A Missing Generation of Firms? Aggregate Effects of the Decline in New Business Formation*

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Preliminary and Incomplete

October 2015

Abstract

Unlike most previous recessions, the 2007-2009 contraction was associated with a very large and persistent decline in new business formation. We study the aggregate implications of this phenomenon. While reduced entry rate plays only a minor role in accounting for the initial contraction, the effects are very persistent under plausible models of firm dynamics. This suggests that lower entry may account for part of the slow U.S. recovery. We start with a simple calculation that illustrates that lower entry since 2006 "accounts" for a significant reduction of employment. We next present state-level and MSA-level evidence within the U.S. in order to evaluate this hypothesis. We consider several alternative factors that may affect the speed of the recovery such as the debt to GDP ratio, the decline in house prices, or the decline in small business lending. Among the considered hypothesis the decline in entry stands out as the dominant factor in predicting the speed of the recovery.

JEL: E32, E44

Keywords: entry, recovery, persistence, financial crisis, business formation

*We thank Andy Atkeson, Jeff Campbell, Jason Faberman, Mark Wright, and seminar participants at the Chicago Fed, Fed Board and the 5th Ifo Conference on Macroeconomics and Survey Data for discussions and comments. We thank Yuriy Gorodnichenko for sharing his Stata code. The views expressed here are those of the authors and do not necessarily represent those of the Federal Reserve Bank of Chicago, the Board of Governors, or the Federal Reserve System.

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1 Introduction

After the United States experienced a sharp contraction of economic activity in 2008 and 2009, many analysts expected a strong recovery.[1] Indeed most estimated DSGE models imply that since the shocks that drove the recession are transitory, the economy will eventually (albeit very slowly) catch up to its previous trend.[2] As of mid-2014, however, there appears to be little evidence of this catch-up, as GDP remains nearly 10% below its pre-2007 trend, and institutions such as the CBO have revised down their estimates of potential output. Reinhart and Rogoff (2009) argue that the US is only a special case, and that financial crises *generally* lead to very protracted recoveries. However, little is known regarding the economic mechanisms which might generate these slow recoveries.

At a basic level, one can distinguish three hypotheses. First, the lower trend of potential economic activity happened coincidentally with the recession (and perhaps contributed to causing it); for instance, Fernald (2014) provides evidence that TFP started slowing down around 2004. Second, the recovery may be slow owing to the specific shocks or mechanisms that drove the recession, such as deleveraging and the ZLB, but the economy will *eventually* catch up. Third, the recession *caused* a lower trend of potential GDP, as in the hysteresis idea of Blanchard and Summers (1986), and as studied by Reifschneider, Wascher and Wilcox (2013) among others.[3]

In this paper, we contribute to this debate by presenting and evaluating a plausible economic mechanism that can generate a high (but finite) persistence, namely entry of new businesses and establishments. First, we document that the recession was associated witha very large and persistent decline of entry of new businesses, illustrated in Figure 1. We do not explore the causes of reduced entry, which remain largely unknown, but are likely driven by a combination of credit tightening and lower current demand, and possibly higher perceived uncertainty, lower expected growth, or changes in the tax and regulatory environment. Rather, in this paper we focus on studying the *implications* of the decline in entry. As a matter of accounting, lower entry must have a small effect on aggregates initially, because of the stock-flow dynamics: the entry rate is around 10%, and new businesses are much smaller than old ones, so that their total contribution to employment is only 3%.

[1] For instance, the CEA predicted in 2009 that GDP would grow at 3.2%, 4.0%, 4.6%, and 4.2% in 2010, 2011, 2012 and 2013 respectively. The realized rates were 2.5%, 1.8%, 2.8%, and 1.9%.

[2] For instance, Galí, Smets and Wouters (2012) or Christiano, Christiano, Eichenbaum and Trabandt (2014)).

[3] Technically, hysteresis can exist either in a "weak" version - where aggregate supply is affected temporarily by the current output gap leading to added persistence - and a "strong" version – where the potential is affected permanently. The line between the first kind of hysteresis and the second hypothesis is somewhat thin.

Hence, we argue that the aggregate contribution of reduced entry to the large and sharp 2009 contraction of employment or output is almost negligible. However, it is plausible that lower entry has more important effects over the medium-run, and hence may in part explain why the recovery has been slow over the following years. The basic argument is that a temporary reduction of new business formation creates a "missing generation" effect: new firms that would have been created never appear. While many of these firms would have died young, a few would have grown over time and contributed to job creation. For instance, the 2009 cohort of new firms was small. This mechanically reduced employment and output in 2009, but again only by a fairly small number. Going forward, in 2010 some of the firms from the 2009 cohort would have died, but some would have survived and grown. Hence, lower entry in 2009 creates a negative contribution to employment and output in 2010. This argument applies to 2011, 2012, etc., to the extent that some of the firms that would have been born in 2009 would have survived and grown in these years.

We first present a theoretical argument that it might have a very large persistence. The intuition is simple: the persistence is largest when the death rate of firms is almost equal to the growth rates of firms conditional on survival. This difference is small in the data, as has been documented in the firm dynamics literature (e.g. Hall (1987)). We first use a simple statistical model to illustrate this in the simplest possible setting. A calculation using the statistical model shows that, had entry rates stayed at their historical average since 2006 (rather than fall as they did) there would be about 1.7 millions more jobs in the U.S. economy. This calculation requires a number of assumptions, that we discuss in detail below, but it gives a rough order of magnitude of the (significant) size of the entry problem in the United States.

To empirically evaluate the relevance of this mechanism, we assembled regional data from the United States, both at the State and at the MSA levels. A first basic test is whether entry rates indeed declined more in places (States, MSAs or countries) where the recession was the sharpest, and overall growth since 2006 the slowest. The data clearly support this first test. Hence, while entry rates are not usually strongly pro-cyclical (as seen most simply in figure 1, or in Campbell (1998)), for this specific episode they are. Of course, entry rates might simply reflect house prices or other regional factors that drove the recession. Since it is difficult to offer a credible instrument for entry, we first propose a forecasting test: does entry help us forecast the strength of the recovery of an area (State, or MSA), even when conditioning on the size of the initial contraction, and on housing prices and the leverage variable advocated by Mian and Sufi in a series of papers? We estimate regressions to forecast GDP, and employment growth since 2010, using data from before 2010 on GDP, employment, house prices, leverage, and entry rates. We find that, both across US states

and across MSAs, a one percentage point decline in the entry rate between 2006 and 2010 is associated with to a 0.5-1.2 overall lower growth of GDP or employment per capita from 2010 to 2013. This is both statistically and economically significant. Using this cross-sectional regression to infer the macroeconomic effect of reduced entry leads to the conclusion that the lower entry rate may account for 1.25-3 points of lower GDP and employment.

1.1 Related Literature

The paper is related to a small literature studying the effect of entry on business cycle dynamics (Campbell (1998), Luttmer (2007)). The more recent study in this literature is Clementi and Palazzo (2013) who emphasize the higher persistence of output generated by their model in response to aggregate technology shocks. Lee and Mukoyama (2012) provide evidence that the entry rate is more cyclical than exit rate for US manufacturing firms and document productivity differences during booms and recessions for exiting plants. Siemer (2012) provides evidence that financial constraints affected employment growth in small young firms and works particularly through entry and exit. A financial shock in the model can lead to a large decline in entry and a slow recovery. Buera, Fattal-Jaef and Shin (2014) develop a model in which a credit crunch affects small young firms more strongly than old large firms. Sedlácek and Sterk (2014) show that job creation by U.S. firms is strongly influenced by aggregate conditions at firm entry. They find that average firm size is more important than the number of entering firms using Business Dynamics Statistics data since 1979.

Saffie and Ates (2013) study in an endogenous growth model that a sudden stop gives rise to a quantity/quality trade-off; while there are fewer firms born during a sudden stop, the average quality is higher.

Fernald (2014) documents that the a productivity slow down started in the U.S. prior to the financial crisis and finds that potential output grew even slower during the recession and recovery. Reifschneider, Wascher and Wilcox (2013) show using an unobserved components model developed by Fleischman and Roberts (2011) that potential output was 7 percent below the trajectory it appeared to be on prior to the recession.

The empirical literature studying the determinants of the economic decline during the 2007-2009 recession find several relevant factors: the decline in house prices (Mian and Sufi (2011), Chaney, Sraer and Thesmar (2010)), the aggregate demand channel (Mian and Sufi (2012)) and financial constraints (Duygan-Bump, Levkov and Montoriol-Garriga (2010), Siemer (2012), Chodorow-Reich (2014)).

A recent literature on slowing business dynamism studies the implications of the secular

decline in new business formation (Hathaway and Litan (2014), Pugsley and Sahin (2014)).

Compared to these papers our contribution is to emphasize the importance of firm entry for the recovery following the 2007-2009 recession. We further explore if the entry channel is a potential explanation for the observed slowdown in productivity growth during and following the recession. We then develop a model of firm entry and study under what conditions low firm entry can imply a slow recovery and what the implications are for productivity growth.

This paper is organized as follows. We first present basic facts about entry using data from the Business Dynamics Statistics. We next present the key mechanism in the context of a simple model and use that model to motivate our empirical calculation of the effect of the lower entry rate. Next, we use both US cross-state and cross-MSA data to study the empirical links between entry, GDP, employment, and productivity, and to relate these to housing prices and household leverage.

2 Data and Basic facts

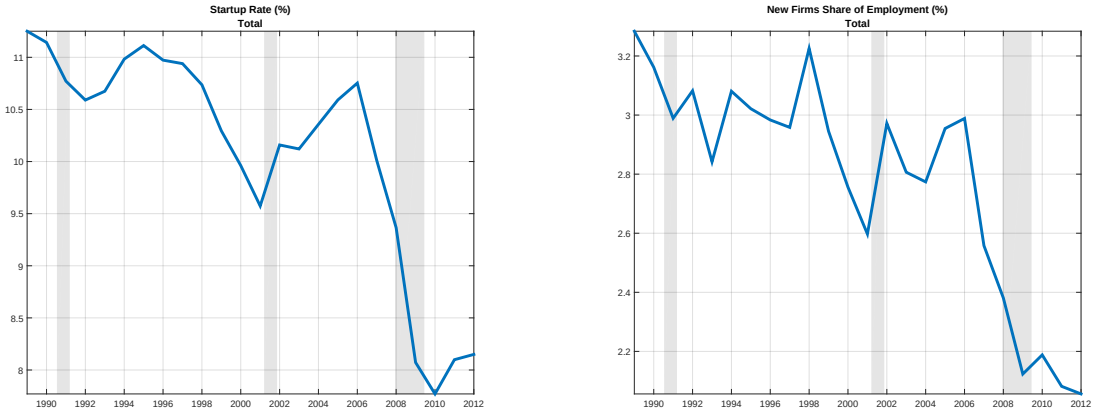
We source the data on firm entry at the aggregate, MSA and state level from the Business Dynamics Statistics (Census). The BDS are built from the Longitudinal Business Database at the annual frequency and provide March employment of private sector establishments and firms. The data track age of establishment and corporate structure. GDP at the MSA and state level are obtained from the Bureau of Economic Analysis (BEA) while employment is obtained from the Bureau of Labor Statistics Local employment statistics. (These data are constructed by combining the CES and Unemployment insurance data.) To construct measures of leverage (debt to income) we rely on Equifax and IRS data and compare our measure to Mian and Sufi (2012) to check comparability. House price data are taken from the Federal House Finance Agency (FHFA). We also use data from the county business patterns to construct sector employment at the county/msa level as the BDS only provides sector data at the national level.

