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Effects of Immigration on Native Entrepreneurship
in the U.S.

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Abstract

This paper investigates the causal impact of immigration on the likelihood of entry and exit of entrepreneurs among U.S.-born individuals. Using Current Population Survey data from the U.S. Census over the 2000-2016 period, I find that immigration had a negative effect on entry of native entrepreneurs, while having no impact on their exit. Exploring heterogeneity across individuals, I find that immigration had a negative and statistically significant effect on both entry and exit of female entrepreneurs, but has no effects on male entrepreneurs. Specifically, a 10-percent increase in the share of immigrants in the population lowers the entry and exit rates of female entrepreneurs by 10 percent and 5 percent, respectively, relative to the sample mean. Estimates imply that the net effect of immigration on female entrepreneurship is negative, but economically small.

JEL Classification: F22, J15, J16, J24, J61, L26

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1   Introduction

Immigration to wealthy countries has grown dramatically over the last four decades, and thus has significantly changed the racial composition in these countries. For example, according to the U.S. Census data, there were fewer than 10 million foreign-born individuals in 1970 (less than 5 percent of the U.S. population), but that size steadily rose to about 45 million in 2016 (about 15 percent of the population). A similar upward trend has occurred in Europe as well (OECD 2017).[1] Socio-economic effects of immigration have been intensely debated among economists and policy makers. Researchers have investigated the impact of immigration on employment, income distribution, productivity, and innovation (Peri 2016). The impact of immigration on native entrepreneurship, however, has attracted limited attention.

Economists have long recognized entrepreneurial activity as a key engine behind innovation, job creation, and economic prosperity (Schumpeter 1950). Recent empirical studies have shown that expansions of start-ups are a major source of job creation (Haltiwanger et al. 2013, Decker et al. 2014). Immigration becomes relevant to entrepreneurship among natives in several key ways. First, cheaper labor provided by immigrants makes doing-business more profitable, which in turn encourages entry into entrepreneurship. Second, several studies have found that business ownership is higher among foreign-born individuals (Fairlie 2010). On one hand, immigrant entrepreneurs create new job opportunities for native workers. On the other hand, competition from immigrant entrepreneurs may have a crowding-out effect on native entrepreneurs. Finally, immigrants demand for goods and services that may lead to more entrepreneurial activity. Therefore, it is interesting and relevant to examine how immigration has affected entrepreneurial activity among natives.

This paper investigates the impact of immigration on entry into and exit from entrepreneurship among natives. The first crucial step in this analysis is identifying entrepreneurs from the data. Previous studies have assumed that all self-employed individuals are entrepreneurs (Borjas and Bronas 1989, Fairlie 2014). However, recent studies suggest that self-employed individuals

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[1] With these trends, populist opposition to immigration is also on the rise in Europe and the US. Immigration was hotly debated during the 2016 U.S. Presidential Election, and perhaps was the main factor that made Donald J. Trump be the president.

often lack the growth-enhancing traits of entrepreneurs such as risk-taking and innovation. Self-employed and salaried workers have similar human capital traits, and median self-employed earn less than median salaried workers (Moskowitz and Vissing-Jorgensen 2002, Levine and Rubenstein 2017). In addition, Hurst and Pugsley (2011) show that most self-employed individuals report having no desire to grow their business. Levine and Rubenstein (2017) argue that incorporated self-employment serves as a better proxy for entrepreneurship. As such, I identify incorporated self-employed individuals as entrepreneurs.[2]

I use the U.S. Current Population Survey March files (CPS-March) to identify entry and exit of entrepreneurs at the individual-level among natives, and I use the American Community Surveys (ACSs) to calculate the share of immigrants in the work force. I then investigate how immigration has affected the likelihood of entry into and exit from entrepreneurship across U.S. states and industries over the 2000-2016 period. The census surveys contain information about individuals characteristics (gender, race, age, education, etc.), their locations and the industries in which they work; as a result, I am able to control for the effects of these factors in my analysis. To address the possible problem of simultaneity and omitted variable bias, I use an instrumental variable approach, building on the shift-share instrument of Altonji and Card (1991). The instrument is an imputed immigrant share, constructed by taking the total immigrants from each source country and reallocating them across states and industries based on their state-industry shares in 1980. Imputed immigrant share is a valid instrument for two reasons. First, several studies have shown that locations and occupations/sectors of new immigrants are strongly influenced by previous immigrants from the same country, and that economic factors have a relatively small effect on these decisions (Bartel 1989, Patel and Vella 2013). Second, the share of immigrants in 1980 is plausibly exogenous to any unobservable time-varying effects which may otherwise affect entrepreneurship during my sample period 2000-2016.

Results of my analysis can be summarized as follow. When I consider the whole sample, I find that immigration had a negative and marginally significant effect on the likelihood of entry into entrepreneurship among natives, while having no effect on the exit of entrepreneurs. The

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[2] As shown in Section 4, immigration has no impact on entry and exit of unincorporated self-employed individuals.

rich nature of the CPS data allows me to explore heterogeneity across groups based on gender, race (white vs non-whites), education (high-school or less vs at least some college), and age. I find that immigration had a negative and significant impact on entry and exit rates of female entrepreneurs with the effect being more significant on entry. Specifically, if the immigration share goes up by 10 percent, the entry and exit rates of female entrepreneurs go down by 10 and 5 percent, respectively, relative to the sample mean. I find that immigration negatively affects the entry rates of whites, less-educated individuals, and older people (e.g., those who are at least 40 years old), but these effects are small and statistically significant at the 10 percent-level. Yet the effect on the exit rate of each of these group is insignificant. Thus, the effects on entrepreneurship are predominantly observed among females.

Although immigration has lowered both entry and exit rates among females, its net effect is negative. However, the net effect turns out economically small. For example, my estimates imply that if the immigrant share were 10 percent higher in 2015, there would have been about 8,500 fewer female entrepreneurs in that year. As mentioned earlier, business ownership is higher among immigrants, and they are more likely to create new businesses (Fairlie and Lofstorm 2015). A 10 percent increase in the share of immigrants in 2015 would have created about 10,000 new immigrant entrepreneurs. To sum up, although immigration has a negative impact on the level of business ownership among native females, it increases the total number of entrepreneurs in the country.

