665
TOTAL	All Industries Above	4,757,224	4,287,230	469,994	0.0988	248,971	232,860	16,112	0.0647

PANEL C: Sales at New (< 1 year), Small (< 10 Workers), Private Establishments (Millions in 2007 Dollars)[a]

		Total Sales				Sales Per Worker		
Industry Name	Industry SIC	Total Private	Other Private	Female Owned	Percent Female Owned	Total Private	Other Private	Female Owned
Manufacturing	20-39	4,986	4,567	419	0.0840	0.0932	0.0936	0.0892
Wholesale Trade	50, 51	11,209	10,448	762	0.0680	0.1806	0.1831	0.1529
FIRE	60-65, 67	11,855	11,456	398	0.0336	0.0935	0.0936	0.0907
Services	73, 80, 81, 86, 87, 89	20,143	18,830	1,313	0.0652	0.0787	0.0788	0.0768
TOTAL	All Industries Above	48,193	45,301	2,892	0.0600	0.0967	0.0970	0.0928

[a]Private companies classified by the SBA as women-owned are labeled "Female Owned".

Table 2
Segregation of Female-Owned Private Businesses for 1-Digit Industries

Average Segregation Index Values Across MSAs
Based on Counts of Establishments in the First Quarter of 2007[a]

Industry Name	Industry SIC Category	All Sized Estab	1-Worker Estab
Manufacturing	20-39	0.196	0.332
Wholesale Trade	50, 51	0.200	0.395
FIRE	60-65, 67	0.169	0.281
Services	73, 80, 81, 86, 87, 89	0.105	0.145

[a]Segregation is calculated using the Dissimilarity index. This measures the percentage of private women-owned establishments in a given MSA that would have to move to a different census tract if each tract in the MSA was to have the same percentage of private women-owned businesses as the MSA overall.

Table 3
Segregation of Female-Owned Private Businesses for 2-Digit Industries

Average Segregation Index Values Across MSAs
Based on Counts of Establishments in the First Quarter of 2007[a]

Industry Name	Industry SIC	All Sized Estab	1-Worker Estab	Industry Name	Industry SIC	All Sized Estab	1-Worker Estab
MANUFACTURING				WHOLESALE TRADE			
Food and Kindred Products	20	0.644	0.563	Durables	50	0.244	0.481
Tobacco Products	21	0.047	0.007	Non-Durables	51	0.313	0.521
Textile Mill Products	22	0.664	0.558				
Apparel & Other Fabric Products	23	0.537	0.659	FIRE			
Wood Products Except Furniture	24	0.683	0.568	Depository Institutions	60	0.545	0.224
Furniture and Fixtures	25	0.632	0.449	Nondepository Credit Institutions	61	0.473	0.566
Paper and Allied Products	26	0.568	0.361	Security & Com, Brokers/Dealers	62	0.571	0.514
Printing, Publishing & Allied	27	0.392	0.609	Insurance Carriers	63	0.584	0.470
Chemicals and Allied Products	28	0.623	0.558	Ins. Agents, Brokers, Service	64	0.318	0.573
Petroleum Refining and Related	29	0.325	0.077	Real Estate	65	0.210	0.341
Rubber & Misc Plastic Products	30	0.572	0.295	Holding & Other Invest. Offices	67	0.590	0.570
Leather & Leather Products	31	0.501	0.314				
Stone, Clay, Glass, Concrete Prod.	32	0.666	0.655	SERVICES			
Primary Metal Industries	33	0.510	0.137	Business Services	73	0.137	0.193
Fab Metal Ex Machinery & Trans.	34	0.587	0.520	Health Services	80	0.185	0.365
Ind & Com. Mach. & Computers	35	0.539	0.578	Legal Services	81	0.284	0.484
Elec & Components Ex Computer	36	0.585	0.458	Membership Organizations	86	0.174	0.059
Transportation Equipment	37	0.607	0.335	Eng, Acc, Research, Management	87	0.185	0.270
Photo, Medical & Optical Goods	38	0.587	0.392	Services not elsewhere classified	89	0.432	0.480
Misc Manufacturing	39	0.445	0.575				

[a]Segregation is calculated using the Dissimilarity index. This measures the percentage of private women-owned establishments in a given MSA that would have to move to a different census tract if each tract in the MSA was to have the same percentage of private women-owned businesses as the MSA overall.

Table 4
Alternative Measures of Agglomeration for
Female-Owned Relative to Other Privately Owned Establishments
(2007:Q1; 1-Digit Industries)

PANEL A: Proximity to All Industry Employment (Urbanization)[a]

	All-Sized Establishments			1-Worker Establishments		
Industry Name[c]	Avg All Industry Employment within 1 mile for All Private Establishments	% Difference Female vs. Other Private[b]	t-ratio % Difference	Avg All Industry Employment within 1 mile for All Private Establishments	% Difference Female vs. Other Private[b]	t-ratio % Difference
Manufacturing	17430	-9.42	-11.72	12774	-6.42	-4.32
Wholesale Trade	21279	-4.46	-5.33	16339	-8.98	-5.43
FIRE	19486	-24.14	-36.73	12058	-13.00	-9.87
Services	18780	-1.02	-2.78	14201	3.69	6.29

PANEL B: Proximity to Own Industry Employment (Localization)[a]

	All-Sized Establishments			1-Worker Establishments		
Industry Name[c]	Avg Own-Industry Employment within 1 mile for All Private Establishments	% Difference Female vs. Other Private[b]	t-ratio % Difference	Avg Own-Industry Employment within 1 mile for All Private Establishments	% Difference Female vs. Other Private[b]	t-ratio % Difference
Manufacturing	2352	-21.78	-25.93	1575	-14.85	-9.38
Wholesale Trade	1499	-10.95	-12.06	1103	-14.22	-7.92
FIRE	3298	-28.87	-40.36	1734	-15.53	-10.71
Services	5800	0.05	0.13	4274	6.68	10.04