2.1 Stylized facts

Figure 1, panel (a) depicts the entry rate of new firms, defined as new units that were created last year as a percentage of existing units.

While this entry rate was fairly stable from 1990 until 2006, it started falling in 2007 and has remained at a low level since then. The decline is large: in 2006 there were around 562,000 new firms created, as opposed to around 390,000 in 2010 and 410,000 in 2011. This represents

Figure 1: **Impulse Response to a shock to Entry**



(a) Entry Rate (b) Employment-weighted Entry Rate

Notes: Source: BDS Data

a decline of about 27% from the 2006 peak. Moreover, there is so far no clear tendency for business entry to recover.[4] Figure 1, panel (b) presents the employment-weighted entry rate, which behaves similarly.

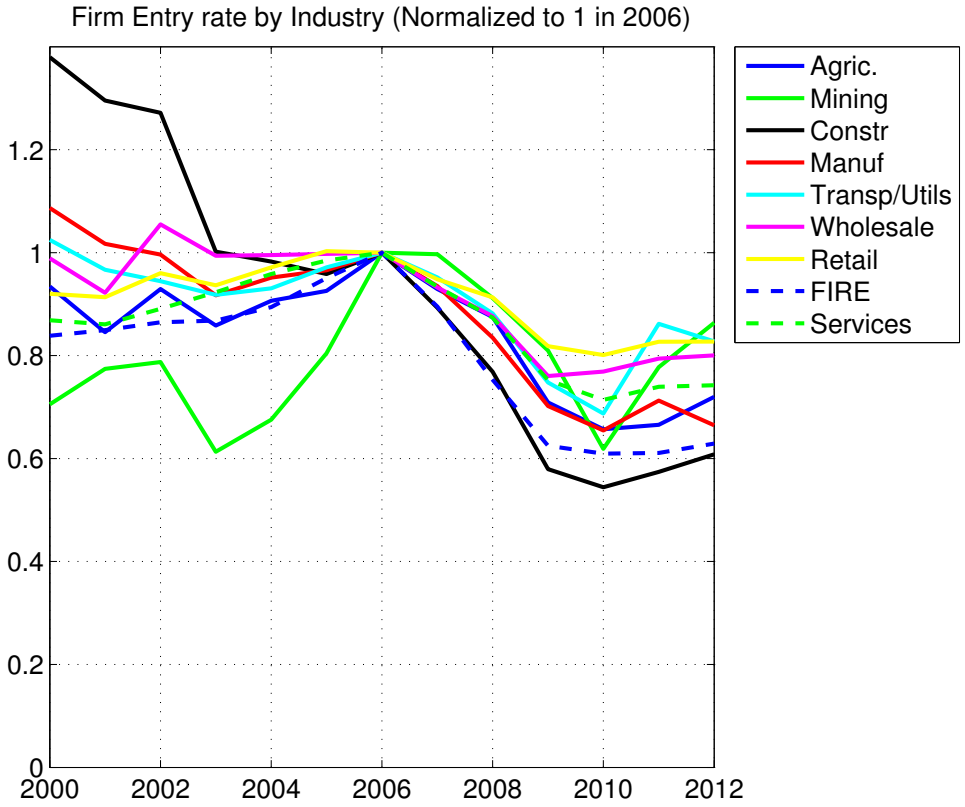
One might speculate that this decline in aggregate entry is driven by a few industries that were highly affected by the recession (such as new housing construction), or that it reflects compositional changes where some industries with higher entry rates (such as retail) represent a smaller share of the economy. However, Figure 3 calculates the entry rate for the broad sectors of the economy, and shows that the decline of entry rates affects all sectors since 2007, though admittedly some sectors are more affected than others.

3 Basic mechanism for missing generation mechanism

To highlight the simplicity of the "missing generation" mechanism we start with a bare-bone model. This can be viewed as a statistical model or accounting framework. Denote by $\mu_{a,t}$ the number of firms of age a at time t, i.e. the age distribution of firms. Hence, $\mu_{0,t}$ is the number of new firms created at time t. Denote by $y_{a,t}$ the average output of firms of age a

[4]The recent decline of entry rate is also part of a longer decline in business dynamism that is visible across many economic statistics (see Decker et al. (2013)). Indeed, one possibility is that the declines seen since 2008 are never reversed as the trend catches on to these lower levels.

Figure 2: **Entry rate by industry**



at time t. We write $\delta_{a,t}$ for the death rate of firms of age a at time t, so that

$$\mu_{a+1,t+1} = (1 - \delta_{a,t})\mu_{a,t},$$

and $\gamma_{a,t}$ for the average growth rate conditional on survival of firms of age a at time t, so that

$$\gamma_{a,t} = \frac{y_{a+1,t+1}}{y_{a,t}}.$$

Total output is given by

$$Y_t = \sum_{a=0}^{\infty} \mu_{a,t} y_{a,t}.$$

As a matter of accounting, changes in output are driven by some combination of four factors: the death rates $\delta_{a,t}$, the conditional growth rates $\gamma_{a,t}$, the startup rate $\mu_{0,t}$ or the initial size of startups $y_{0,t}$. The on-impact effect of a shock to the startup rate depends on the relative

share of output of the new firms, which is small. However, the impact at future dates also depends on the death rates and conditional growth rates of firms.

To illustrate this in the simplest possible way, suppose that death rates and conditional growth rates constant as a function of age and over time, so that

$$\mu_a = (1-\delta)^a \mu_0,$$

and

$$y_a = \gamma^a y_0.$$

In this case, total output is in steady-state

$$Y = \frac{y_0 \mu_0}{1 - \gamma\delta}.$$

Now consider an increase in the startup rate μ_0. The effect on total output at time k is given by $(\gamma(1-\delta))^k y_0$. This persistence is high if $\gamma(1-\delta)$ is large i.e. if the growth rate conditional on survival is almost equal to the death rate. This turns out to be the empirically relevant case. Perhaps the more convincing way to demonstrate it is to note that Zipf's law requires it. Of course, Zipf's law is a robust empirical feature: $\Pr(y \geq x) \sim x^{-\xi}$, with ξ around $1.05 - 1.1$.

To see this, note that the average size of a firm age a is $\gamma^a y_0$, and that the firm size distribution satisfies

$$\begin{aligned}
\Pr(y &\geq x) = \Pr(\gamma^a y_0 \geq x) \\
\Pr(y &\geq x) = \Pr\left(a \geq \frac{\log\left(\frac{x}{y_0}\right)}{\log\gamma}\right) \\
\Pr(y &\geq x) = \frac{1}{\delta}(1-\delta)^{\frac{\log\left(\frac{x}{y_0}\right)}{\log\gamma}} \\
\Pr(y &\geq x) \sim x^{\frac{\log(1-\delta)}{\log\gamma}}
\end{aligned}$$

where we have used that $\Pr(a \geq A) = \sum_{a=A}^{\infty}(1-\delta)^a = \frac{1}{\delta}(1-\delta)^A$. Hence, $\log(1-\delta) \approx -\log\gamma$ to be consistent with the data, i.e. death rate and growth rate roughly equal.

We illustrate this persistence in figure 6, which depicts the response of output to a shock to μ_0. The top panel shows the responses to an i.i.d. shock while the bottom panel shows the responses to a persistent shock, and in each panel the two lines compare a case where $\gamma(1-\delta)$ is high or low. The main conclusion is that persistence is much larger in the former

case. The very strong persistence coming from an i.i.d. shock is impressive, and stands in contrast to the low persistence typically obtained in business cycle models. While one may think that our results are driven by the simplistic nature of the model, we show in the Appendix that a standard firm dynamics model a la Hopenhayn (1992) has very similar implications.

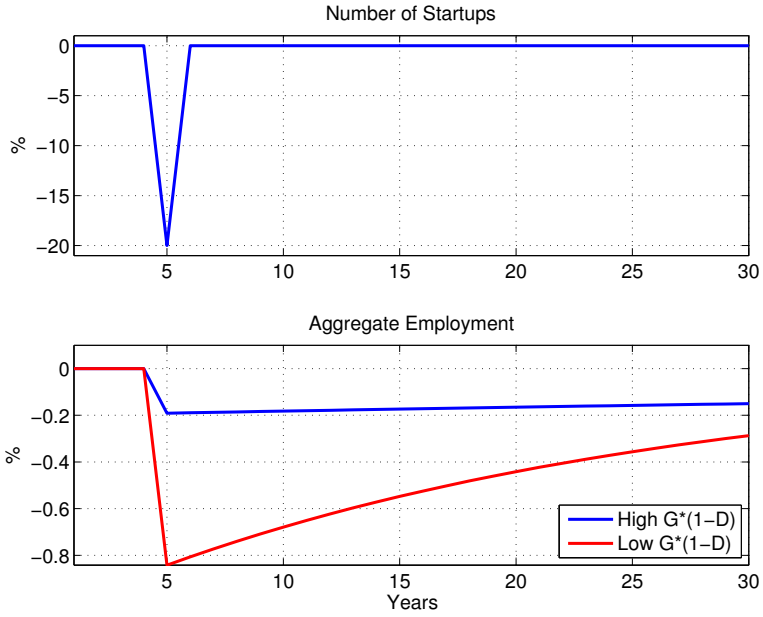
There are at least two important criticisms of the "missing generation mechanism". First, one may argue that firms that did not enter in 2008 will eventually enter once conditions recover, so that entry will overshoot its historical average. The analogy here is with a baby boom following a baby bust during a War. Potential entrepreneurs who had ideas for new businesses presumably do not forget them, though the conditions that make the ideas implementable may vanish. Figure 1 shows, however, that as of 2011 there was little hint of such a rebound, let alone an overshoot.