This paper relates to a large literature on immigration economics. Previous studies have investigated the implications of immigration for a variety of issues (such as local-labor market conditions, innovation, productivity, politics, etc.), and full rendering of this literature is beyond the scope of this paper. Card (2009), Borjas (2014), Fairlie and Loftstorm (2015), and Peri (2016) provide complementary reviews of previous studies.[3] This paper more relates to Fairlie and Meyer (2003). Using the 1980 and 1990 decennial surveys across 132 metropolitan areas, they investigate the impact of immigration during the 1980s on native self-employment and

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[3]Borjas's overall message is that immigration poses serious challenges to local market conditions. However, Card and Peri (2016) argue that Borjas's book provides a one-sided view of immigration. Card's (2009) and Peri's (2016) surveys conclude that immigration is generally beneficial for host countries, and its adverse effects are limited and/or transient. Fairlie and Loftstorm (2015) provide an overview of the literature on the contribution of immigrant entrepreneurs to the host economy.

earnings among non-blacks.[4] Fairlie and Meyer (2003) find that the immigration results in a large negative and highly significant effects on self-employment among native non-blacks, and the effect is stronger among males than females. They also find that immigration does not have a significant impact on native self-employment earnings.

This paper differs from their study in several aspects. First, my analysis focuses on the impact of immigration on incorporated self-employment, while they consider all self-employed individuals. Second, I investigate the effects on entry and exit rates of entrepreneurs, whereas Fairlie and Meyer examine the impact on the level of self-employment. Investigating the entry and exit of entrepreneurs separately provides a better understanding of their business dynamics. Finally, their analysis utilizes two decennial surveys, while this paper uses annual surveys from 2000 to 2016. This last point turns out to have important effects on results, and my further analysis shows that Fairlie and Meyer's results are sensitive to different sample sizes and time periods.

This paper also relates to a large body of research that has investigated the determinants of entrepreneurship. The factors that have been found to be important for entrepreneurship include credit constraints (Evans and Jovanovic 1989, Cagetti and De Nardi 2006, Sarker and Unel 2017), attitudes toward risk (Blanchflower 1998, Hall and Woodward 2010), family background and inheritance (Fairlie 2008, Hurst and Pugsley 2011), fiscal policies (Cullen and Gordon 2007, Beland and Unel 2018), international trade and investment (Grossman 1984, Dinopoulos and Unel 2015, Eren et al. 2017), among others. One strand of this literature has examined factors behind the low level of entrepreneurial activity among certain groups, and found discrimination in credit markets on the basis of race and gender, even after controlling factors that may influence loan decision (Blanchard et al. 2008, Asiedu et al. 2012). This finding offers an explanation for why immigration had a negative effect on the entry of female entrepreneurs, but not that of males. If increased competition from immigrants drives up entry costs, and females have limited

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[4]In an earlier work, Fairlie and Meyer (1998) examine the impact of immigration on native blacks, and find that immigration has no effects on self-employment among blacks. Olney (2013), using data on immigration and establishments in the 30 largest U.S. metropolitan areas over 1998–2008, examines whether firms expand their production activities in response to immigration. He shows that immigration increases the number of establishments that are small in size and relatively mobile in low-skill intensive industries. It has no impact on either the number of exiting establishments or their employment levels.

access to credit, then their entry rate will be curtailed.

The rest of the paper is organized as follows. The next section describes the data and explains how key variables are constructed along with providing summary statistics. Section 3 introduces the econometric methodology employed in the paper, and discusses the instrument. Section 4 presents and evaluates the results, and Section 5 concludes the paper.

2   Data

The data are drawn from the Current Population Survey March (CPS-March) files from 2000 to 2016, the 1980 and 2000 census decennial surveys, and the American Community Survey (ACS) files from 2001 to 2016. They are publicly available at Integrated Public Use Micro Samples (IPUMS) website (Flood et al. 2017). The analysis covers 50 states and D.C. from 2000 to 2016, and the period is dictated by the availability of data on self-employment and immigrants. The CPS-March data are used to identify entrepreneurial activity, and the decennial surveys and ACSs are used to calculated share of immigrants in population.[5]

Entrepreneurial activity is measured by business creation and closure at individual-owner level. The CPS-March classifies individuals in the labor force as wage & salary workers or self-employed, with the latter classified as incorporated and unincorporated. The previous studies identified all self-employed individuals as entrepreneurs (Borjas and Bronars 1989, Hamilton 2000, Fairlie 2014). However, several studies have documented facts about self-employed individuals which are hard to reconcile with entrepreneurship. Hamilton (2000) shows that the median self-employed individual has lower initial earnings and slower earnings growth than wage and salary workers. Levine and Rubinstein (2017) show that the self-employed and salaried workers have similar education, learning aptitude scores, and family backgrounds, and thus argue that self-employment is not a good proxy for entrepreneurship. But they also show that *incorporated* self-employed earn more than comparable salaried workers, tend to experience a sizeable increase in earnings, tend to score higher on learning aptitude tests, exhibit greater self-esteem, and engage in more aggressive and risky activities when young. As a result, they suggest using

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[5]Decennial surveys or the ACSs do not include information about last year worker class, and thus cannot be used to identify entry and exit of self-employment.

incorporated self-employment as a proxy for entrepreneurship. As such, I identify incorporated self-employed individuals as entrepreneurs. However, I also present results based on all self-employed individuals as well.

The survey asks individuals their current and prior year worker class for their major job along with their gender, race, nativity, age, education, industry where they work/worked, last year's income, etc. Using this information, new entrepreneurs (i.e., newly incorporated self-employed individuals) can be identified each year. My analysis includes all U.S.-born individuals between 25 and 55 years old (the prime age group), who worked at least 20 weeks in the previous year and usually worked at least 15 hours per week in that year, and excludes those with imputed/missing worker class and inconsistent reports (Fairlie and Meyer 2003, Levine and Rubinstein 2017).[6] Industries are classified into eleven broadly defined sectors, and consider entrepreneurial activity in nonagricultural private sectors only, as in previous studies.

Figure 1 shows the average annual entry and exit of entrepreneurs over the sample period. The entry rate in each year is calculated as the fraction of individuals who become a new entrepreneur in that year. Similarly, the exit rate is calculated as the fraction of entrepreneurs who become a non-entrepreneur in that year. Note that the rate of exit from entrepreneurship is significantly higher than the rate of entry, because the domain of entry is substantially large. The average entry and exit rate of entrepreneurs over this period are 0.5 and 10.7 percent, respectively. According to Figure 1, there is an upward trend in the entry rate, and interestingly the Great Recession did not have a significant impact on it. The exit rate shows no clear trend until 2010, and increased considerably since then.

Table 1 reports summary statistics on entrepreneurs among different groups over the 2000–2016 period. In this table, Young represents individuals who are less than 40 years old, and More Educated refers to individuals who have at least some college education. The share of entrepreneurs in the sample population is about 3.7 percent, and observe that it is higher among white, educated, older males. The average annual entry and exit rates of entrepreneurs are around 0.5 and 11 percent, respectively, and these rates vary significantly across groups.