PANEL C: Proximity to Banking Sector Employment (SIC 60 and 61)[a]

	All-Sized Establishments			1-Worker Establishments		
Industry Name[c]	Avg Banking Industry Employment within 1 mile for All Private Establishments	% Difference Female vs. Other Private[b]	t-ratio % Difference	Avg Banking Industry Employment within 1 mile for All Private Establishments	% Difference Female vs. Other Private[b]	t-ratio % Difference
Manufacturing	475	-8.27	-8.79	342	-4.91	-2.81
Wholesale Trade	590	-2.64	-2.68	451	-9.04	-4.70
FIRE	600	-27.88	-37.36	340	-15.36	-10.16
Services	540	-0.34	-0.79	383	5.00	7.27

[a]Urbanization is measured as total employment across all industries within 1 mile in 2007:Q1. Localization is measured as total employment in 2007:Q1 at companies in the own (1-digit) industry within 1 mile. Banking employment is measured as employment in 2007:Q1 in SIC 60 and 61 within 1 mile.

[b]Equal to 100 x (exp[b - V(b)/2] - 1) where b is the coefficient on the Female dummy in the semi-log model, and V(b) is its estimated variance. See Halvorsen and Palmquist (1980) and Kennedy (1981) for details.

[c]Manufacturing includes SIC 20-39; Wholesale Trade includes SIC 50 and 51; FIRE includes Sic 60-65 and 67; Services includes SIC 73, 80, 81, 86, 87, and 89.

Table 5: Elasticity of Sales/Workers With Respect to Alternative Measures of Agglomeration[a]
(t-ratios based on robust standard errors in parentheses)

PANEL A: 1 to 9 Worker Establishments at Privately Owned, Newly Created (< 1 year) Establishments

	Urbanization Only			Urbanization and Localization			Urbanization, Localization, and Banking		
Log Employment within 1 Mile[b]	All	Female	Other	All	Female	Other	All	Female	Other
All employment	0.00490 (4.23)	0.00317 (0.92)	0.004603 (3.89)	-0.0044 (-2.71)	-0.00449 (-0.78)	-0.00422 (-2.52)	-0.0021 (-0.93)	0.00874 (1.26)	-0.00317 (-1.54)
Own 2-Digit employment	-	-	-	0.01165 (6.16)	0.00876 (1.42)	0.01094 (5.78)	0.01192 (6.27)	0.01054 (1.70)	0.01107 (5.79)
Banking employment (SIC 60, 61)	-	-	-	-	-	-	-0.00276 (-1.21)	-0.01558 (-2.61)	-0.00123 (-0.58)
2-digit SIC fixed effects	35	35	35	35	35	35	35	35	35
MSA fixed effects	304	304	304	304	304	304	304	304	304
SES controls	14	14	14	14	14	14	14	14	14
Observations	752698	150390	730783	752698	150390	730783	752698	150390	730783
R^2 within	0.1841	0.0905	0.1899	0.1845	0.0907	0.1903	0.1845	0.0910	0.1903
R^2 overall	0.1828	0.0914	0.1885	0.1834	0.0917	0.1890	0.1835	0.0923	0.1891

PANEL B: 1-Worker Establishments at Privately Owned, Newly Created (< 1 year) Establishments

	Urbanization Only			Urbanization and Localization			Urbanization, Localization, and Banking		
Log Employment within 1 Mile[b]	All	Female	Other	All	Female	Other	All	Female	Other
All employment	0.00276 (2.77)	0.00460 (1.96)	0.00260 (2.55)	-0.00213 (-1.84)	0.00101 (0.43)	-0.00212 (-1.66)	-0.00425 (-2.14)	0.00128 (0.42)	-0.00476 (-2.34)
Own 2-Digit employment	-	-	-	0.00600 (3.75)	0.00411 (1.86)	0.00574 (3.51)	0.00579 (3.63)	0.00415 (1.92)	0.00548 (3.34)
Banking employment (SIC 60, 61)	-	-	-	-	-	-	0.00245 (1.33)	-0.00033 (-0.10)	0.00305 (1.69)
2-digit SIC fixed effects	35	35	35	35	35	35	35	35	35
MSA fixed effects	304	304	304	304	304	304	304	304	304
SES controls	14	14	14	14	14	14	14	14	14
Observations	431139	91500	406298	431139	91500	406298	431139	91500	406298
R^2 within	0.0385	0.0280	0.0391	0.0389	0.0282	0.0394	0.0389	0.0282	0.0394
R^2 overall	0.0397	0.0290	0.0401	0.0402	0.0293	0.0406	0.0402	0.0293	0.0406

[a]Private companies classified by the SBA as women-owned are labeled "Female Owned." Sales are measured in millions in 2007 dollars.
[b]Employment controls are based on all-age and all-size establishments within 1-mile of the census tract centroid in 2005:Q4. Banking sector employment includes SIC 60 and 61.