Second, one might think that the composition of entrants changed during the recession. This is potentially very important given the wide variety of experiences for newborn firms. Many new firms die quickly or survive but do not grow much and hence do not contribute significantly to aggregate job creation; a small fraction of new entrants, however, grows extremely quickly and ends up contributing importantly to aggregate job creation. These fast-growing firms are sometimes colorfully referred to as "gazelles". If the decline of entry is solely due to reduction of entrants of the first type, the effect of lower entry on aggregate employment would be limited. Our calculation implicitly assumes that the reduction of entry affected both types of firms equally. To shed some light on this issue, we can assess the quality of the firms that did enter during the recession. A first simple measure of the quality of new entrants is the average size of new firms or establishments, which does not appear to have changed significantly since 2006, as shown in Figure 4.

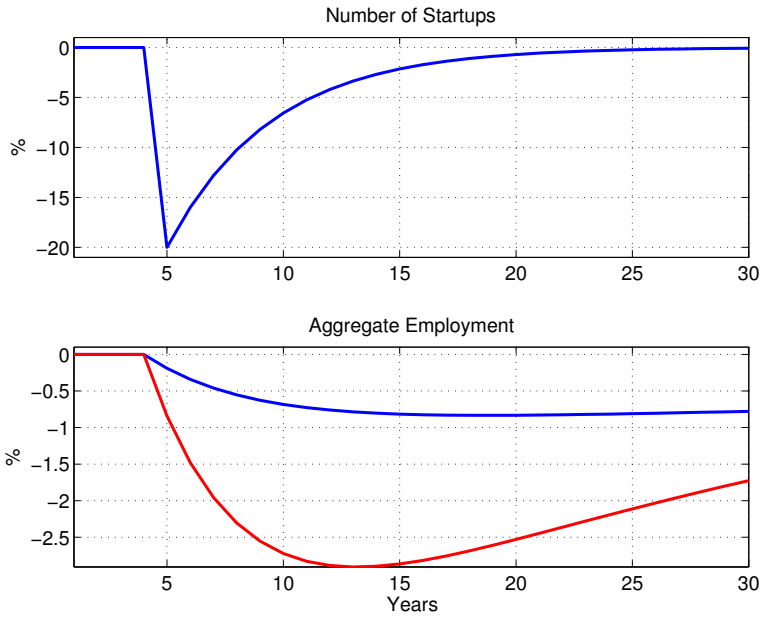
Sedlácek and Sterk (2014) argue that over a long time series, starting in the late 1970s, that variations in firm size are more important for employment in young firms than the variation in the number of entrants. The variation along this margin appears fairly minor during the financial crisis. Since size is the most natural measure of firm quality, one possible interpretation is that there was little change in the type of firms entering during the Great Recession.

Another simple way to assess this question is to look at the realized growth experience of the firms that did enter. If these firms were indeed more likely to be "gazelles", we should see that they experience fast growth, and indeed faster growth than comparable firms that entered just before the recession. In Figure 5 above that presents the average size of each firm by cohort and by age, each line of this chart follows a particular cohort. For instance, the green line depicts the average size of firms created in 2006, from their birth (age 0, in

Figure 3: **Simulation: Shock to Number of Startups**



(a) iid shock

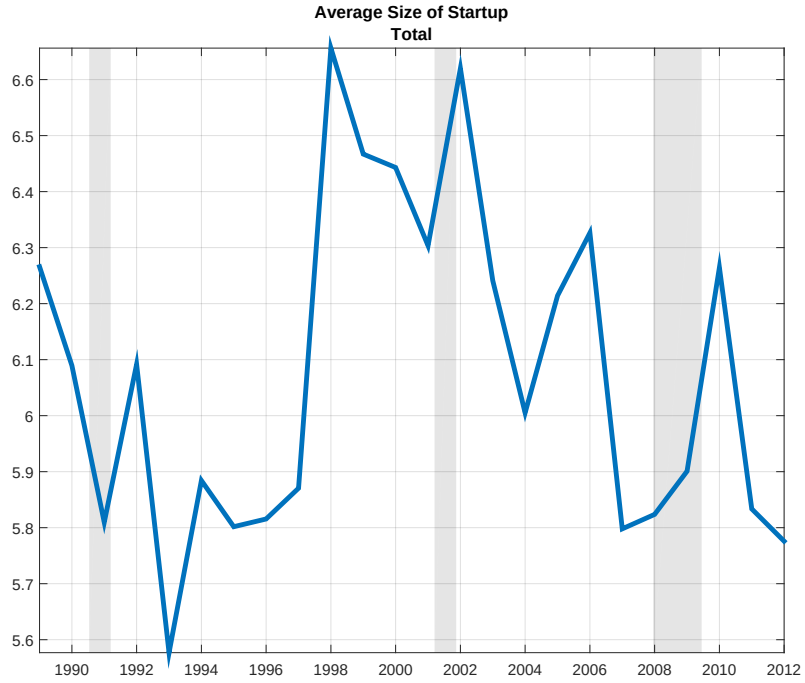


(b) persistent shock

2006) to their fifth anniversary (in 2011). The chart allows tracking the success of each cohort as they age and suggests limited variation in the selection.

Tracking firms over time allows to assess informally the time-varying selection. If only

Figure 4: **Average employment per new firm**



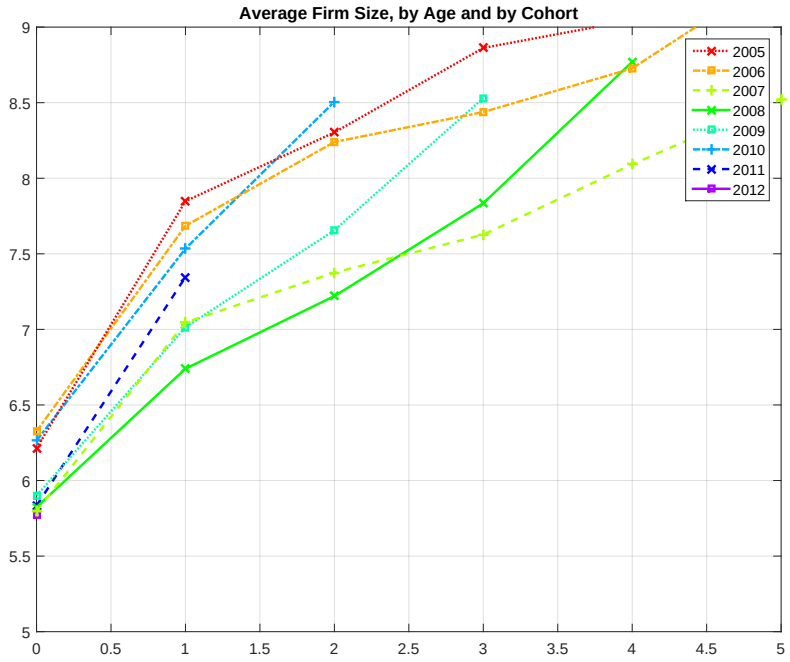
high quality firms entered in 2008, we should see that these cohorts grow more quickly than the average. Graphically, we observe a little bit of this – e.g., the 2008 cohort seems to catch up to the 2007 cohort – but it is fairly limited. However, we believe a model could help us quantify the variation in selection during this period.

4 A simple illustrative calculation

To provide an order of magnitude of the labor demand effect created by the "missing generation" mechanism, we calculate the employment that would have occurred if, starting in 2006, the entry rate had stayed at its historical average (which we calculate over 1990-2006), and assuming that the growth rates and death rates of all other firms behaved as they did in the data. This is a direct application of the accounting model described in the previous section, applied to employment rather than output (since we do not have data on shipments or value added in the BDS).

Suppose we start at time t_0 with a firm distribution $\mu(a, t_0)$ and $n(a, t_0)$. Given the future paths of growth rates, death rates, $\{\gamma_{a,s}, \delta_{a,s}\}_{s=t_0, a\geq 0}^{t}$, and the future paths of startup numbers and startup sizes, $\{\mu(0, s), n(0, s)\}_{s=t_0}^{t}$, we can construct recurisvely the distribution of firm

Figure 5: **Average Firm Employment by Cohort and Age**



employment at future dates $\mu(a,t), n(a,t)$ for $t > t_0$, and hence deduce total employment as

$$N(t) = \sum_{a=0}^{\infty} \mu(a,t) n(a,t).$$

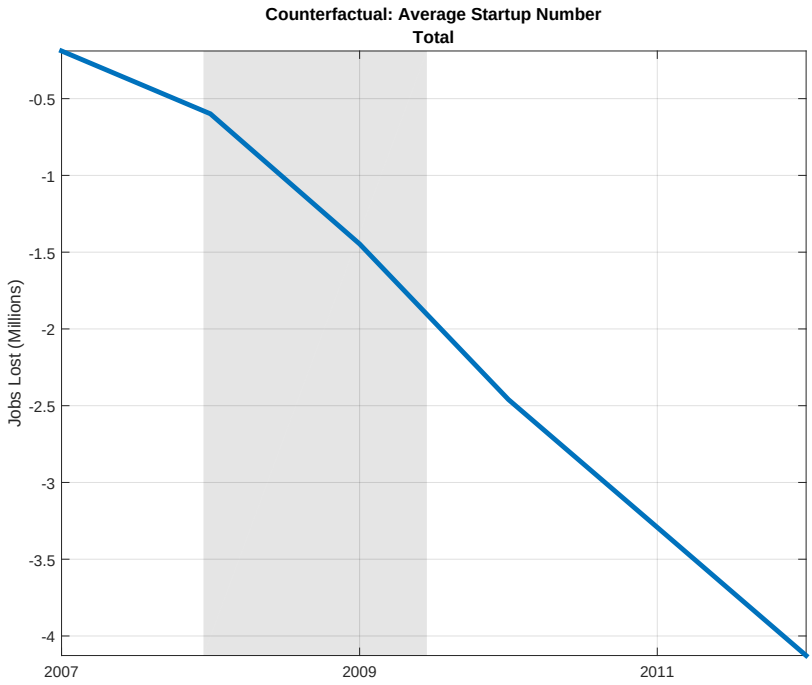
Specifically, we start from the t_0 =2006 distribution: $\{\mu(a,t_0), n(a,t_0)\}_{a=0}^{\infty}$, and we calculate counterfactual employment $N^s(t)$, for $t \geq t_0$ if growth & death rates, and startup size are as in the data, but the start-up number stays at historical average. The difference $N(t) - N^s(t)$ provides an accounting evaluation of startup effects.

While this is conceptually simple, there are some implementation issues, in part because the data is binned, and in part because the accounting identities do not work perfectly. However, they work approximately, and we are able to reproduce the path of actual employment if we plug in actual startup rates, hence we are fairly confident in our results.

Consistent with the basic argument, we find a small initial effect, so that entry accounts for little of the large decline of employment that took place in 2008 and 2009: for instance, while total private wage employment in March 2009 was 5.2 millions lower than in March 2006 according to our data, we estimate that only around 1.5m are accounted for by reduced

entry since 2006. However, the effect of lower entry builds up over time, both because the entry rate remains low and because of the intrinsic persistence ("missing generation effect") discussed above. As of March 2012, we find that there would be about 4m more jobs had entry stayed at its historical average.