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[6]Individuals who were not in the labor force or were unemployed at least eight months are excluded. Estimates based on the full sample that does not impose any restrictions on weeks and working hours are similar, but they are less precise.

Statistics in the last two columns indicate the average entry (exit) rate is higher (lower) among educated, old males.

The CPS-March data also record individuals' immigration status since 1994.[7] However, to calculate immigrant shares for each state-industry cell more precisely I use the 2000 decennial survey and ACS data which include more observations. In constructing the instrument for immigrant shares, I use the 1980 decennial survey. My calculations include all immigrants in the labor force between between 16 and 64 years old, but exclude those with imputed immigration status. The immigrant share in the labor force has steadily risen from about 6 percent in 1980 to about 17 percent in 2016. Figure 2 shows this trend over the 2000–2016 period. Further, entrepreneurship among immigrants is similar to that among natives. The share of entrepreneurs in their population is about 3.6 percent, and the average annual entry rate into entrepreneurship is 0.5 percent, while the average annual exit rate is 9.6 percent.

3   Econometric Specification

Let E_{ijst}^{+} be a dummy variable that equals one if individual i becomes a new entrepreneur in industry j, state s, and year t; zero otherwise. Similarly, let E_{ijst}^{-} be a dummy that equals one if individual i, who was an entrepreneur in industry j and state s, becomes a non-entrepreneur in year t; zero otherwise.[8] To address the impact of immigration on the entry and exit of entrepreneurs, I estimate the following linear probability model:

$$Y_{isjt} = \beta M_{jst} + \gamma X_{ist} + \bar{E}_{jst-1} + \eta_s + \eta_j + \eta_t + \eta_s t + \eta_j t + \varepsilon_{st}, \qquad (1)$$

where $Y_{ijst} = \{E_{ijst}^{+}, E_{ijst}^{-}\}$ and M_{jst} denotes the corresponding share of immigrants.[9]

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[7]In 1994, the CPS was redesigned to improve its quality and quantity, which had significant impact on the population shares of some variables, especially self-employment groups (Hipple 2010). Thus, the data on self-employment prior to 1994 are not comparable with those reported after 1994.

[8]The CPS-March data also provide information about each individual's state of residence in previous year, from which one can identify migration between states. However, the fraction of individuals who changed their states is less than 2 percent of the whole sample. Several factors (such as new job opportunities, education/training, marriage, etc.) can affect individuals' decision to move from one state to another. My analysis excludes all interstate migrants to rule out their possible effects on results.

[9]Equation (1) excludes the impact of immigrants working in other industries. The immigrant share in other industries (M_{ost}) is highly correlated with M_{jst} (the correlation is more than 0.8), and thus including it to (1) creates a multicollinearity problem. In this case, estimated coefficients on M_{jst} and M_{ost} become insignificant.

The variable X_{ist} represents the set of individual characteristics that include dummies for gender, marital status, three race dummies (white, black, other), four education dummies (less than high school, high school, some college, college and above), and a quadratic for age. Individuals wishing to have/expand their own business usually face credit constraints, and often use their properties as collateral; as a result, self-employment is more likely among individuals who own their houses. To control for this effect, the set X also includes a dummy variable that equals one if the individual owns her house. $\bar{E}_{jst-1}$ measures the lagged value of the fraction of entrepreneurs in each industry-state cell to control for persistence in entrepreneurial activity.[10] Results remain mostly the same even if homeownership and $\bar{E}_{jst-1}$ variables are not included.

State and industry fixed effects (η_s and η_j) control for any time invariant state- and industry-specific factors that can affect occupational choice, and year-fixed effects (η_t) control for common shocks.[11] I also include state-specific and industry-specific time trends ($\eta_s t$, $\eta_j t$, and $\eta_{j'} t$) to control for other trending factors that can affect self-employment. Robust standard errors are clustered at the state level to reduce the potential serial correlation in the error term (Bertrand et al. 2004), and regressions are weighted by the CPS personal weights.

Despite having a rich set of controls, fixed effects, and time trends, estimating equation (1) may still be subject to reverse causality and omitted variable bias. For example, immigrants may choose to live in states that are experiencing more entrepreneurial activity. Or states may implement certain policies that encourage entrepreneurship and increase immigration. To address this endogeneity problem, I use an instrumental variable (IV) approach where the instrument is constructed utilizing the share of immigrants in each industry-state cell. Specifically, I first classify individuals into 16 regions where they are originally from.[12] Let N_t^c denote the labor

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[10]I do not include state-level variables such as unemployment rate, real personal income, growth rate of gross state product, etc. Entry and exit of entrepreneurs most probably affect these variables; consequently, these outcome variables become bad controls (Angrist and Pischke 2009). However, including them into the above specification does not have a significant impact on my estimates.

[11]I reclassify industries under 11 broadly defined sectors: mining & construction, manufacturing, transport, telecommunication & utilities, wholesale, retail, finance-insurance-real estate, business service & repair, personal services, recreation, and professional service. As mentioned earlier, all individuals working in agriculture-forestry-fishing and public administration sectors are excluded, following most previous studies.

[12]The decennial and American Community Surveys include information about the birth place of each individual. I classified these birth places into 16 country-groups: the United States, Canada, Mexico, Central America and Caribbean, Rest of Americas, Western Europe, Eastern Europe, China and Mongolia (including Hong Kong and Taiwan), Japan, Korea, Philippines, India and Southwest Asia, Rest of Asia, Africa, and Others.

force of immigrants from country-group c in year t, and $share^c_{s80}$ the share of group c in state s in 1980, while $share^c_{j80}$ represents the share of group c in industry j in 1980. The imputed share of immigrants in each industry-state cell in each year is calculated as follows:

$$\widehat{M}_{jst} = \frac{\sum_{c \in \mathcal{F}} share^c_{s80} \times share^c_{j80} \times N^c_t}{\sum_{c \in \mathcal{A}} share^c_{s80} \times share^c_{j80} \times N^c_t},$$

(2)

where $\mathcal{F}$ where F represents the set of foreign countries, and $\mathcal{A}$ represents the set of all countries (including the U.S.). I use $\widehat{M}_{jst}$ as an instrument for the actual share M_{jst}.

The nature of this instrument is that it only uses the distribution of immigrants by state and industry in 1980, which was driven by their historical settlement across states and by broad comparative advantages across industries. It then simply exploits the changes in the national population of immigrants by origin to generate variation that is likely exogenous to any individual state and industry. This identification strategy extends Altonji and Card's (1991) approach that uses the historical distribution of immigrants in US cities as an instrument to study the effects of immigration on the labor-market outcomes of less-skilled natives (see also Card 2001). Its validity is supported by several studies that have shown that locations and occupations/sectors of new immigrants are strongly influenced by previous immigrants from the same country, and that economic factors have a relatively small effect on these decisions (Bartel 1989, Patel and Vella 2013, Peri et al. 2015). Ottaviano et al. (2013) use a similar instrument to proxy cost-driven immigration by industry and year.