Table 6: Difference in Localization Elasticity Between Female and Other Private Business Owners (Dependent variable is based on sales/workers; t-ratios based on robust standard errors in parentheses)[a]

Log Own 2-Digit Employment within 1 Mile	1 to 9 Worker Establishments	1 Worker Establishments	1 to 9 Worker Establishments	1 Worker Establishments
All establishments	-0.01027 (-3.18)	-0.00643 (-2.30)	-	-
Female owned private establishments	-	-	-0.00369 (-1.09)	0.00466 (1.57)
Other privately owned establishments	-	-	-0.00516 (-1.49)	-0.00500 (-1.66)
Publicly owned establishments	-	-	-0.01369 (-4.71)	-0.01576 (-5.38)
2-Digit SIC FE	35	35	35	35
Tract FE	42027	33245	42027	33245
Observations	129347	67077	129347	67077
R^2 within	0.0293	0.0055	0.0295	0.0069
R^2 overall	0.0234	0.0030	0.0234	0.0033

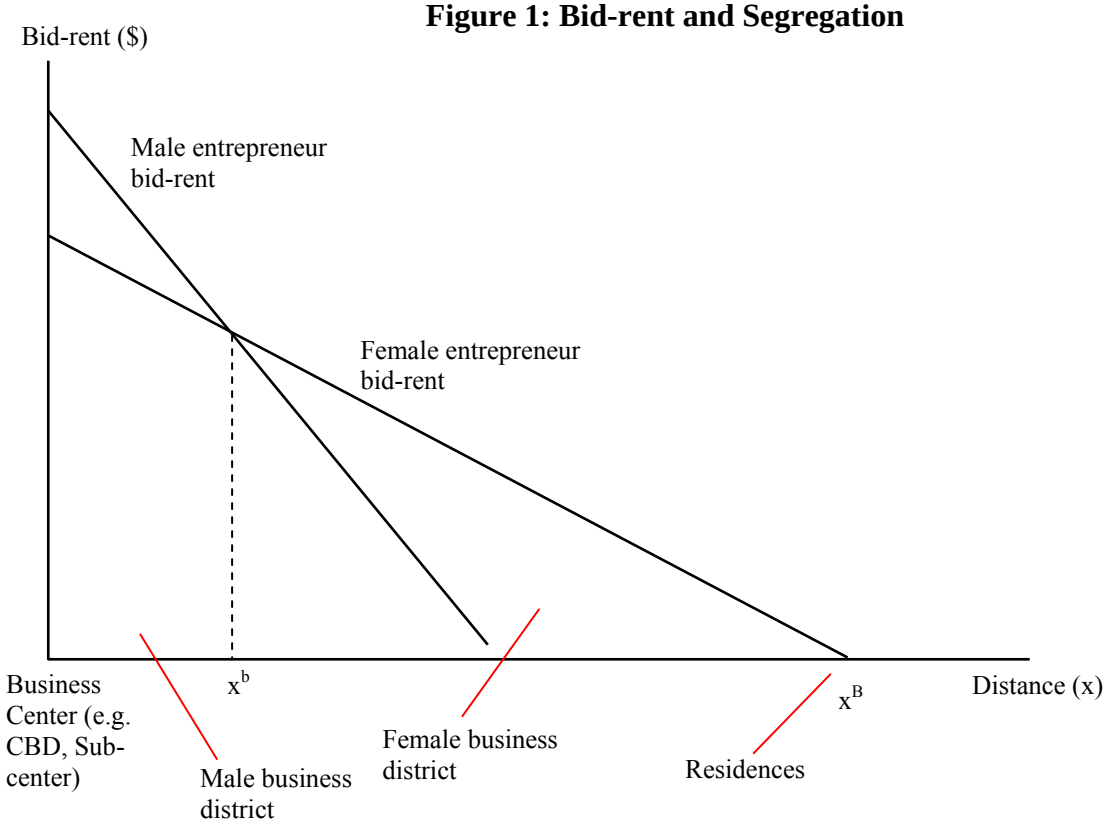
[a]Dependent variable is $\log[(S/W)^F / (S/W)^{OP}]$, where S/W^F and S/W^{OP} equal sales per worker at female and non-female (other) private establishments and are measured using privately-owned, newly created (< 1 year) establishments.
[b]Employment controls are based on all-age and all-size establishments within 1-mile of the census tract centroid in 2005:Q4. Sales are measured in millions in 2007 dollars. Private companies classified by the SBA as women-owned are labeled "Female Owned."

Table 7: Commute Time Regressions
(Dependent Variable: Commute time in minutes;
Absolute value of t-ratios in Parentheses)*

	All Workers			Workers NOT Working at Home		
	All	Non Self-Employed	Self-Employed	All	Non Self-Employed	Self-Employed
Family Total Income	8.680E-06	1.130E-05	6.470E-06	5.990E-06	8.760E-06	4.030E-07
	(55.07)	(63.85)	(18.29)	(35.55)	(46.76)	(0.98)
Investment Income	-4.790E-05	-4.740E-05	-1.970E-05	-3.480E-05	-3.240E-05	-1.500E-05
	(52.73)	(43.54)	(11.90)	(35.46)	(27.96)	(7.70)
Age	0.76837	0.83994	0.25309	0.31119	0.34183	-0.01644
	(194.39)	(197.91)	(19.15)	(68.04)	(70.44)	(0.97)
Age Squared	-0.00931	-0.01002	-0.00358	-0.00370	-0.00396	-0.00015
	(204.43)	(202.27)	(26.42)	(69.30)	(69.27)	(0.84)
Female	-1.67657	-1.83615	-2.90762	-1.31026	-1.48334	-1.35822
	(72.03)	(75.89)	(33.56)	(53.00)	(58.27)	(12.60)
Child Present	0.62047	0.61121	0.75240	0.58751	0.57198	0.67592
	(14.60)	(13.59)	(5.95)	(13.20)	(12.22)	(4.67)
Female X (Child Present)	-1.47385	-1.44320	-2.32252	-0.95815	-0.96160	-1.22142
	(29.49)	(27.51)	(13.93)	(18.22)	(17.56)	(6.08)
Married	0.86265	0.93668	0.38254	0.83248	0.89578	0.05512
	(45.48)	(47.37)	(5.78)	(41.4)	(43.09)	(0.69)
Asian	-0.49289	-0.87472	2.36460	0.10314	-0.04872	1.81637
	(9.69)	(16.38)	(14.54)	(1.90)	(0.86)	(9.58)
Black	0.36841	0.13923	1.28495	2.03183	1.91894	2.96440
	(12.20)	(4.51)	(8.81)	(62.58)	(58.22)	(16.72)
Hispanic	-1.22120	-1.44353	0.08531	0.03193	-0.10553	1.38243
	(28.50)	(32.54)	(0.53)	(0.69)	(2.20)	(7.16)
Other Race	-1.11000	-1.33483	0.53202	0.17359	0.02071	1.88920
	(31.20)	(36.27)	(3.93)	(4.49)	(0.52)	(11.56)
Some Years in College	0.91672	1.03215	-0.18416	0.35199	0.43831	-0.64677
	(43.70)	(46.92)	(2.70)	(15.80)	(18.93)	(7.95)
College Graduate or More	1.49957	1.77652	-0.95723	0.56848	0.74220	-1.43430
	(55.39)	(61.89)	(11.71)	(19.99)	(24.9)	(14.65)
11-20 years in US	-0.08713	-0.09572	0.14086	0.40263	0.48158	-0.74957
	(1.57)	(1.66)	(0.69)	(6.58)	(7.63)	(3.04)
Over 20 years in US	1.06774	1.05207	0.48868	0.37870	0.46021	-1.45206
	(24.09)	(22.98)	(2.84)	(7.81)	(9.25)	(6.9)
Constant	5.34914	4.08786	13.17069	18.42662	17.66641	25.97300
	(60.47)	(43.82)	(39.2)	(183.27)	(168.05)	(61.37)
Observations	5,755,765	5,213,398	542,367	4,833,526	4,435,117	398,409
Occupation/MSA FE	15,970	15,874	11,327	15,836	15,743	10,626
R-squared (overall)	0.0209	0.0241	0.0258	0.0099	0.0119	0.0134