Figure 6: **Counterfactual: Jobs Lost Due to Startup Decline since 2007**



This simple calculation is, however, only an accounting exercise, and may not reflect the full effect of lower entry. For instance, it is possible that lower entry benefits incumbents. In this case, our calculation would overestimate the job losses due to lower entry. Second, our calculation assumes that the firms that would have entered would have had the same growth and death probability as the firms that did enter. We discuss this further below. And finally, the 1990-2006 historical average might not be the right benchmark if, for instance because of the aging of US population, a lower startup rate would have occurred even in the absence of a recession.

5 Empirical Evidence

It is well known that the severity of the 2008 contraction varied greatly across the United States, in a way related to the intensity of the housing boom and bust (Mian and Sufi

(2012)). We use this cross-sectional variation to test the missing generation mechanism. We construct two panel datasets, at the State and MSA levels. The first question we take up is, did entry decline more in areas where the contraction was more severe? Second, is it true that the recovery was slower in areas where the reduction in entry was larger, even if we condition on other factors (e.g. size of the contraction, house prices, debt to income ratio) that are important to account for the economic recovery.

For all geographic levels we estimate the regression

$$\Delta y_i^{10-12} = \alpha + \beta_1 \Delta y_i^{06-10} + \beta_2 \Delta entry_i^{06-10} + \beta_3 \Delta HPI_i^{06-10} + \beta_4 DI_i^{06} + \beta_5 \Delta SBL_i^{06-10}$$

where Δy_i^{10-12} denotes the growth rate of GDP (employment/TFP) in the between 2006 and 2010, Δy_i^{06-10} denotes the growth rate of GDP (employment/ TFP) during 2006-2010. $\Delta entry_i^{06-10}$ denotes the change in entry rate between 2006 and 2010, ΔHPI_i^{06-10} denotes the change in the house price index between 2006 and 2010 and DI_i^{06} denotes the debt to income ration in 2006. ΔSBL_i^{06-10} denotes the change in small business lending between 2006 and 2010. Subscript i denotes either state or MSA.

5.1 Recession: Change in Firm Entry

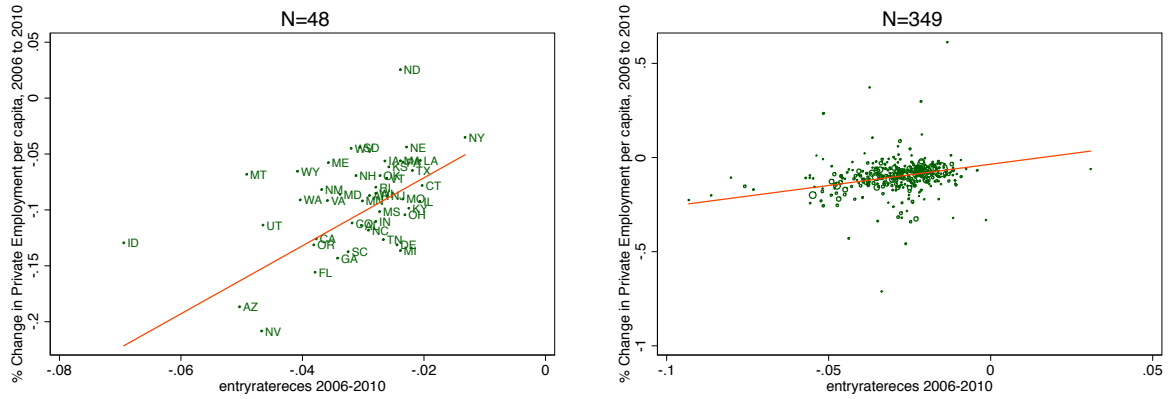
To start with the first question it is useful to consider a graph of the decline in entry between 2006 and 2010 plotted against the decline in GDP during the same time period. Figure 7 shows this at the State level in panel (a), the MSA level in panel (b). Panel (a) of figure 7 shows that a decline in GDP implied a larger decline in entry. For instance, some of the largest declines in entry are in Arizona and Nevada.

Of course, there is a fair amount of noise in this relationship, especially with smaller states. North Dakota and Wyoming are outliers as the economy in these state during this time period was heavily influenced by a shale gas/oil boom. Michigan on the other hand suffered a particularly large decline in GDP driven by the financial havoc of the big three in the automobile industry. Panel (b) of figure 7 confirms the findings for MSAs. The next section examines to what extend firm entry and other potential explanatory variables can predict the economic recovery following the financial crisis.

5.2 Recovery: Cross-state Evidence

In this section we examine if the change in entry rate during the recession can predict the speed of the following recovery. We compare the predictions of firm entry for the recovery with predictions of other potential candidate explanations, such as the size of the initial

Figure 7: **Initial contraction in GDP vs. Change in Entry rate**



(a) State (b) MSA

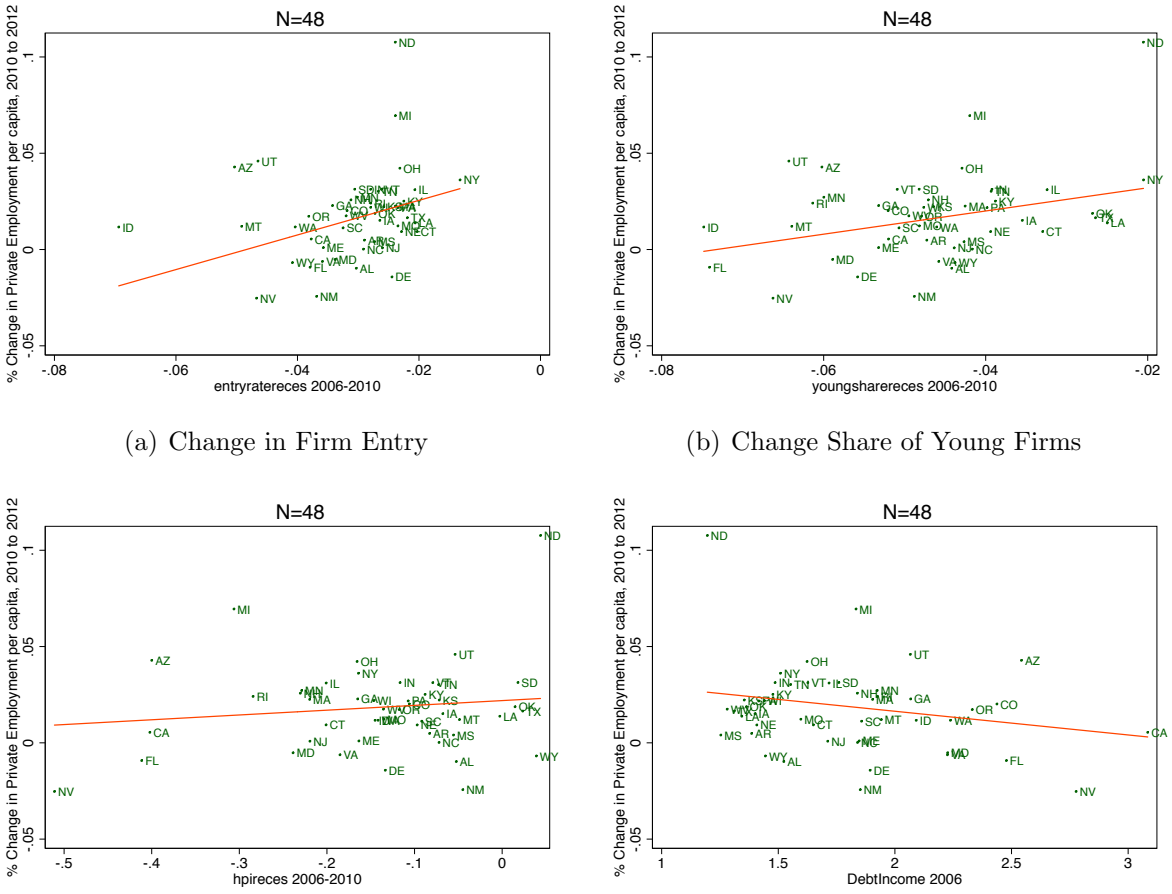
Notes: The figures display the relationship between the GDP per capita decline from 2006 to 2010 vs. the change in the entry rate from 2006 to 2010, for the 48 continental United States; for all MSA.

contraction, the decline in house prices and the debt to income ratio. Of course, these are not mutually exclusive explanations; and moreover, they are correlated. Lower demand or tigher credit may lead to lower entry. The goal here is to establish a correlation that suggests that firm entry is capturing directly some of the slow recovery. This seems to us a minimal test of the missing generation mechanism - though by far not a definitive one.

Figure 8 plots the recovery in GDP between 2010 and 2012 (the last year for which we have State and MSA-level GDP data) against four interesting variables. Panel (a) shows that the decline in entry during the recession is positively correlated with the speed of the economic recovery. States with larger declines in firm entry had a slower recovery. Panel (b) considers a different measure for the importance of firm entry: the share in employment of young firms. The period 2006-2010 features several years of lower entry and higher death of young firms. These accumulate over time and result in a decline in employment in young firms relative to older firms. The findings for the share of young firms are very similar to those of the decline in entry. Panel (c) of figure 8 plots the recovery in GDP against the decline in the house price index during the recession. It shows that areas with larger declines in house prices on average had a slower recovery. Finally, panel (d) of Figure 8 shows that states with a larger debt to income ratio had a slower recovery in GDP. However, the strength of the association is clearly weaker for these last two variables - despite their status both in the academic literature and in the popular press.

Figures alone, however, do not allow us to evaluate the predictive power of the candidate explanations. We therefore turn to regressions which allow us to include various controls.

Figure 8: **State-level Evidence: Forecasting the Economic Recovery**



(a) Change in Firm Entry

(b) Change Share of Young Firms

(c) Change HPI

(d) Debt to Income ratio in 2006

Notes: The figures display the relationship between the GDP per capita recovery and various explanatory variables.