4   Results

4.1   Benchmark Results

Table 2 reports the IV regression results based on equation (1) where M_{jst} is instrumented by $\widehat{M}_{jst}$ from equation (2). All regressions include state, industry, and year fixed effects, and state-specific and industry-specific time trends, but for brevity their effects are not shown in the table. F-statistic measures the significance of the instrument in the first-stage regression. Columns 1 and 2 report the impact of immigration on the likelihood of becoming an entrepreneur, and note that the first-stage F-statistics are highly significant in both cases. In column 1, immigration

has a negative and marginally significant impact on the entry, and the effect becomes significant at the 10-percent level when other controls are included. Consistent with statistics in Table 1, estimated coefficients on controls imply that entry into entrepreneurship is more likely among married, educated males who own their houses. Note also that the entry rate is higher in places where the share of entrepreneurs was higher.

Columns 3 and 4 show the effects of immigration on the likelihood of exiting from entrepreneurship. Estimated coefficients on immigration are positive but highly insignificant. That is, immigration had no impact on the likelihood that an incorporated self-employed individual would close her business. Estimated coefficients on controls imply that the likelihood of exit from entrepreneurship decreases with education and homeownership. Note that probability of exit is lower among male entrepreneurs, but substantially higher among non-whites ones.

In sum, immigration has a small negative impact on the entry into entrepreneurship among U.S.-born individuals, while having no significant effects on closing their businesses. However, summary statistics in Table 1 show significant variation in entrepreneurial activity across groups. For example, a comparison of the first and fifth rows implies that the entry (exit) rate of more-educated entrepreneurs is lower (higher) than that of less-educated ones. It is then possible that immigration may have a different impact on each group. But before exploring the heterogeneity differential impact of immigration, I would like to discuss three important points.

First, how would results differ if equation (1) was estimated by the simple OLS? For entry, the estimated coefficient on Immigration is $-0.0034\,(0.0044)$, i.e. it is negative and highly insignificant. For exit, the corresponding estimate is $0.0013\,(0.0614)$, i.e. positive and highly insignificant. Note that the magnitudes in both cases are close to zero as well. Estimated coefficients on controls (available upon request) are largely comparable with those reported in Table 2. It then follows that both in terms of magnitude and precision the OLS estimates are different from the IV estimates.

Second, note that there is a significant increase in the average entry and exit rates in 2015 and 2016 (see Figure 1), and one may argue that the results might be driven by these particular years. Regressions based on a sample that excludes 2015 and 2016 yields similar qualitative results: the estimated coefficient on Immigrant is $-0.0179^*\,(0.0097)$ for the entry and $-0.0548\,(0.2545)$ for

the exit. I also considered regressions by excluding the Great Recession years (2008 and 2009), and found similar effects. Specifically, estimated coefficients on Immigrant are -0.0158^* (0.0090) for entry, and 0.0118 (0.2016) for exit.

Finally, it is interesting to investigate how the results change if one identifies all self-employed (i.e. incorporated and unincorporated) individuals as entrepreneurs, as most previous studies have assumed (Hamilton 2000, Fairlie 2014). Columns 1 and 2 in Table 3 report the estimates, and the results are mostly the same as those reported in Table 2.[13] The last two columns in Table 3 show the impact of immigration on entry and exit of unincorporated self-employment among U.S.-born individuals. Observe that the effects on entry and exit rates are positive and highly insignificant. Unincorporated self-employed individuals usually hold low-skill intensive occupations (Levine and Rubinstein 2017), and thus one may expect that they are more vulnerable to competition with immigrants. These findings indicate that immigration has not had any crowding-out effect on native unincorporated self-employment. Further, immigrants have created several thousand unincorporated self-employment businesses. For example, according to the Census data, the number of unincorporated self-employed businesses created by prime-aged immigrants in 2015 was more than 130,000.

4.2 Exploring Heterogeneity

This section analyzes the impact of immigration on entrepreneurial activity among groups based on gender, race, education, and age. Results for entry and exit rates are reported in Tables 4.A and 4.B, respectively. All regressions in these tables include state, industry, and year fixed effects, and state- and industry-specific time trends. I begin my analysis by exploring heterogeneity based on gender. As mentioned earlier, a comparison of the first and second row in Table 1 reveals that entrepreneurship is lower among females than males. Low level of entrepreneurship among females may partly reflect their preferences; however, several studies have shown that females face higher barriers in creating and maintaining their own businesses.

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[13]The number of observations in Entry is lower than that in Table 2 because the sample domain in this table covers only wage & salary workers, while that in Table 2 covers wage & salary workers and unincorporated self-employed individuals. When I re-estimate column 2 of Table 2 by only considering entry from wage & salary workers, the estimated coefficient on Immigrant is -0.0205^{**} (0.0095), i.e. the impact of immigration on entry to entrepreneurship among native wage & salary workers is negative and significant at the 5-percent level.

For example, Asiedu et al. (2012) find that the denial rate in a sample of loan applications in 2003 is higher for female-owned firms than firms owned by males –about 16 percent for females and 9 percent for males (see also Blanchard et al. 2008). If the increased competition from immigrants drives up the entry costs, the limited access to credit may lower the likelihood of entry to entrepreneurship among females. In this case, the impact of immigration on female entrepreneurs will be greater than that on males.

Turning to regression estimates, according to column 1 in Table 4.A, immigration has a negative and significant impact on the likelihood of entry to entrepreneurship among females. The estimated coefficient on Immigrant implies that a 10-percent increase in the immigrant share decreases the entry rate by 10 percent.[14] Column 1 in Table 4.B indicates that the impact of immigration on the exit of female entrepreneurs is a negative and significant at the 10-percent level (p-value is about 5.5 percent).[15] In this case, a 10 percent increase in the immigrant share decreases the exit rate by 5 percent, relative to the sample mean. Estimated coefficients on controls are largely similar to those reported in Table 2.