*Data source is the year-2000 5 percent sample of the Decennial Census. Samples are restricted to individuals working 35 or more hours per week and who receive no welfare income. All models are estimated by ordinary least squares.

Figure 1: Bid-rent and Segregation



Appendix A: Theory

The comparative statics of v(-) are:

$$\partial v/\partial x = t/(\partial^2 u/\partial v^2) < 0. \quad (A.1)$$

$$\partial v/\partial K = -(\partial^2 u/\partial v \partial K)/(\partial^2 u/\partial v^2) > 0, \quad (A.2)$$

$$\partial v/\partial \alpha = -(\partial^2 u/\partial v \partial \alpha)/(\partial^2 u/\partial v^2) > 0. \quad (A.3)$$

The comparative statics of rent for commercial space are:

$$\partial r/\partial x = -tv(x.K,\alpha) + (\partial v/\partial x)(-(T + tx) + \partial u/\partial v) + \tau = -tv(x,K,\alpha) + \tau < 0. \quad (A.4)$$

$$\partial r/\partial K = (\partial v/\partial K)(-(T + tx) + \partial u/\partial v) + \partial u/\partial K = \partial u/\partial K > 0, \quad (A.5)$$

$$\partial r/\partial \alpha = (\partial v/\partial \alpha)(-(T + tx) + \partial u/\partial v) + \partial u/\partial \alpha = \partial u/\partial \alpha > 0, \quad (A.6)$$

$$\partial r/\partial \tau = (x^B - x) > 0. \quad (A.7)$$

The comparative statics of density are:

$$\partial n/\partial x = (\partial r/\partial x)/c''(n) = [-tv(K,x) + \tau]/c''(n) < 0. \quad (A.8)$$

$$\partial n/\partial K = (\partial r/\partial K)/c''(n) = (\partial u/\partial K)/c''(n) > 0, \quad (A.9)$$

$$\partial n/\partial \alpha = (\partial r/\partial \alpha)/c''(n) = (\partial u/\partial \alpha)/c''(n) > 0. \quad (A.10)$$

$$\partial n/\partial \tau = (\partial r/\partial \tau)/c''(n) = -(x^B - x)/c''(n) < 0. \quad (A.11)$$

The comparative statics of land rent are:

$$\partial R/\partial K = (\partial r/\partial K)n + (r - c'(n))(\partial n/\partial K) = (\partial u/\partial K)n(x,K,\alpha,\tau) > 0, \quad (A.12)$$

$$\partial R/\partial \alpha = (\partial r/\partial \alpha)n + (r - c'(n))(\partial n/\partial \alpha) = (\partial u/\partial \alpha)n(x,K,\alpha,\tau) > 0, \quad \text{(A.13)}$$

$$\partial R/\partial x = (\partial r/\partial x)n + (r - c'(n))(\partial n/\partial x) = - tv(K,x)n(x,K,\alpha,\tau) < 0. \quad \text{(A.14)}$$

$$\partial R/\partial \tau = (\partial r/\partial \tau)n + (r - c'(n))(\partial n/\partial \tau) = -[(x^B - x)/c''(n)]\, n(x,K,\alpha,\tau) < 0, \quad \text{(A.15)}$$

Appendix B: Supplemental Tables

Table B-1
Employment at Different Types of Establishment in the First Quarter of 2007 by 2-Digit Industry[a]