Table 1 studies the predictive power of the candidate explanations for per capita GDP growth between 2010 and 2013. The regressions allow us to control for the decline in GDP during the recession. Generally, one would expect mean reversion in GDP growth, so that states with particularly large declines in output during the recession are likely to recover faster. Controlling for the GDP decline during the recession allows us to assess if the candidate explanations have predictive power for the recovery above and beyond what we would expect just based on the size of the recession. Clearly, Table 1 confirms that all candidate explanations individually have predictive power for the recovery. However, combining the explanatory factors in column (4) - (6) illustrates that the decline in the share of young firms, the decline in entry and the decline small business lending significantly predict the

Table 1: Explaining State Level GDP Growth 2010-2012

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Δ GDP 10-12					
Δ GDP 06-10	-0.007	-0.077	0.020	-0.031	-0.072	-0.046
	(0.087)	(0.103)	(0.089)	(0.110)	(0.111)	(0.094)
Debt/Inc 06	-0.027***			-0.016	-0.016	-0.014
	(0.008)			(0.019)	(0.015)	(0.016)
Δ HPI 06-10		0.105***		0.022	0.003	-0.038
		(0.037)		(0.070)	(0.064)	(0.062)
Δ entry 06-10			1.431***	0.584		1.001
			(0.496)	(0.725)		(0.629)
Δ young 06-10					0.727*	
					(0.431)	
Δ Small bus loans						0.365***
						(0.089)
Observations	48	48	48	48	48	48
R-squared	0.226	0.166	0.170	0.237	0.274	0.454
Weighted	y	y	y	y	y	y

Notes: This table reports results from the following panel regressions:

$$\Delta y_i^{10-12} = \alpha + \beta_1 \Delta y_i^{06-10} + \beta_2 \Delta entry_i^{06-10} + \beta_3 \Delta HPI_i^{06-10} + \beta_4 DI_i^{06} + \beta_5 \Delta SBL_i^{06-10}.$$

Δy_i^{10-12} denotes the growth rate of GDP in the between 2006 and 2010, Δy_i^{06-10} denotes the growth rate of GDP during 2006-2010. $\Delta entry_i^{06-10}$ denotes the change in entry rate between 2006 and 2010, ΔHPI_i^{06-10} denotes the change in the house price index between 2006 and 2010 and DI_i^{06} denotes the debt to income ration in 2006. ΔSBL_i^{06-10} denotes the change in small business lending between 2006 and 2010. Subscript i denotes state. The table reports the coefficients, the number of observations, and the R^2. All variables are annual. The number of observations varies in each regression because of data availability. Three stars (***) denote significance at the 1% confidence level, while two stars (**) and one (*) star denote significance at the 5% and 10% confidence levels.

recovery in GDP. However, entry has the largest coefficient. In particular we know that entry in aggregate declined by about 0.03 percentage points. A coefficient of about 1.1 in column (6) then tells us that real GDP would have been about 3.3 percent higher in absence of decline in entry. This finding is economically and statistically significant.

Table 2 considers the predictive power of the explanatory variables for per capita state

Table 2: Explaining State Level Employment Growth 2010-2012

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Δ N 10-12					
Δ N 06-10	-0.062	0.109	-0.160	-0.125	-0.106	-0.178*
	(0.102)	(0.100)	(0.101)	(0.107)	(0.099)	(0.095)
Debt/Inc 06	-0.014**			-0.022**	-0.029***	-0.021**
	(0.006)			(0.010)	(0.008)	(0.009)
Δ HPI 06-10		-0.008		-0.072**	-0.106***	-0.102***
		(0.026)		(0.033)	(0.031)	(0.031)
Δ entry 06-10			1.384***	0.853*		1.180***
			(0.400)	(0.464)		(0.417)
Δ young 06-10					0.539**	
					(0.253)	
Δ Small bus loans						0.195***
						(0.053)
Observations	48	48	48	48	48	48
R-squared	0.122	0.030	0.232	0.318	0.335	0.487
Weighted	y	y	y	y	y	y

Notes: This table reports results from the following panel regressions:

$$\Delta y_i^{10-12} = \alpha + \beta_1 \Delta y_i^{06-10} + \beta_2 \Delta entry_i^{06-10} + \beta_3 \Delta HPI_i^{06-10} + \beta_4 DI_i^{06} + \beta_5 \Delta SBL_i^{06-10}.$$

Δy_i^{10-12} denotes the growth rate of employment in the between 2006 and 2010, Δy_i^{06-10} denotes the growth rate of employment during 2006-2010. $\Delta entry_i^{06-10}$ denotes the change in entry rate between 2006 and 2010, ΔHPI_i^{06-10} denotes the change in the house price index between 2006 and 2010 and DI_i^{06} denotes the debt to income ration in 2006. ΔSBL_i^{06-10} denotes the change in small business lending between 2006 and 2010. Subscript i denotes state. The table reports the coefficients, the number of observations, and the R^2. All variables are annual. The number of observations varies in each regression because of data availability. Three stars (***) denote significance at the 1% confidence level, while two stars (**) and one (*) star denote significance at the 5% and 10% confidence levels.

level private sector employment growth during the recovery. The findings for the employment recovery are similar to the GDP findings but the decline in entry remains significant throughout the regressions. Thus the decline in entry appears to have a more prominent role in explaining the employment recovery. The magnitude of the coefficient for the decline in entry are comparable in magnitude to the findings for GDP. The decline in house prices,

however, has essentially no predictive effect on employment growth during the recovery, columns (2, 4, 6).

In summary, we find that the decline in business creation during the Great recession has significant predictive power for the economic recovery even if we control for other factors.

5.3 Recovery: Cross-MSA Evidence

In this section we study if the findings on the state level hold true at the MSA level.Figure 10 depicts post recession GDP growth against the candidates explanations. Panel (a) and (b) show our two measures of decline in business formation during the recession. Again, similar to the Figure 8 we see that MSAs with larger declines in business formation exhibited a slower recovery. For house price declines and the debt to income ratio, however, the findings appear to be weaker than for new business formation.

Generally, there is much more heterogeneity at the MSA level than at the state level. For example, the MSA of Kokomo, IN is one of the fastest growing MSAs during the recovery with employment growing by more than 40% in 2010 alone. This is due to GM opening a factory in this MSA with 2500 employees and the fact that Kokomo has less than 50000 inhabitants. It is not surprising that we observe much more heterogeneity at the MSA level.

Table 3 shows the results for GDP per capita growth at the MSA level. While individually the explanatory variables are significant, they loose their statistical significance if one jointly includes them. One possible explanation for the weaker results is the way the BEA calculates GDP at the MSA level. Essentially the BEA uses state level GDP in combination with county level industry earnings to construct MSA level GDP. However, industry earnings represent about 64 percent of GDP and this calculation of MSA level GDP is therefore bound to have significant measurement errors. On a more positive note, the results for GDP show that the effect of entry is about half of the effect we identified at the state level. We can thus confidently say the effect of new business formation for GDP growth is of the same order of magnitude on the state and MSA level.

Table 4 shows our findings for employment growth for the MSAs. Employment is measured directly at the firm and therefore we would expect much less measurement errors than for GDP. The results confirm that our findings for firm entry are highly significant and in the same order of magnitude as we previously documented.

Table 3: Explaining MSA Level GDP Growth 2010-2012

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Δ GDP 10-12 winsordep					
Δ RGDP PC 06-10	0.072***	0.036	0.039*	0.032	0.025	0.038*
	(0.020)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
Debt/Inc 06	-0.049***			-0.065***	-0.058***	-0.074***
	(0.012)			(0.014)	(0.014)	(0.015)
Δ HPI 06-10		0.041***		0.047***	0.035**	0.022
		(0.011)		(0.014)	(0.014)	(0.016)
Δ entry 06-10			0.717***	0.250		0.293
			(0.164)	(0.194)		(0.229)
Δ young 06-10					0.342***	
					(0.121)	
Δ Small bus loans						0.164***
						(0.033)
Observations	371	371	349	349	349	333
R-squared	0.068	0.064	0.081	0.140	0.155	0.203
Weighted	y	y	y	y	y	y
Winsor	1−99	1−99	1−99	1−99	1−99	1−99

Notes: This table reports results from the following panel regressions:

$$\Delta y_i^{10-12} = \alpha + \beta_1 \Delta y_i^{06-10} + \beta_2 \Delta entry_i^{06-10} + \beta_3 \Delta HPI_i^{06-10} + \beta_4 DI_i^{06} + \beta_5 \Delta SBL_i^{06-10}.$$

Δy_i^{10-12} denotes the growth rate of GDP in the between 2006 and 2010, Δy_i^{06-10} denotes the growth rate of GDP during 2006-2010. $\Delta entry_i^{06-10}$ denotes the change in entry rate between 2006 and 2010, ΔHPI_i^{06-10} denotes the change in the house price index between 2006 and 2010 and DI_i^{06} denotes the debt to income ration in 2006. ΔSBL_i^{06-10} denotes the change in small business lending between 2006 and 2010. Subscript i denotes MSA. The table reports the coefficients, the number of observations, and the R^2. All variables are annual and winsorized (1 99). The number of observations varies in each regression because of data availability. Three stars (***) denote significance at the 1% confidence level, while two stars (**) and one (*) star denote significance at the 5% and 10% confidence levels.