Since the effects of immigration on both entry and exit of U.S.-born female entrepreneurs are negative, it seems its net effect is ambiguous. However, using the estimated coefficients from Tables 4.A and 4.B implies that the net effect is always negative. To see this, let F_t denote the female population in year t, and e_t the fraction of entrepreneurs among native females. Using our estimates, the net effect of a 10 percent increase in the immigrant share on female entrepreneurs is $(0.00037 - 0.00727e_t)F_t$, and this effect is always negative if $e_t < 0.051$.[16] In other words, a 10-percent increase in the immigrant share has a net negative impact on the level of female

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[14]The immigrant share in population over 2000-2016 is about 15.5 percent. A 10-percent increase in the immigrant share decreases the probability of entry of female entrepreneurs by $0.024 \times 1.55 \approx 0.037$ percentage points. Since the average entry rate among non-entrepreneur females is about 0.32 percent (Table 1), a 10 percent increase in the immigrant share decreases the likelihood of entry by 12 percent, relative to the sample mean. Similarly, 10-percent increase in the immigrant share decreases the exit rate by $0.4446 \times 1.55 \approx 0.690$. Since the average exit rate is about 12 percent, such an increase in the immigrant share decreases the likelihood of exit by 6 percent.

[15]Some of the exiting entrepreneurs become unincorporated self-employed, but their numbers are extremely small (less than 10). Thus, when females entrepreneurs close their businesses they mainly become wage & salary workers.

[16]A 10-percent increase in the immigrant share decreases the probability of entry and exit by 0.00037 and 0.0069, respectively (see footnote 14). It then follows that such an increase in the immigrant share decreases the number of businesses created and destroyed by $0.00037(1 - e_t)F_t$ and $0.0069e_tF_t$, respectively. Subtracting the latter from the former yields the above net effect.

entrepreneurs if the share of entrepreneurs among them is less than 5.1 percent. However, the average share of female entrepreneurs is always around 2 percent (Table 1).

Using above estimates, one can also hypothetically calculate the *net* number of females prevented from being entrepreneurs due to immigration. According to the 2015 population survey, for example, the total number of prime-aged, native females employed in non-agricultural, private sectors (at least 20 weeks and 15 hours per week) is about 38.9 million, and the share of entrepreneurs among them is about 2 percent. It then follows that 10 percent increase in the immigrant share translates into about 8,500 fewer female entrepreneurs among natives. However, a 10 percent increase in the immigrant share would have created about 10,000 new immigrant entrepreneurs.[17] Thus, although immigration reduced entrepreneurship among native females, the total number of entrepreneurs in the U.S. increased.

Column 2 in Tables 4.A and 4.B shows the impact of immigration on entry and exit of entrepreneurs among native males. Immigration had a negative and insignificant effect on the entry rate, while having a positive and insignificant impact on the exit rate. Thus, unlike females, immigration had no effect on the entrepreneurial activity among native males. Note that estimated coefficients on controls in each case are mostly similar to their counterparts in column 1.

It is interesting that immigration has an effect on entrepreneurship among females, but not males. One may think that this is because immigrant entrepreneurs are concentrated in sectors that used to be dominated by female entrepreneurs. Table 5 shows the distribution of entrepreneurs across sectors for females, males, and immigrants, respectively. Although there are some distributional differences across groups, they are not large enough to explain the results in columns 1 and 2 of Tables 4.A and 4.B.

Immigration can potentially have two conflicting effects on entrepreneurial activity of natives. On one hand, cheaper labor provided by immigrants lowers cost of doing business, and thus encourage entrepreneurship.[18] On the other hand, immigrants are also entrepreneurial and,

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[17]A 10 percent increase in the immigrant share in 2015 implies about 1.7 million new immigrants, and the entry rate of entrepreneurs among them is about 0.58 percent.

[18]Several studies (Ottaviano et al. 2013, Beland and Unel 2018) have shown that immigrants earn less than native workers even after controlling for individual characteristics.

the competition could negatively effect entrepreneurship among natives. The above estimate for entry implies that the crowding-out effect of immigrants has been more dominant among females. A possible explanation is that increased competition stemming from immigrant entrepreneurs drives up entry costs, and since females have more limited access to credit (Asiedu et al. 2012), they will have less incentive to become entrepreneurs. Existing female entrepreneurs benefit from the reduced competitive pressure and cheaper labor from immigrant workers, and thus the likelihood of female entrepreneurs exiting the market decreases.

In sum, immigration has a small negative effect on entrepreneurship among female natives, while having no effects on males. I have also investigated the effects of immigration on self-employment among these groups, and results remain the same.[19] These findings are different from Fairlie and Meyer (2003), who find that immigration during the 1980s results in a large decrease in self-employment among natives, and the effect is stronger among males than females. Specifically, they estimate a two-stage estimate using the 1980 and 1990 decennial population surveys covering 132 metropolitan areas (MAs). In the first stage, they pool the 1980 and 1990 decennial population surveys, and estimate a probit equation for the self-employment probability. Regressing the first-difference MA fixed effects obtained in the first stage on the first differences of the immigrant share and other MA-level characteristics (such as native unemployment rate, native population, and average income of natives), they find a negative and significant effect of immigration on native self-employment.

There are several differences between the present study and theirs. For example, due to the limited data availability, their analysis could only cover the 1980 and 1990 decennial surveys, and thus the second-stage analysis is based on 132 observations. In contrast, my analysis utilizes repeated cross-section data over the 2000-2016 period, and hence I can control time effects.[20] However, with the availability of the population surveys in later years, one wonders how their results change if different periods and samples are used. Using the data across 219 MAs con-

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[19]As in Table 3, however, the effects of immigration on unincorporated self-employment is highly insignificant for both females and males, and thus results for self-employment are mainly driven by incorporated self-employed females.

[20]Geographic unit that I use in my analysis is state, not metropolitan area. I use the CPS-March to identify entry and exit of entrepreneurs, and the March surveys have considerably lower number of observations than decennial and American Community surveys. In addition, constructing time-consistent MAs over the 1980–2016 period reduces the sample more than 30 percent, and hence making MA-level analysis less precise.

sistently created by Peri et al. (2015) from 1990 to 2010, I re-estimated Fairlie and Meyer's two-stage model for the 1990-2000 and 2000-2010 periods. I find that the impact of immigration on self-employment among native males is negative and significant for the 1990-2000 period, but positive and insignificant for the 2000-2010 period. Thus, Fairlie and Meyer's results are sensitive to the time period and MAs sample.

I now turn to exploring heterogeneity based on race, and results are reported in columns 3 and 4 in Tables 4.A and 4.B. Immigration has a negative and significant (at the 10-percent level) impact on the entry of white entrepreneurs, while having negative and insignificant impact on that of non-white ones. Its impact on the exit of entrepreneurs in either group is statistically insignificant, although the signs are different across the two groups.

Columns 5 and 6 in Tables 4.A and 4.B report the impact of immigration on entry and exit of native entrepreneurs with respect to their schooling. "Less" refers to entrepreneurs who have at most a high school diploma, while "More" to those who have at least some college education. The impact of immigration on entry of less-educated entrepreneurs is negative and statistically significant at the 10-percent level. But its impact on the entry of entrepreneurs with more schooling is highly insignificant. Effects of immigration on exit of native entrepreneurs are highly insignificant among both groups.