Industry Name	Industry SIC	Private Plus Public Establishments	Female-Owned Private Establishments	Other Private Establishments	Percent of Total Employment at Female-Owned Private Establishments
Food and Kindred Products	20	1,037,496	31,674	975,229	0.0305
Tobacco Products	21	29,867	100	27,689	0.0033
Textile Mill Products	22	230,189	9,413	214,256	0.0409
Apparel & Other Fabric Products	23	310,553	34,314	267,015	0.1105
Wood Producs Except Furniture	24	366,835	13,117	351,088	0.0358
Furniture and Fixtures	25	328,969	12,497	306,861	0.0380
Paper and Allied Products	26	446,013	13,591	410,067	0.0305
Printing, Publishing & Allied	27	1,366,527	75,921	1,271,705	0.0556
Chemicals and Allied Products	28	882,247	18,556	754,757	0.0210
Petroleum Refining and Related	29	113,964	1,816	98,842	0.0159
Rubber & Misc Plastic Products	30	639,004	24,745	597,139	0.0387
Leather & Leather Products	31	45,881	3,669	37,646	0.0800
Stone, Clay, Glass, Concrete Prod.	32	393,885	13,915	375,855	0.0353
Primary Metal Industries	33	441,220	10,925	416,647	0.0248
Fab Metal Ex Machinery & Trans.	34	1,085,625	53,043	1,020,884	0.0489
Ind & Com. Mach. & Computers	35	1,516,204	58,700	1,379,616	0.0387
Elec & Components Ex Computer	36	1,235,751	33,420	1,083,813	0.0270
Transportation Equipment	37	1,185,381	14,872	1,136,988	0.0125
Photo, Medical & Optical Goods	38	857,516	19,521	732,074	0.0228
Misc Manufacturing	39	395,550	35,036	348,502	0.0886
Wholesale Trade: Durables	50	3,355,516	202,356	3,128,283	0.0603
Wholesale Trade: Non-Durables	51	1,902,335	120,458	1,770,102	0.0633
Depository Institutions	60	1,247,243	5,489	1,201,796	0.0044
Nondepository Credit Institutions	61	841,336	40,918	788,657	0.0486
Security & Com, Brokers/Dealers	62	708,521	9,751	668,571	0.0138
Insurance Carriers	63	1,113,988	8,863	1,031,390	0.0080
Insurance Agents, Brokers, Service	64	1,020,389	50,131	964,188	0.0491
Real Estate	65	2,616,416	168,156	2,443,860	0.0643
Holding & Other Investment Offices	67	564,562	9,973	532,111	0.0177
Business Services	73	6,938,361	749,751	6,018,505	0.1081
Health Services	80	9,534,705	384,284	9,126,432	0.0403
Legal Services	81	1,303,925	54,553	1,249,180	0.0418
Membership Organizations	86	2,235,121	369	2,234,728	0.0002
Eng, Acc, Research, Management	87	5,314,152	368,137	4,906,458	0.0693
Services not elsewhere classified	89	177,386	20,089	157,280	0.1133
TOTAL of all Industries Above	-	51,782,633	2,672,121	48,028,214	0.0516

[a]Private companies classified by the SBA as women-owned are labeled "Female Owned".

Table B-2
Privately Owned Establishment Counts in the First Quarter of 2007 by 2-Digit Industry[a]

		All Establishments of All Ages and Size				Newly Arrived (< 1 year in age) Small (< 10 employees) Establishments			
Industry Name	Industry SIC	Total Private	Female Owned	Other Private	Percent Female Owned	Total Private	Female Owned	Other Private	Percent Female Owned
Food and Kindred Products	20	25,859	2,580	23,279	0.0998	1,200	133	1,066	0.1112
Tobacco Products	21	481	24	457	0.0491	39	0	39	0.0000
Textile Mill Products	22	8,689	1,636	7,053	0.1883	433	73	359	0.1696
Apparel & Other Fabric Products	23	24,784	6,872	17,912	0.2773	1,688	350	1,337	0.2076
Wood Products Except Furniture	24	28,230	1,616	26,614	0.0572	1,730	48	1,682	0.0277
Furniture and Fixtures	25	14,144	1,261	12,883	0.0891	629	55	574	0.0868
Paper and Allied Products	26	9,138	978	8,159	0.1071	273	51	222	0.1863
Printing, Publishing & Allied	27	90,845	12,698	78,148	0.1398	5,736	482	5,254	0.0840
Chemicals and Allied Products	28	24,412	2,263	22,149	0.0927	988	120	869	0.1211
Petroleum Refining and Related	29	3,137	163	2,974	0.0520	87	2	84	0.0271
Rubber & Misc Plastic Products	30	16,018	1,182	14,836	0.0738	327	31	296	0.0943
Leather & Leather Products	31	3,087	541	2,546	0.1752	250	44	206	0.1769
Stone, Clay, Glass, Concrete Prod.	32	20,742	2,174	18,568	0.1048	1,035	101	934	0.0980
Primary Metal Industries	33	9,054	509	8,545	0.0562	209	12	197	0.0569
Fab Metal Ex Machinery & Trans.	34	43,050	3,408	39,642	0.0792	1,266	103	1,163	0.0815
Ind & Com. Mach. & Computers	35	66,992	4,741	62,251	0.0708	2,144	128	2,016	0.0595
Elec & Components Ex Computer	36	32,108	2,282	29,826	0.0711	1,650	94	1,556	0.0571
Transportation Equipment	37	16,887	987	15,900	0.0584	790	58	732	0.0731
Photo, Medical & Optical Goods	38	22,822	1,780	21,042	0.0780	818	70	748	0.0860
Misc Manufacturing	39	50,241	8,455	41,785	0.1683	3,580	379	3,201	0.1058
Wholesale Trade: Durables	50	355,138	32,689	322,449	0.0920	18,084	1,427	16,657	0.0789
Wholesale Trade: Non-Durables	51	174,123	21,415	152,707	0.1230	9,672	1,013	8,658	0.1048
Depository Institutions	60	83,954	979	82,975	0.0117	1,318	19	1,299	0.0141
Nondepository Credit Institutions	61	92,497	7,213	85,283	0.0780	7,898	258	7,640	0.0327
Security & Com, Brokers/Dealers	62	64,290	2,291	61,999	0.0356	5,409	152	5,256	0.0282
Insurance Carriers	63	27,101	1,291	25,810	0.0476	957	46	912	0.0478
Insurance Agents, Brokers, Service	64	153,480	14,430	139,050	0.0940	5,755	347	5,407	0.0604
Real Estate	65	454,494	38,611	415,882	0.0850	25,802	992	24,810	0.0384
Holding & Other Invest. Offices	67	82,412	2,930	79,482	0.0356	9,301	216	9,085	0.0232
Business Services	73	881,672	126,949	754,724	0.1440	66,996	4,823	62,173	0.0720
Health Services	80	603,510	58,041	545,470	0.0962	15,313	994	14,319	0.0649
Legal Services	81	199,788	18,023	181,765	0.0902	3,264	212	3,052	0.0650
Membership Organizations	86	389,545	67	389,479	0.0002	7,480	4	7,476	0.0005
Eng, Acc, Research, Management	87	600,395	76,926	523,469	0.1281	37,479	2,855	34,624	0.0762
Services not elsewhere classified	89	84,108	11,990	72,118	0.1426	9,372	418	8,954	0.0446
TOTAL of all Industries Above	-	4,757,224	469,994	4,287,230	0.0988	248,971	16,112	232,860	0.0647