Table 4: Explaining MSA Level Employment Growth 2010-2012

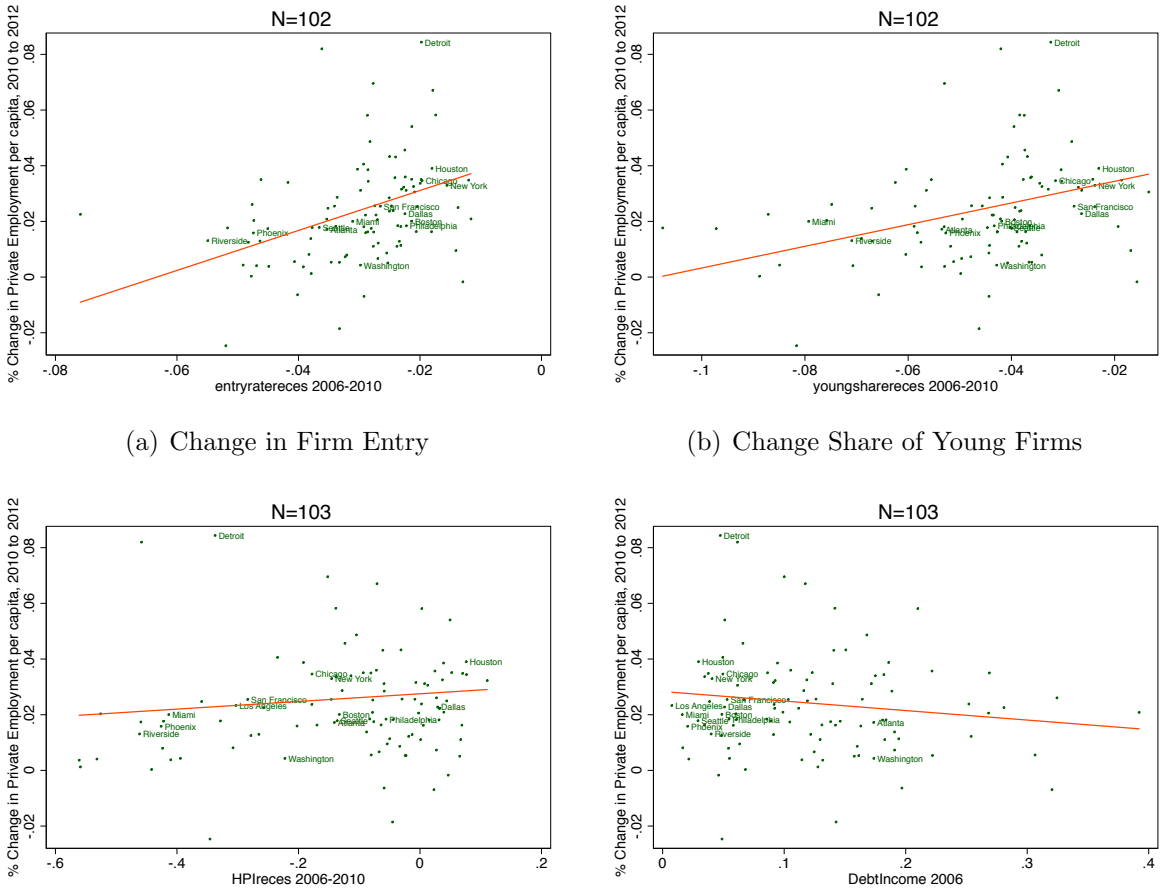
	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Δ N 10-12 winsordep					
Δ N 06-10	-0.019	-0.010	-0.072***	-0.050**	-0.024	-0.063***
	(0.022)	(0.024)	(0.023)	(0.022)	(0.023)	(0.021)
Debt/Inc 06	-0.047***			-0.018	-0.034***	-0.025**
	(0.011)			(0.012)	(0.012)	(0.011)
Δ HPI 06-10		-0.013		-0.043***	-0.021*	-0.034***
		(0.009)		(0.011)	(0.012)	(0.013)
Δ entry 06-10			0.821***	1.094***		0.943***
			(0.136)	(0.159)		(0.178)
Δ young 06-10					0.296***	
					(0.103)	
Δ Small bus loans						0.071***
						(0.025)
Observations	349	349	349	349	349	333
R-squared	0.052	0.008	0.098	0.167	0.075	0.144
Weighted	y	y	y	y	y	y
Winsor	1−99	1−99	1−99	1−99	1−99	1−99

Notes: This table reports results from the following panel regressions:

$$\Delta y_i^{10-12} = \alpha + \beta_1 \Delta y_i^{06-10} + \beta_2 \Delta entry_i^{06-10} + \beta_3 \Delta HPI_i^{06-10} + \beta_4 DI_i^{06} + \beta_5 \Delta SBL_i^{06-10}.$$

Δy_i^{10-12} denotes the growth rate of employment in the between 2006 and 2010, Δy_i^{06-10} denotes the growth rate of employment during 2006-2010. $\Delta entry_i^{06-10}$ denotes the change in entry rate between 2006 and 2010, ΔHPI_i^{06-10} denotes the change in the house price index between 2006 and 2010 and DI_i^{06} denotes the debt to income ration in 2006. ΔSBL_i^{06-10} denotes the change in small business lending between 2006 and 2010. Subscript i denotes MSA. The table reports the coefficients, the number of observations, and the R^2. All variables are annual and winsorized (1 99). The number of observations varies in each regression because of data availability. Three stars (***) denote significance at the 1% confidence level, while two stars (**) and one (*) star denote significance at the 5% and 10% confidence levels.

Figure 9: **MSA-level Evidence: Forecasting the Economic Recovery**



(a) Change in Firm Entry

(b) Change Share of Young Firms

(c) Change HPI

(d) Debt to GDP per capita in 2006

Notes: The figures display the relationship between the GDP per capita recovery and various explanatory variables. The figure include all MSAs with available data with a population of at least 500.000. All MSA are weighted by size.

5.3.1 Evidence across Industries

While the financial crisis affected all industries, it did not affect all of them equally hard. In this section we examine the effect of the decline in entry on specific industries. However, the BDS data itself contain industry employment only at the national level.

To construct industry employment at the MSA level we thus rely on data from the County Business Patterns (CBP). The CBP does not disclose data which would allow identification of individual business. Employment by county and industry is thus sometimes not provided or provided in intervals. We follow the methodology of David, Dorn and Hanson (2013) to impute employment at the county-industry level and then aggregate up to MSA

Table 5: MSA Employment excluding construction

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Δ N ex. construction 10-12					
Δ N ex const. 06-1	-0.074***	-0.078***	-0.099***	-0.088***	-0.079***	-0.078***
	(0.019)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Debt/Inc 2006	-0.034***			-0.022**	-0.032***	-0.030***
	(0.009)			(0.010)	(0.010)	(0.011)
Δ HPI 06-10		-0.002		-0.020**	-0.006	-0.017
		(0.007)		(0.009)	(0.010)	(0.012)
Δ entry 06-10			0.549***	0.666***		0.635***
			(0.112)	(0.137)		(0.170)
Δ young 06-10					0.182**	
					(0.088)	
Δ Small bus loans						0.021
						(0.025)
Observations	371	371	349	349	349	333
R-squared	0.079	0.042	0.105	0.145	0.098	0.119
Weighted	y	y	y	y	y	y
Winsor	1−99	1−99	1−99	1−99	1−99	1−99

Notes: This table reports results from the following panel regressions:

$$\Delta y_i^{10-12} = \alpha + \beta_1 \Delta y_i^{06-10} + \beta_2 \Delta entry_i^{06-10} + \beta_3 \Delta HPI_i^{06-10} + \beta_4 DI_i^{06} + \beta_5 \Delta SBL_i^{06-10}.$$

Δy_i^{10-12} denotes the growth rate of employment (excluding construction) in the between 2006 and 2010, Δy_i^{06-10} denotes the growth rate of employment (excluding construction) during 2006-2010. $\Delta entry_i^{06-10}$ denotes the change in entry rate between 2006 and 2010, ΔHPI_i^{06-10} denotes the change in the house price index between 2006 and 2010 and DI_i^{06} denotes the debt to income ration in 2006. ΔSBL_i^{06-10} denotes the change in small business lending between 2006 and 2010. Subscript i denotes MSA. The table reports the coefficients, the number of observations, and the R^2. All variables are annual and winsorized (1 99). The number of observations varies in each regression because of data availability. Three stars (***) denote significance at the 1% confidence level, while two stars (**) and one (*) star denote significance at the 5% and 10% confidence levels.

level.[5] We then consider the 8 major sectors that are provided in the BDS data at the na-

[5]For details we refer the reader to the Appendix of David et al. (2013). We differ in that we do the imputations at the 6 digits NAICS level. However, this does not yield substantial differences.

tional level. Detailed results for all eight industries individually can be found in Appendix A.

Table 6 shows the results for all non-construction industries in the sample. The table confirms that our main finding is not driven by construction alone but much more broad based across industries. Overall the coefficient is of the same magnitude as in our previous regressions.

5.4 Impulse Response to Entry Shock

We now consider the effect of a shock to entry using linear projection methods as introduced by Jorda (2005). Unlike the previous part of our analysis this part focusses not exclusively and the financial crisis but examines the effect of a change in entry on macroeconomic outcomes over the entire sample of available data, starting in 1978. We focus on data at the state level as GDP data at the MSA level are only available since the early 2000s. To estimate the IRF we estimate for k leads the following panel regression[6]

$$\Delta \ log \ GDP_{i,t\to t+k} = \alpha_i^{(k)} + \delta_t^{(k)} + b^{(k)} \Delta \ Entry \ rate_{i,t} + \sum_{j=0}^{J} \Delta \ log \ GDP_{i,t-j} + \varepsilon_{i,t}^{(k)} \qquad (2)$$

In practice we set $J = 2$. We follow Auerbach and Gorodnichenko (2011) and cluster the standard errors by time and also take into account that the regressions were run a common set of data. The set of impulse response functions is shown in Figure 10. We show the IRF of the entry rate to an increase in the entry rate because entry is persistent and high entry today implies higher entry tomorrow.
The persistence in entry is also what causes the effect on macro quantities (GDP and employment) to be increasing in the first two to three years after the shock. Along with the point estimate the graphs show the 90th percentile confidence interval and thus illustrate that an increase in entry has a persistent effect on outcomes, in particular GDP.

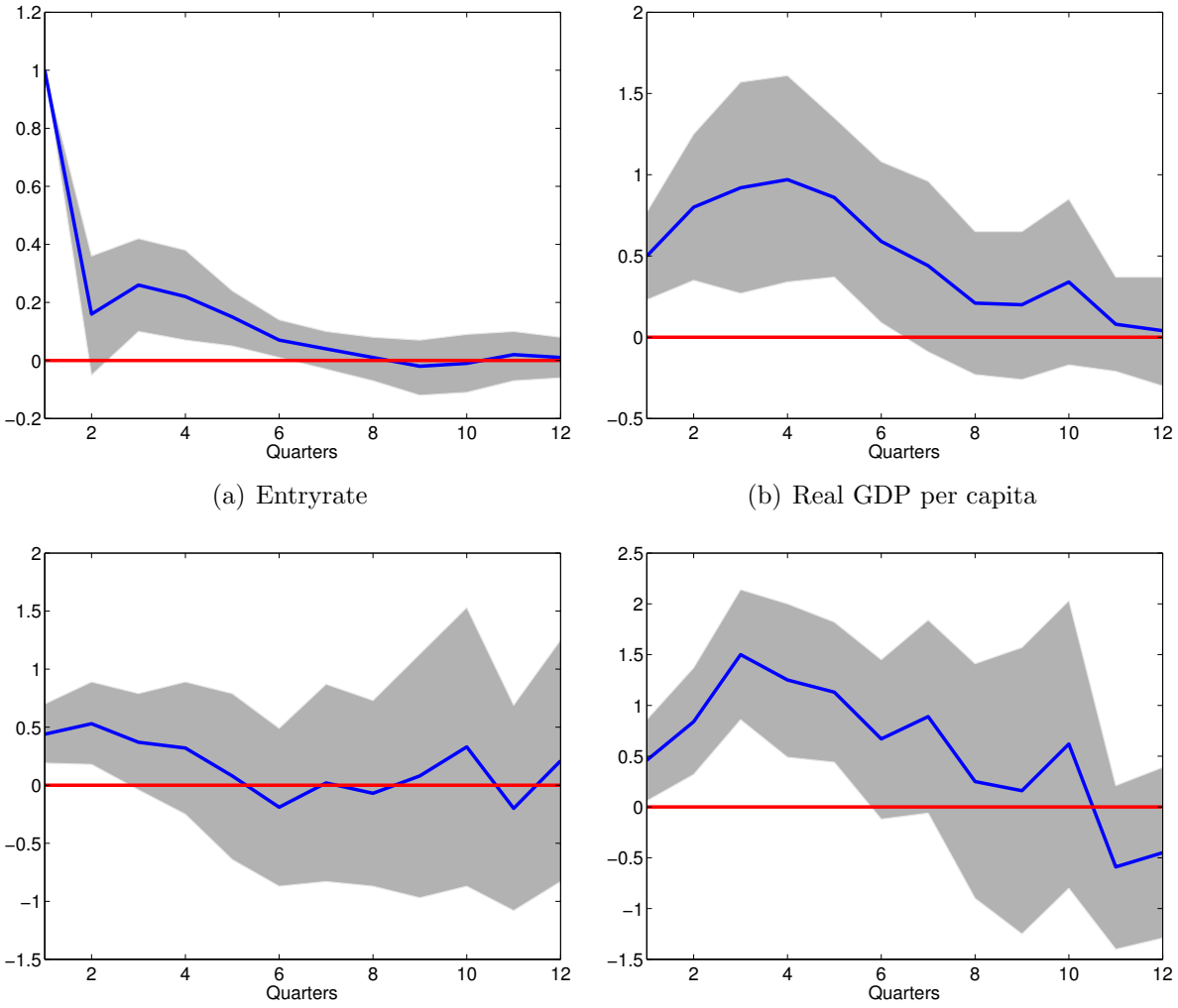
5.4.1 Recovery: Instrumental Variable Evidence