Finally, the last two columns in Table 4.A and 4.B explore effects of immigration on different age groups. Individuals who are less than 40 years old classified as "Young," and the rest as "Old." Immigration has a negative and significant effect on the entry of old entrepreneurs, while having no significant impact on that of young entrepreneurs. As in the previous cases, its impact on the exit of entrepreneurs among each age group is insignificant. Estimates in this section indicate that immigration mainly had a negative and significant impact on the entry of white female entrepreneurs who are less educated and old, while having only a negative and statistically less significant impact on the exit of female entrepreneurs.[21]

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[21]Results reported in Tables 4.A and 4.B remain mostly the same if the Great Recession or 2016 are excluded from the sample.

5 Concluding Remarks

Generating a variety of benefits as well as challenges to the host economies, immigration has been a hotly debated issue among economists and policy makers in the U.S. and other rich countries. This paper contributes to the large literature on immigration economics by studying how it affects the entrepreneurship among the US-born population. More specifically, using survey data from the U.S. Census across states and industries over the 2000–2016 period, I investigate the impact of immigration on the likelihood of entry into and exit from entrepreneurship at individual-owner level. I identify all incorporated self-employed individuals as entrepreneurs, and I use an instrumental variable approach to measure the causal effect.

I find that immigration had a negative effect on the entry of entrepreneurs, while having no significant impact on their exits. I then explore heterogeneity across groups, based on gender, race, education, and age. My analysis shows that immigration has a negative and significant effect on the entry and exit of female entrepreneurs, but has no effect on entrepreneurship among males. The latter finding indicates that immigrants have not crowded out entrepreneurship among U.S.-born males. I also find that immigration had a negative effects on entry rates of whites, the less-educated individuals, and older people. However, these effects are barely significant at the 10-percent level. Its effects on the exit rate of entrepreneurs among each of these group is insignificant. In sum, immigration predominantly affected entrepreneurship among native females.

My estimates imply that the net effect of immigration on female entrepreneurship is negative. However, these findings should not encourage restrictive immigration policies for several reasons. First, using population data from the Census, my estimates indicate that the overall negative effect is small. Second, immigrants themselves are highly entrepreneurial and each year create tens of thousands of new businesses (Fairlie and Loftsorm 2015). Finally, the present work only focuses on how immigration affected small business owners, while assuming away other positive effects of immigrants on the U.S. economy. For example, several other studies (Hunt and Gauthier-Loiselle 2010, Peri 2012) have shown that they have contributed to innovation and productivity growth in the U.S., which in turn improved economic prosperity.

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Table 1. Summary Statistics for Entrepreneurship Among Natives (%), 2000–2016

	Stock	Entry	Exit
All Sample	3.72	0.54	10.67
	(18.93)	(7.35)	(30.88)
Female	2.07	0.32	11.89
	(14.23)	(5.65)	(32.37)
White	4.08	0.58	10.26
	(19.78)	(7.58)	(30.34)
Young	2.42	0.41	12.09
	(15.36)	(6.36)	(32.60)
More Educated	4.28	0.62	9.91
	(20.23)	(7.84)	(2.99)
Service	3.55	0.53	10.92
	(18.51)	(7.24)	(31.19)

Notes: The data draw from the CPS files at IPUMS (Flood et al. 2017). The sample includes only natives of ages 25–55 years, who worked in non-agricultural private sectors at least 20 weeks in the previous year and usually worked at least 15 hours in that year. Young refers to individuals who are less than 40 years old, and Skilled represents fraction of individuals who have at least some college education. Numbers in parentheses are standard deviations, and the CPS weights are used in all calculations.

Table 2. Impact of Immigration on Native Entrepreneurship in the U.S., 2000–2016

Variable	Entry		Exit	
	1	2	3	4
Immigration	−0.0157*	−0.0169*	0.0315	0.0420
	(0.0094)	(0.0088)	(0.2082)	(0.2141)
Male		0.0033***		−0.0236***
		(0.0003)		(0.0053)
Black		−0.0006		0.0450***
		(0.0004)		(0.0115)
Other		0.0004		0.0475***
		(0.0004)		(0.0146)
Age		0.0004***		−0.0022
		(0.0001)		(0.0032)
Age^2		−0.0000		0.0000
		(0.0000)		(0.0000)
Married		0.0020***		0.0115
		(0.0003)		(0.0070)
High School		0.0017***		−0.0216
		(0.0004)		(0.0183)
Some College		0.0032***		−0.0388**
		(0.0004)		(0.0169)
College		0.0057***		−0.0515***
		(0.0004)		(0.0159)
Home Owner		0.0020***		−0.0792***
		(0.0003)		(0.0098)
Avg Entrp		0.0330***		−0.0876
		(0.0078)		(0.0753)
F-statistics	39.811	40.184	9.588	10.080
Observations	803,487	803,487	31,709	31,709

Notes: All regressions include state, industry, and year fixed effects; and regressions are weighted by the CPS weights. Numbers in parentheses are the robust standard errors clustered at the state level, and ***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.

Table 3. Impact of Immigration on Native Entrepreneurship in the U.S., 2000–2016

Variable	All Self-employed		Unincorporated	
	Entry	Exit	Entry	Exit
Immigration	−0.0172*	0.0426	0.0008	0.0505
	(0.0088)	(0.0645)	(0.0061)	(0.0490)
Male	0.0035***	−0.0131***	0.0002	−0.0194***
	(0.0003)	(0.0029)	(0.0002)	(0.0023)
Black	−0.0020***	0.0138***	−0.0014***	0.0051
	(0.0005)	(0.0043)	(0.0004)	(0.0054)
Other	0.0004	0.0187**	0.0003	0.0074
	(0.0012)	(0.0072)	(0.0012)	(0.0059)
Age	0.0004**	−0.0026*	0.0001	−0.0038**
	(0.0002)	(0.0013)	(0.0001)	(0.0016)
Age^2	−0.0000	0.0000	−0.0000	0.0000*
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married	0.0019***	0.0093***	−0.0002	−0.0023
	(0.0005)	(0.0027)	(0.0003)	(0.0030)
High School	−0.0001	−0.0076	−0.0020***	−0.0149**
	(0.0008)	(0.0051)	(0.0006)	(0.0056)
Some College	0.0025***	−0.0077	−0.0010**	−0.0130*
	(0.0005)	(0.0057)	(0.0005)	(0.0068)
College	0.0054***	−0.0115**	−0.0005	−0.0236***
	(0.0007)	(0.0054)	(0.0006)	(0.0065)
Home Owner	0.0020***	−0.0372***	−0.0001	−0.0299***
	(0.0004)	(0.0033)	(0.0003)	(0.0036)
Avg Entrp	0.0319***	−0.0101	0.0152***	0.0113
	(0.0071)	(0.0303)	(0.0037)	(0.0272)
F-statistics	38.723	16.944	39.171	25.389
Observations	753,421	82,975	750,296	51,102

Notes: All regressions include state, industry, and year fixed effects; and regressions are weighted by the CPS weights. Numbers in parentheses are the robust standard errors clustered at the state level, and ***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.