[a]Private companies classified by the SBA as women-owned are labeled "Female Owned".

Table B-3
2-Digit SIC Industry TOTAL Sales and Sales Per Worker (Millions in 2007 Dollars)
at Small (< 10 Employees) Privately Owned, Newly Arrived (< 1 year) Establishments
in the First Quarter of 2007 by 2-Digit Industry[a]

		Total Sales at New Establishments			Sales Per Worker at New Establishments		
Industry Name	Industry SIC	All Private	Female-Owned Private	Other Private	All Private	Female-Owned Private	Other Private
Food and Kindred Products	20	467	35	432	0.1546	0.1224	0.1580
Tobacco Products	21	8	0	8	0.1081	-	0.1081
Textile Mill Products	22	105	21	84	0.1107	0.1453	0.1045
Apparel & Other Fabric Products	23	288	56	233	0.0897	0.0956	0.0883
Wood Producs Except Furniture	24	245	10	235	0.0785	0.0887	0.0782
Furniture and Fixtures	25	112	9	103	0.0772	0.0721	0.0777
Paper and Allied Products	26	55	10	45	0.0946	0.1032	0.0930
Printing, Publishing & Allied	27	753	63	690	0.0711	0.0674	0.0715
Chemicals and Allied Products	28	285	22	263	0.1086	0.0880	0.1108
Petroleum Refining and Related	29	36	0	36	0.1331	0.1000	0.1337
Rubber & Misc Plastic Products	30	89	4	85	0.1004	0.0722	0.1022
Leather & Leather Products	31	38	5	33	0.0757	0.0598	0.0788
Stone, Clay, Glass, Concrete Prod.	32	181	12	169	0.0787	0.0675	0.0797
Primary Metal Industries	33	120	4	116	0.1913	0.1060	0.1963
Fab Metal Ex Machinery & Trans.	34	366	38	327	0.1110	0.1532	0.1075
Ind & Com. Mach. & Computers	35	543	25	519	0.1013	0.0732	0.1032
Elec & Components Ex Computer	36	465	22	443	0.1062	0.0876	0.1073
Transportation Equipment	37	166	26	140	0.0867	0.1705	0.0796
Photo, Medical & Optical Goods	38	190	12	178	0.0864	0.0721	0.0875
Misc Manufacturing	39	471	45	426	0.0772	0.0696	0.0781
Wholesale Trade: Durables	50	7,253	442	6,811	0.1757	0.1474	0.1779
Wholesale Trade: Non-Durables	51	3,956	319	3,637	0.1905	0.1611	0.1936
Depository Institutions	60	423	2	421	0.1295	0.0666	0.1302
Nondepository Credit Institutions	61	2,289	85	2,203	0.1137	0.1280	0.1132
Security & Com, Brokers/Dealers	62	940	38	902	0.0764	0.1109	0.0754
Insurance Carriers	63	540	9	532	0.2306	0.0915	0.2364
Insurance Agents, Brokers, Service	64	976	55	921	0.0778	0.0759	0.0779
Real Estate	65	4,526	163	4,363	0.0804	0.0778	0.0805
Holding & Other Investment Offices	67	2,161	46	2,115	0.1083	0.1069	0.1084
Business Services	73	9,047	672	8,376	0.0814	0.0793	0.0816
Health Services	80	2,757	146	2,611	0.0651	0.0615	0.0654
Legal Services	81	510	33	477	0.0634	0.0700	0.0630
Membership Organizations	86	858	0	857	0.0586	0.0500	0.0586
Eng, Acc, Research, Management	87	5,980	414	5,567	0.0873	0.0806	0.0879
Services not elsewhere classified	89	990	47	943	0.0868	0.0770	0.0874
TOTAL of all Industries Above	-	48,193	2,892	45,301	0.0967	0.0928	0.0970

[a]Private companies classified by the SBA as women-owned are labeled "Female Owned".