One obvious concern is the potential endogeneity of entry. While we use the decline in entry during the recession in our regressions to predict the recovery, it is possible that entry could capture expectations of future growth. In this section we control for this potential endo-

[6]For the panel labeled entry rate the regressions are slightly different, in particular for entry we consider

$$\Delta \ Entry \ Rate_{i,t+k} = \alpha_i^{(k)} + \delta_t^{(k)} + b^{(k)} \Delta \ Entry \ rate_{i,t} + \varepsilon_{i,t}^{(k)} \qquad (1)$$

Figure 10: **Impulse Response to a shock to Entry**



(a) Entryrate

(b) Real GDP per capita

(c) Private Employment per Capita

(d) TFP

Notes: The figures displays the impulse response and 90% confidence bands of state level entry rate, GDP, private employment and TFP to an increase in the entry rate for data from 1977-2011. Standard errors are clustered by year.

geneity with two different instrumental variable approaches. Our first instrumental variable is based on demographics while the second instrumental variable is based on the industry composition of a state.

One potential instrument is the widely used Bartik instrument, see Bartik (1991). In the context of our question we construct the Bartik instrument by combining the national

industry decline in entry during the recession with industry pre-recession market share, i.e.

$$\widehat{IV}_{jt}^{entry} = \sum_i s_{i,2006}\ entry_{it} \tag{3}$$

Table 6: MSA Employment Instrument

	(1)	(2)	(3)
	Dependent variable: Δ N 10-12		
Δ N 06-10	0.02	-0.00	-0.00
	(0.03)	(0.02)	(0.02)
Debt/Inc 06	-0.05***	-0.04***	-0.04***
	(0.01)	(0.01)	(0.01)
Δ HPI 06-10	0.01	0.02*	0.02*
	(0.01)	(0.01)	(0.01)
Δ Small bus loans 06-10		0.06**	0.06**
		(0.03)	(0.03)
Δ Entry IV	1.42**	1.13*	1.13*
	(0.59)	(0.58)	(0.58)
Observations	371	333	333
R^2	0.09	0.12	0.12
Weighted	y	y	y
Winsor	1−99	1−99	1−99

Notes: This table reports results from the following panel regressions:

$$\Delta y_i^{10-12} = \alpha + \beta_1 \Delta y_i^{06-10} + \beta_2 \Delta entryIV_i^{06-10} + \beta_3 \Delta HPI_i^{06-10} + \beta_4 DI_i^{06} + \beta_5 \Delta SBL_i^{06-10}.$$

Δy_i^{10-12} denotes the growth rate of employment (excluding construction) in the between 2006 and 2010, Δy_i^{06-10} denotes the growth rate of employment (excluding construction) during 2006-2010. $\Delta entry_i^{06-10}$ denotes the change in entry rate between 2006 and 2010, ΔHPI_i^{06-10} denotes the change in the house price index between 2006 and 2010 and DI_i^{06} denotes the debt to income ration in 2006. ΔSBL_i^{06-10} denotes the change in small business lending between 2006 and 2010. Subscript i denotes MSA. The table reports the coefficients, the number of observations, and the R^2. All variables are annual and winsorized (1 99). The number of observations varies in each regression because of data availability. Three stars (***) denote significance at the 1% confidence level, while two stars (**) and one (*) star denote significance at the 5% and 10% confidence levels.

6 Conclusion

This paper examines the quantitative importance of the decline in entry for the speed of the economic recovery after the financial crisis of 2007-2009. We showed using both county and MSA level data that counties with a larger decline in entry had, on average, a slower recovery even if controlling for other important factors such as the depth of the recession, the debt-to-income ratio or the decline in house prices during the recession. Furthermore, we showed that the decline in entry has a broad based effect on many industries and is not driven by construction per se. Finally, we showed using local linear regressions that a change in entry has a persistent effect on macroeconomic outcomes.

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- Supplementary Online Appendix -
NOT FOR PUBLICATION

Appendix A Detailed Cross-MSA Industry Evidence

This appendix provides regression results for eight large industries:

$$\Delta y_i^{10-12} = \alpha + \beta_1 \Delta y_i^{06-10} + \beta_2 \Delta entry_i^{06-10} + \beta_3 \Delta HPI_i^{06-10} + \beta_4 DI_i^{06} + \beta_5 \Delta SBL_i^{06-10}.$$

Δy_i^{10-12} denotes the growth rate of employment in the between 2006 and 2010, Δy_i^{06-10} denotes the growth rate of employment during 2006-2010. $\Delta entry_i^{06-10}$ denotes the change in entry rate between 2006 and 2010, ΔHPI_i^{06-10} denotes the change in the house price index between 2006 and 2010 and DI_i^{06} denotes the debt to income ration in 2006. ΔSBL_i^{06-10} denotes the change in small business lending between 2006 and 2010. Subscript i denotes MSA. The table reports the coefficients, the number of observations, and the R^2. All variables are annual and winsorized (1 99).

Table 7: MSA Agriculture, Forestry, & Fishing

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Δ N 10-12					
Δ N 06-10	-0.013	-0.073**	-0.089***	-0.103***	-0.064*	-0.102***
	(0.032)	(0.034)	(0.031)	(0.033)	(0.035)	(0.033)
Debt/Inc 06	0.012			0.084**	0.028	0.110***
	(0.036)			(0.038)	(0.040)	(0.039)
Δ HPI 06-10		0.129***		-0.026	0.041	0.013
		(0.031)		(0.036)	(0.039)	(0.038)
Δ entry 06-10			3.526***	3.909***		3.879***
			(0.423)	(0.519)		(0.517)
Δ young 06-10					1.250***	
					(0.339)	
Δ Small bus loans						-0.286***
						(0.085)
Observations	371	371	350	350	350	346
R^2	0.001	0.046	0.167	0.179	0.080	0.207
Weighted	y	y	y	y	y	y
Winsor	1−99	1−99	1−99	1−99	1−99	1−99

Notes: This table reports results from the following panel regressions:

$$\Delta y_i^{10-12} = \alpha + \beta_1 \Delta y_i^{06-10} + \beta_2 \Delta entry_i^{06-10} + \beta_3 \Delta HPI_i^{06-10} + \beta_4 DI_i^{06} + \beta_5 \Delta SBL_i^{06-10}.$$

Δy_i^{10-12} denotes the growth rate of employment in the between 2006 and 2010, Δy_i^{06-10} denotes the growth rate of employment during 2006-2010. $\Delta entry_i^{06-10}$ denotes the change in entry rate between 2006 and 2010, ΔHPI_i^{06-10} denotes the change in the house price index between 2006 and 2010 and DI_i^{06} denotes the debt to income ration in 2006. ΔSBL_i^{06-10} denotes the change in small business lending between 2006 and 2010. Subscript i denotes MSA. The table reports the coefficients, the number of observations, and the R^2. All variables are annual and winsorized (1 99). The number of observations varies in each regression because of data availability. Three stars (***) denote significance at the 1% confidence level, while two stars (**) and one (*) star denote significance at the 5% and 10% confidence levels.

Table 8: MSA Mining

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Δ N 10-12					
Debt/Inc 06	0.490***			0.286	0.287	0.256
	(0.164)			(0.192)	(0.191)	(0.198)
Δ N 06-10	-0.008	-0.009	0.000	-0.013	-0.013	-0.016
	(0.023)	(0.023)	(0.024)	(0.024)	(0.024)	(0.024)
Δ HPI 06-10		0.551***		0.552***	0.553***	0.644***
		(0.131)		(0.181)	(0.182)	(0.192)
Δ entry 06-10			2.496	-1.885		-2.043
			(2.080)	(2.621)		(2.623)
Δ young 06-10					-1.182	
					(1.640)	
Δ Small bus loans						-0.547
						(0.440)
Observations	371	371	350	350	350	346
R^2	0.024	0.046	0.004	0.057	0.057	0.059
Weighted	y	y	y	y	y	y
Winsor	1−99	1−99	1−99	1−99	1−99	1−99

Notes: This table reports results from the following panel regressions:

$$\Delta y_i^{10-12} = \alpha + \beta_1 \Delta y_i^{06-10} + \beta_2 \Delta entry_i^{06-10} + \beta_3 \Delta HPI_i^{06-10} + \beta_4 DI_i^{06} + \beta_5 \Delta SBL_i^{06-10}.$$

Δy_i^{10-12} denotes the growth rate of employment in the between 2006 and 2010, Δy_i^{06-10} denotes the growth rate of employment during 2006-2010. $\Delta entry_i^{06-10}$ denotes the change in entry rate between 2006 and 2010, ΔHPI_i^{06-10} denotes the change in the house price index between 2006 and 2010 and DI_i^{06} denotes the debt to income ration in 2006. ΔSBL_i^{06-10} denotes the change in small business lending between 2006 and 2010. Subscript i denotes MSA. The table reports the coefficients, the number of observations, and the R^2. All variables are annual and winsorized (1 99). The number of observations varies in each regression because of data availability. Three stars (***) denote significance at the 1% confidence level, while two stars (**) and one (*) star denote significance at the 5% and 10% confidence levels.