Table 4.A. Impact of Immigration on Entry into Entrepreneurship, 2000–2016

	Gender		Race		Schooling		Age	
	Female	Male	White	Non-White	Less	More	Young	Old
Variable	1	2	3	4	5	6	7	8
Immigration	−0.0237***	−0.0099	−0.0181*	−0.0117	−0.0295*	−0.0093	−0.0095	−0.0233*
	(0.0066)	(0.0112)	(0.0101)	(0.0149)	(0.0173)	(0.0086)	(0.0088)	(0.0129)
Male			0.0034***	0.0028***	0.0019***	0.0039***	0.0027***	0.0038***
			(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)
Black	−0.0004	−0.0011			−0.0006	−0.0006	0.0005	−0.0018***
	(0.0003)	(0.0007)			(0.0005)	(0.0004)	(0.0005)	(0.0005)
Other	0.0004	0.0002		0.0014*	−0.0007	0.0009	0.0010**	−0.0004
	(0.0005)	(0.0005)		(0.0008)	(0.0006)	(0.0006)	(0.0005)	(0.0009)
Age	0.0003***	0.0004*	0.0004***	0.0003	0.0003	0.0004**	0.0005	0.0010
	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0005)	(0.0006)
Age^2	−0.0000*	−0.0000	−0.0000	−0.0000	−0.0000	−0.0000	−0.0000	−0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married	0.0016***	0.0024***	0.0021***	0.0014***	0.0019***	0.0020***	0.0013***	0.0024***
	(0.0003)	(0.0004)	(0.0004)	(0.0003)	(0.0004)	(0.0004)	(0.0003)	(0.0005)
High School	0.0002	0.0026***	0.0020***	0.0003	0.0015***		0.0015***	0.0019***
	(0.0005)	(0.0006)	(0.0004)	(0.0006)	(0.0004)		(0.0004)	(0.0005)
Some College	0.0012**	0.0043***	0.0034***	0.0021***			0.0027***	0.0035***
	(0.0005)	(0.0006)	(0.0004)	(0.0006)			(0.0004)	(0.0005)
College	0.0030***	0.0074***	0.0061***	0.0040***		0.0027***	0.0044***	0.0068***
	(0.0006)	(0.0007)	(0.0005)	(0.0007)		(0.0003)	(0.0005)	(0.0006)
Home Owner	0.0010***	0.0030***	0.0021***	0.0014***	0.0021***	0.0019***	0.0017***	0.0023***
	(0.0002)	(0.0005)	(0.0003)	(0.0003)	(0.0003)	(0.0004)	(0.0003)	(0.0005)
Avg Selfemp	0.0291***	0.0338***	0.0365***	0.0099	0.0329**	0.0317***	0.0211**	0.0438***
	(0.0096)	(0.0092)	(0.0092)	(0.0079)	(0.0140)	(0.0073)	(0.0080)	(0.0109)
F-statistics	69.116	26.534	36.453	63.912	31.214	47.069	42.196	38.415
Observations	396,604	406,883	679,672	123,815	282,533	520,954	370,130	433,357

Notes: All regressions include state, industry, and year fixed effects; and regressions are weighted by the CPS weights. Numbers in parentheses are the robust standard errors clustered at the state level, and ***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.

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Table 4.B. Impact of Immigration on Exit from Entrepreneurship, 2000–2016

	Gender		Race		Schooling		Age	
	Female	Male	White	Non-White	Less	More	Young	Old
Variable	1	2	3	4	5	6	7	8
Immigration	−0.4446*	0.2618	0.0252	−0.0696	−0.3758	0.1441	0.4204	−0.0927
	(0.2260)	(0.2684)	(0.1903)	(0.7129)	(0.3407)	(0.2494)	(0.3190)	(0.2046)
Male			−0.0258***	−0.0019	−0.0497***	−0.0164***	−0.0310**	−0.0198***
			(0.0053)	(0.0176)	(0.0125)	(0.0057)	(0.0125)	(0.0060)
Black	0.0055	0.0645***			0.0895***	0.0248*	0.0212	0.0621***
	(0.0136)	(0.0166)			(0.0261)	(0.0134)	(0.0196)	(0.0131)
Other	0.0463*	0.0481***		−0.0120	0.0636	0.0446***	0.0351	0.0600***
	(0.0251)	(0.0169)		(0.0173)	(0.0479)	(0.0165)	(0.0262)	(0.0177)
Age	0.0006	−0.0028	−0.0014	−0.0032	0.0066	−0.0047	−0.0466**	0.0182*
	(0.0075)	(0.0028)	(0.0028)	(0.0150)	(0.0060)	(0.0040)	(0.0206)	(0.0102)
Age^2	−0.0000	0.0000	0.0000	0.0001	−0.0001	0.0000	0.0007**	−0.0002*
	(0.0001)	(0.0000)	(0.0000)	(0.0002)	(0.0001)	(0.0000)	(0.0003)	(0.0001)
Married	0.0066	0.0128*	0.0076	0.0481**	−0.0001	0.0137**	0.0243**	0.0061
	(0.0116)	(0.0075)	(0.0065)	(0.0188)	(0.0146)	(0.0064)	(0.0116)	(0.0072)
High School	−0.0826*	−0.0099	−0.0094	−0.1112	−0.0200		−0.0667**	−0.0010
	(0.0454)	(0.0190)	(0.0180)	(0.0859)	(0.0177)		(0.0275)	(0.0204)
Some College	−0.1361***	−0.0157	−0.0222	−0.1731*			−0.0946***	−0.0141
	(0.0448)	(0.0176)	(0.0161)	(0.0919)			(0.0311)	(0.0183)
College	−0.1406***	−0.0323*	−0.0376**	−0.1566		−0.0127**	−0.1016***	−0.0280
	(0.0443)	(0.0174)	(0.0159)	(0.0942)		(0.0054)	(0.0285)	(0.0180)
Home Owner	−0.0813***	−0.0783***	−0.0842***	−0.0479*	−0.1106***	−0.0668***	−0.0741***	−0.0844***
	(0.0179)	(0.0133)	(0.0109)	(0.0279)	(0.0159)	(0.0104)	(0.0104)	(0.0144)
Avg Selfemp	−0.0821	−0.1247	−0.0816	0.0308	−0.0401	−0.0800	−0.1392	−0.0536
	(0.1644)	(0.0814)	(0.0802)	(0.4229)	(0.1315)	(0.1029)	(0.1292)	(0.0953)
F-statistics	25.310	7.259	9.236	27.612	7.642	12.229	8.216	11.044
Observations	8,443	23,266	29,408	2,301	8,184	23,525	9,534	22,175

Notes: All regressions include state, industry, and year fixed effects; and regressions are weighted by the CPS weights. Numbers in parentheses are the robust standard errors clustered at the state level, and ***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.