Table B-4
Excess Urbanization of Female-Owned Private Establishments in 2007:Q1 By 2-Digit Industries[a]

		All Sized Establishments			1-Worker Establishments		
Industry Name	Industry SIC	Mean Nearby Emp for All Private Estab.	% Excess Urbanization of Women-Owned Business[c]	t-ratio for % Excess Localization	Mean Nearby Emp for All Private Estab.	% Excess Urbanization of Women-Owned Business[c]	t-ratio for % Excess Localization
Food and Kindred Products	20	11049	2.65	0.69	8264	10.55	1.21
Tobacco Products	21	15912	0.35	0.21	6357	-44.97	-0.28
Textile Mill Products	22	42823	-31.69	-7.41	20765	-31.21	-4.24
Apparel & Other Fabric Products	23	63982	-53.94	-29.23	29259	-40.75	-11.82
Wood Producs Except Furniture	24	5674	10.86	2.18	4521	-7.61	-0.85
Furniture and Fixtures	25	12761	-5.82	-1.06	7386	1.36	0.18
Paper and Allied Products	26	12796	-9.83	-1.61	9498	-15.25	-1.33
Printing, Publishing & Allied	27	26311	-22.42	-14.19	17000	-22.81	-7.91
Chemicals and Allied Products	28	16845	-21.03	-5.71	11716	-28.97	-4.18
Petroleum Refining and Related	29	13471	-2.88	-0.11	7215	-28.51	-0.87
Rubber & Misc Plastic Products	30	9062	4.46	0.80	7735	-6.05	-0.35
Leather & Leather Products	31	37900	-25.60	-3.30	20066	8.45	0.66
Stone, Clay, Glass, Concrete Prod.	32	8120	-7.16	-1.73	6518	-15.26	-2.36
Primary Metal Industries	33	12007	-7.28	-0.84	8946	-0.84	0.08
Fab Metal Ex Machinery & Trans.	34	9706	1.16	0.36	7421	6.17	0.72
Ind & Com. Mach. & Computers	35	8515	1.32	0.48	6427	3.86	0.53
Elec & Components Ex Computer	36	13237	-15.58	-4.15	9875	-11.90	-1.23
Transportation Equipment	37	7638	-10.34	-1.75	4216	-14.95	-1.02
Photo, Medical & Optical Goods	38	12109	-7.62	-1.70	9741	1.03	0.15
Misc Manufacturing	39	27550	-27.89	-14.67	21069	-22.77	-7.88
Wholesale Trade: Durables	50	17048	-2.50	-2.33	14790	-6.91	-3.10
Wholesale Trade: Non-Durables	51	30211	-9.89	-7.63	19599	-15.09	-6.26
Depository Institutions	60	16475	26.25	3.91	14369	0.00	0.04
Nondepository Credit Institutions	61	12629	-10.04	-4.61	11531	-21.28	-4.37
Security & Com, Brokers/Dealers	62	40629	-19.11	-5.31	17773	-15.46	-2.25
Insurance Carriers	63	23254	-33.54	-7.64	11277	-15.89	-1.63
Insurance Agents, Brokers, Service	64	12615	-13.20	-8.65	9269	-2.82	-0.84
Real Estate	65	17562	-26.85	-31.45	11871	-12.15	-7.41
Holding & Other Investment Offices	67	34363	-23.62	-7.65	15807	-9.64	-1.65
Business Services	73	18714	-6.59	-12.03	12628	0.16	0.20
Health Services	80	13999	4.63	5.56	18963	-11.21	-7.02
Legal Services	81	41148	-20.98	-16.13	37097	-17.64	-7.40
Membership Organizations	86	12736	74.49	2.55	10136	93.42	1.80
Eng, Acc, Research, Management	87	21244	-10.61	-15.55	13708	-2.16	-1.98
Services not elsewhere classified	89	14015	4.53	2.41	12139	13.44	5.90

[a] Localization is measured as total employment in 2007:Q1 at companies in all industries within 1 mile.
[b]Equal to 100 x (exp[b - V(b)/2] - 1) where b is the coefficient on the Female dummy in the semi-log model, and V(b) is its estimated variance. See Halvorsen and Palmquist (1980) and Kennedy (1981) for details.

Table B-5
Excess Localization of Female-Owned Private Establishments in 2007:Q1 By 2-Digit Industries[a]

		All Sized Establishments			1-Worker Establishments		
Industry Name	Industry SIC	Mean Nearby Emp for All Private Estab.	% Excess Localization of Women-Owned Business[c]	t-ratio for % Excess Localization	Mean Nearby Emp for All Private Estab.	% Excess Localization of Women-Owned Business[c]	t-ratio for % Excess Localization
Food and Kindred Products	20	127	4.67	-38.09	64	-8.26	-0.81
Tobacco Products	21	221	-100.00	-14.21	1	-53.37	-0.27
Textile Mill Products	22	201	6.23	-78.15	78	-53.43	-7.45
Apparel & Other Fabric Products	23	2121	3.17	-74.89	878	-56.58	-16.16
Wood Producs Except Furniture	24	19	5.65	-5.88	10	-4.99	-0.45
Furniture and Fixtures	25	54	6.71	-33.98	19	-14.41	-1.16
Paper and Allied Products	26	126	7.74	-65.48	49	-38.15	-3.38
Printing, Publishing & Allied	27	997	2.13	-32.58	554	-28.33	-8.72
Chemicals and Allied Products	28	245	4.98	-58.16	124	-41.98	-5.71
Petroleum Refining and Related	29	138	19.06	-35.78	64	-38.25	-1.08
Rubber & Misc Plastic Products	30	72	6.87	-27.91	37	-26.16	-1.67
Leather & Leather Products	31	59	10.99	-52.71	25	-1.48	-0.01
Stone, Clay, Glass, Concrete Prod.	32	29	5.12	-38.69	17	-25.76	-3.65
Primary Metal Industries	33	60	10.55	-38.34	19	-25.88	-0.87
Fab Metal Ex Machinery & Trans.	34	162	3.99	-8.14	66	-5.78	-0.52
Ind & Com. Mach. & Computers	35	182	3.36	-8.13	102	-9.77	-1.11
Elec & Components Ex Computer	36	237	4.90	-28.15	135	-33.88	-3.53
Transportation Equipment	37	176	7.47	-23.79	55	-20.66	-1.26
Photo, Medical & Optical Goods	38	129	5.58	-30.00	55	-13.43	-1.08
Misc Manufacturing	39	254	2.66	-38.71	186	-30.21	-9.41
Wholesale Trade: Durables	50	580	1.29	-9.20	465	-12.42	-4.92
Wholesale Trade: Non-Durables	51	1274	1.62	-20.03	762	-22.06	-8.19
Depository Institutions	60	377	7.25	13.66	298	-13.89	-0.65
Nondepository Credit Institutions	61	142	2.73	-8.99	118	-24.01	-4.30
Security & Com, Brokers/Dealers	62	2645	4.79	-33.69	862	-27.94	-3.79
Insurance Carriers	63	784	6.48	-64.55	338	-34.38	-3.45
Insurance Agents, Brokers, Service	64	195	1.94	-21.36	133	-10.01	-2.68
Real Estate	65	619	1.18	-27.58	390	-9.64	-4.97
Holding & Other Investment Offices	67	974	4.23	-36.94	324	-18.26	-2.83
Business Services	73	1893	0.67	-7.10	1205	1.50	1.52
Health Services	80	1302	0.97	-3.81	1637	-17.41	-9.68
Legal Services	81	2540	1.73	-34.78	2143	-27.60	-10.56
Membership Organizations	86	318	28.95	46.11	220	40.70	0.95
Eng, Acc, Research, Management	87	1773	0.85	-11.49	1079	-1.82	-1.43
Services not elsewhere classified	89	26	2.19	13.25	23	20.34	7.43