Table 5. Distribution fo Entrepreneurs Across Sectors (%), 2000–2016

Sector	Females	Males	Immigrants
Mining & Construction	8.54	23.14	13.07
Manufactruing	5.79	7.24	4.81
Transportation	2.45	3.79	6.32
Utility	0.21	0.57	0.49
Wholesale	3.71	4.98	5.25
Retail	18.36	13.29	26.55
Finance & Insurance	10.89	9.76	6.03
Business Repair	18.83	17.07	16.15
Personal Service	6.78	1.98	5.26
Recreation	4.35	3.47	1.60
Professional Service	20.10	14.70	14.47

Notes: The data draw from the CPS files at IPUMS (Flood et al. 2017). The sample includes only natives of ages 25–55 years, who worked at least 20 weeks in the previous year and usually worked at least 15 hours in that year. The CPS weights are used in all calculations.
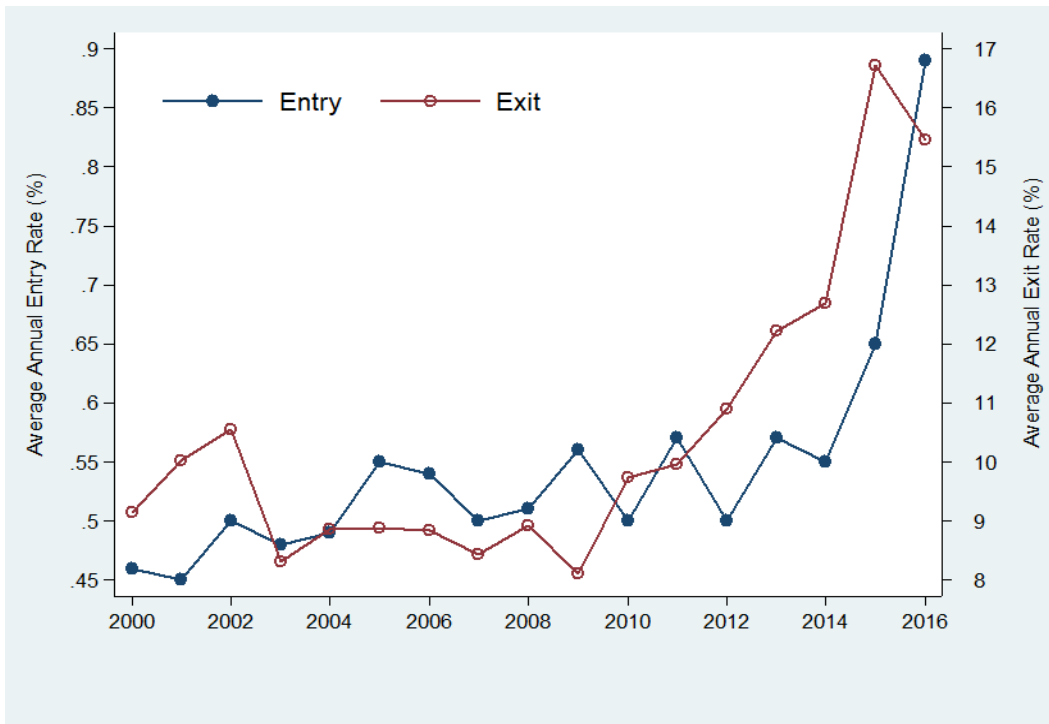
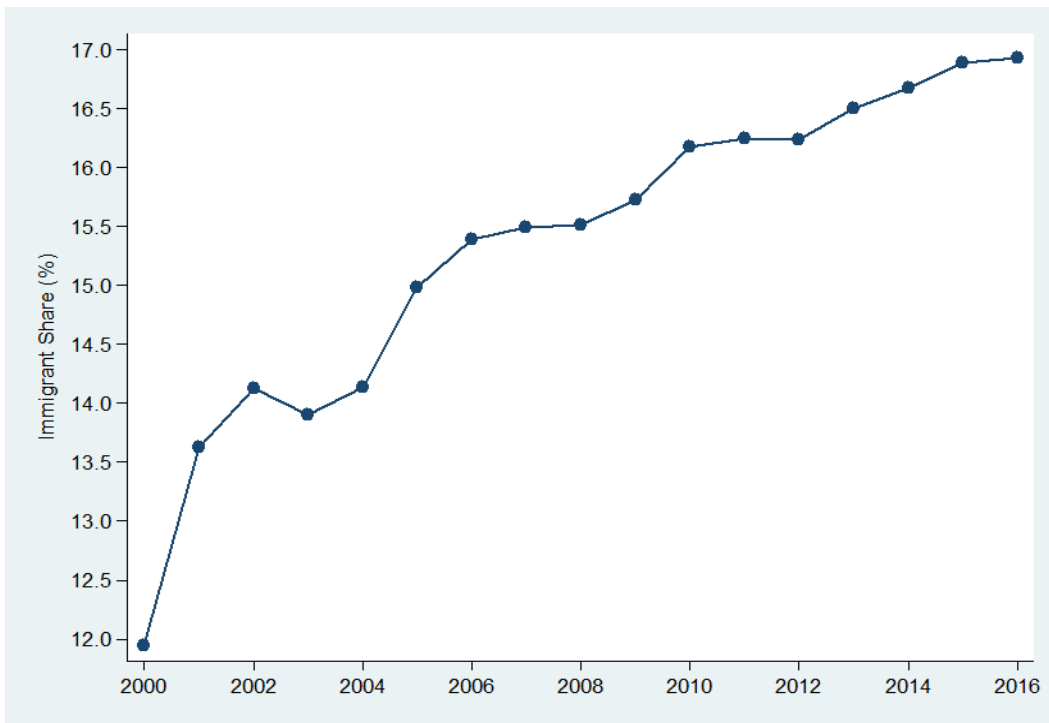Figure 1. The Average Entry and Exit Rate of Native Entrepreneurs (%), 2000–2016

Figure 2. The Immigrant Share in the Labor Force (%), 2000–2016