[a] Localization is measured as total employment in 2007:Q1 at companies in the "own" 2-digit industry within 1 mile.
[b] Equal to 100 x (exp[b - V(b)/2] - 1) where b is the coefficient on the Female dummy in the semi-log model, and V(b) is its estimated variance. See Halvorsen and Palmquist (1980) and Kennedy (1981) for details.

Table B-6
Excess Proximity to Banking Sector Employment
for Female-Owned Private Establishments in 2007:Q1 By 2-Digit Industries[a]

		All Sized Establishments			1-Worker Establishments		
Industry Name	Industry SIC	Mean Nearby Emp for All Private Estab.	% Excess Localization of Women-Owned Business[c]	t-ratio for % Excess Localization	Mean Nearby Emp for All Private Estab.	% Excess Localization of Women-Owned Business[c]	t-ratio for % Excess Localization
Food and Kindred Products	20	293	3.49	0.78	224	7.34	0.76
Tobacco Products	21	466	-17.34	-0.19	138	-60.78	-0.43
Textile Mill Products	22	1128	-32.37	-6.53	528	-33.10	-3.91
Apparel & Other Fabric Products	23	1707	-55.69	-26.40	758	-43.15	-10.97
Wood Producs Except Furniture	24	139	10.93	1.89	102	-6.09	-0.56
Furniture and Fixtures	25	324	-5.72	-0.89	184	1.10	0.15
Paper and Allied Products	26	353	-3.68	-0.47	229	-14.07	-1.02
Printing, Publishing & Allied	27	731	-23.33	-12.78	455	-23.28	-6.96
Chemicals and Allied Products	28	488	-20.36	-4.73	321	-31.25	-3.93
Petroleum Refining and Related	29	384	-3.92	-0.15	196	-39.43	-1.13
Rubber & Misc Plastic Products	30	241	9.54	1.42	178	-6.03	-0.28
Leather & Leather Products	31	987	-28.89	-3.27	514	10.83	0.73
Stone, Clay, Glass, Concrete Prod.	32	208	-7.72	-1.61	146	-14.91	-1.97
Primary Metal Industries	33	335	-13.82	-1.45	253	-8.71	-0.16
Fab Metal Ex Machinery & Trans.	34	252	1.55	0.42	191	13.40	1.27
Ind & Com. Mach. & Computers	35	222	1.02	0.33	159	5.84	0.68
Elec & Components Ex Computer	36	368	-19.19	-4.50	269	-15.56	-1.41
Transportation Equipment	37	202	-10.73	-1.56	103	-12.73	-0.71
Photo, Medical & Optical Goods	38	326	-7.87	-1.50	254	-0.28	0.04
Misc Manufacturing	39	785	-28.87	-13.15	609	-23.25	-6.94
Wholesale Trade: Durables	50	482	-0.90	-0.71	417	-6.95	-2.68
Wholesale Trade: Non-Durables	51	818	-8.03	-5.27	525	-15.82	-5.67
Depository Institutions	60	517	22.35	2.93	436	-3.12	-0.05
Nondepository Credit Institutions	61	392	-12.23	-4.89	326	-25.00	-4.52
Security & Com, Brokers/Dealers	62	1423	-24.55	-6.08	556	-23.47	-3.10
Insurance Carriers	63	759	-41.34	-8.58	348	-17.18	-1.52
Insurance Agents, Brokers, Service	64	385	-17.93	-10.40	262	-5.54	-1.44
Real Estate	65	494	-28.96	-29.59	320	-13.48	-7.13
Holding & Other Investment Offices	67	1149	-29.44	-8.52	489	-13.99	-2.11
Business Services	73	530	-6.81	-10.70	331	0.70	0.72
Health Services	80	366	5.61	5.77	490	-12.52	-6.79
Legal Services	81	1341	-25.83	-17.62	1174	-22.16	-8.21
Membership Organizations	86	347	98.62	2.71	249	147.59	2.12
Eng, Acc, Research, Management	87	627	-14.01	-18.00	379	-5.38	-4.33
Services not elsewhere classified	89	365	5.63	2.57	302	15.37	5.76

[a]Excess proximity to banking employment is m as employment in 2007:Q1 in SIC 60 and 61 within 1 mile.
[b]Equal to 100 x (exp[b - V(b)/2] - 1) where b is the coefficient on the Female dummy in the semi-log model, and V(b) is its estimated variance. See Halvorsen and Palmquist (1980) and Kennedy (1981) for details.