Table 9: MSA Construction

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Δ N 10-12					
Debt/Inc 06 Δ N 06-09	-0.060**			0.001	-0.019	-0.007
	(0.030)			(0.034)	(0.035)	(0.035)
Δ N 06-10	0.014	0.036	-0.108***	-0.061	-0.017	-0.055
	(0.025)	(0.036)	(0.032)	(0.039)	(0.039)	(0.040)
Δ HPI 06-10		-0.033		-0.073*	-0.060	-0.103**
		(0.034)		(0.038)	(0.040)	(0.040)
Δ entry 06-10			2.625***	2.823***		2.822***
			(0.458)	(0.486)		(0.488)
Δ young 06-10					1.120***	
					(0.303)	
Δ Small bus loans						0.177**
						(0.077)
Observations	371	371	350	350	350	346
R^2	0.012	0.003	0.087	0.099	0.048	0.110
Weighted	y	y	y	y	y	y
Winsor	1−99	1−99	1−99	1−99	1−99	1−99

Notes: This table reports results from the following panel regressions:

$$\Delta y_i^{10-12} = \alpha + \beta_1 \Delta y_i^{06-10} + \beta_2 \Delta entry_i^{06-10} + \beta_3 \Delta HPI_i^{06-10} + \beta_4 DI_i^{06} + \beta_5 \Delta SBL_i^{06-10}.$$

Δy_i^{10-12} denotes the growth rate employment in the between 2006 and 2010, Δy_i^{06-10} denotes the growth rate of employment during 2006-2010. $\Delta entry_i^{06-10}$ denotes the change in entry rate between 2006 and 2010, ΔHPI_i^{06-10} denotes the change in the house price index between 2006 and 2010 and DI_i^{06} denotes the debt to income ration in 2006. ΔSBL_i^{06-10} denotes the change in small business lending between 2006 and 2010. Subscript i denotes MSA. The table reports the coefficients, the number of observations, and the R^2. All variables are annual and winsorized (1 99). The number of observations varies in each regression because of data availability. Three stars (***) denote significance at the 1% confidence level, while two stars (**) and one (*) star denote significance at the 5% and 10% confidence levels.

Table 10: MSA Manufacturing

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Δ N 10-12					
Debt/Inc 06	0.068**			0.047	0.049	0.040
	(0.030)			(0.036)	(0.035)	(0.037)
Δ N 06-10	-0.151***	-0.160***	-0.146***	-0.161***	-0.161***	-0.165***
	(0.039)	(0.040)	(0.041)	(0.041)	(0.041)	(0.041)
Δ HPI 06-10		0.050**		0.049	0.045	0.021
		(0.025)		(0.034)	(0.034)	(0.036)
Δ entry 06-10			-0.001	-0.346		-0.320
			(0.381)	(0.485)		(0.486)
Δ young 06-10					-0.161	
					(0.304)	
Δ Small bus loans						0.193**
						(0.082)
Observations	371	371	350	350	350	346
R^2	0.049	0.047	0.036	0.055	0.055	0.070
Weighted	y	y	y	y	y	y
Winsor	1−99	1−99	1−99	1−99	1−99	1−99

Notes: This table reports results from the following panel regressions:

$$\Delta y_i^{10-12} = \alpha + \beta_1 \Delta y_i^{06-10} + \beta_2 \Delta entry_i^{06-10} + \beta_3 \Delta HPI_i^{06-10} + \beta_4 DI_i^{06} + \beta_5 \Delta SBL_i^{06-10}.$$

Δy_i^{10-12} denotes the growth rate of employment in the between 2006 and 2010, Δy_i^{06-10} denotes the growth rate of employment during 2006-2010. $\Delta entry_i^{06-10}$ denotes the change in entry rate between 2006 and 2010, ΔHPI_i^{06-10} denotes the change in the house price index between 2006 and 2010 and DI_i^{06} denotes the debt to income ration in 2006. ΔSBL_i^{06-10} denotes the change in small business lending between 2006 and 2010. Subscript i denotes MSA. The table reports the coefficients, the number of observations, and the R^2. All variables are annual and winsorized (1 99). The number of observations varies in each regression because of data availability. Three stars (***) denote significance at the 1% confidence level, while two stars (**) and one (*) star denote significance at the 5% and 10% confidence levels.

Table 11: MSA Transportation & Public Utilities

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Δ N 10-12					
Debt/Inc 06	0.025			0.016	0.026	0.017
	(0.032)			(0.037)	(0.037)	(0.039)
Δ N 06-10	-0.118***	-0.118***	-0.107***	-0.111***	-0.112***	-0.111***
	(0.039)	(0.039)	(0.040)	(0.041)	(0.041)	(0.041)
Δ HPI 06-10		0.024		0.015	-0.002	-0.014
		(0.026)		(0.035)	(0.035)	(0.037)
Δ entry 06-10			0.193	0.088		0.191
			(0.394)	(0.509)		(0.511)
Δ young 06-10					0.303	
					(0.317)	
Δ Small bus loans						0.171**
						(0.085)
Observations	371	371	350	350	350	346
R^2	0.024	0.025	0.020	0.022	0.024	0.034
Weighted	y	y	y	y	y	y
Winsor	1−99	1−99	1−99	1−99	1−99	1−99

Notes: This table reports results from the following panel regressions:

$$\Delta y_i^{10-12} = \alpha + \beta_1 \Delta y_i^{06-10} + \beta_2 \Delta entry_i^{06-10} + \beta_3 \Delta HPI_i^{06-10} + \beta_4 DI_i^{06} + \beta_5 \Delta SBL_i^{06-10}.$$

Δy_i^{10-12} denotes the growth rate of employment in the between 2006 and 2010, Δy_i^{06-10} denotes the growth rate of employment during 2006-2010. $\Delta entry_i^{06-10}$ denotes the change in entry rate between 2006 and 2010, ΔHPI_i^{06-10} denotes the change in the house price index between 2006 and 2010 and DI_i^{06} denotes the debt to income ration in 2006. ΔSBL_i^{06-10} denotes the change in small business lending between 2006 and 2010. Subscript i denotes MSA. The table reports the coefficients, the number of observations, and the R^2. All variables are annual and winsorized (1 99). The number of observations varies in each regression because of data availability. Three stars (***) denote significance at the 1% confidence level, while two stars (**) and one (*) star denote significance at the 5% and 10% confidence levels.

Table 12: MSA Wholesale Trade

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Δ N 10-12					
Debt/Inc 06	0.027			0.026	0.021	0.017
	(0.026)			(0.030)	(0.030)	(0.032)
Δ N 06-10	-0.142***	-0.152***	-0.154***	-0.154***	-0.151***	-0.162***
	(0.034)	(0.034)	(0.035)	(0.035)	(0.035)	(0.036)
Δ HPI 06-10		0.045**		0.020	0.029	0.009
		(0.021)		(0.029)	(0.029)	(0.031)
Δ entry 06-10			0.688**	0.546		0.579
			(0.325)	(0.415)		(0.420)
Δ young 06-10					0.211	
					(0.260)	
Δ Small bus loans						0.082
						(0.072)
Observations	371	371	350	350	350	346
R^2	0.050	0.059	0.059	0.065	0.062	0.067
Weighted	y	y	y	y	y	y
Winsor	1−99	1−99	1−99	1−99	1−99	1−99

Notes: This table reports results from the following panel regressions:

$$\Delta y_i^{10-12} = \alpha + \beta_1 \Delta y_i^{06-10} + \beta_2 \Delta entry_i^{06-10} + \beta_3 \Delta HPI_i^{06-10} + \beta_4 DI_i^{06} + \beta_5 \Delta SBL_i^{06-10}.$$

Δy_i^{10-12} denotes the growth rate of employment in the between 2006 and 2010, Δy_i^{06-10} denotes the growth rate of employment during 2006-2010. $\Delta entry_i^{06-10}$ denotes the change in entry rate between 2006 and 2010, ΔHPI_i^{06-10} denotes the change in the house price index between 2006 and 2010 and DI_i^{06} denotes the debt to income ration in 2006. ΔSBL_i^{06-10} denotes the change in small business lending between 2006 and 2010. Subscript i denotes MSA. The table reports the coefficients, the number of observations, and the R^2. All variables are annual and winsorized (1 99). The number of observations varies in each regression because of data availability. Three stars (***) denote significance at the 1% confidence level, while two stars (**) and one (*) star denote significance at the 5% and 10% confidence levels.

Table 13: MSA Retail Trade

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Δ N 10-12					
Debt/Inc 06	-0.047***			-0.011	-0.030***	-0.003
	(0.009)			(0.010)	(0.011)	(0.010)
Δ N 06-10	0.007	0.033	-0.030	-0.022	0.014	-0.023
	(0.021)	(0.021)	(0.023)	(0.021)	(0.022)	(0.021)
Δ HPI 06-10		-0.036***		-0.071***	-0.041***	-0.056***
		(0.008)		(0.010)	(0.010)	(0.010)
Δ entry 06-10			0.590***	1.161***		1.136***
			(0.128)	(0.144)		(0.142)
Δ young 06-10					0.245**	
					(0.096)	
Δ Small bus loans						-0.107***
						(0.023)
Observations	371	371	350	350	350	346
R^2	0.065	0.055	0.058	0.235	0.109	0.280
Weighted	y	y	y	y	y	y
Winsor	1−99	1−99	1−99	1−99	1−99	1−99

Notes: This table reports results from the following panel regressions:

$$\Delta y_i^{10-12} = \alpha + \beta_1 \Delta y_i^{06-10} + \beta_2 \Delta entry_i^{06-10} + \beta_3 \Delta HPI_i^{06-10} + \beta_4 DI_i^{06} + \beta_5 \Delta SBL_i^{06-10}.$$

Δy_i^{10-12} denotes the growth rate of employment in the between 2006 and 2010, Δy_i^{06-10} denotes the growth rate of employment during 2006-2010. $\Delta entry_i^{06-10}$ denotes the change in entry rate between 2006 and 2010, ΔHPI_i^{06-10} denotes the change in the house price index between 2006 and 2010 and DI_i^{06} denotes the debt to income ration in 2006. ΔSBL_i^{06-10} denotes the change in small business lending between 2006 and 2010. Subscript i denotes MSA. The table reports the coefficients, the number of observations, and the R^2. All variables are annual and winsorized (1 99). The number of observations varies in each regression because of data availability. Three stars (***) denote significance at the 1% confidence level, while two stars (**) and one (*) star denote significance at the 5% and 10% confidence levels.

Table 14: MSA Finance, Insurance, & Real Estate

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Δ N 10-12					
Debt/Inc 06	-0.033*			-0.018	-0.034	-0.023
	(0.020)			(0.023)	(0.023)	(0.023)
Δ N 06-10	-0.016	-0.017	-0.047*	-0.024	-0.017	-0.036
	(0.027)	(0.029)	(0.028)	(0.030)	(0.030)	(0.030)
Δ HPI 06-10		-0.011		-0.031	-0.009	-0.052**
		(0.018)		(0.022)	(0.022)	(0.023)
Δ entry 06-10			0.526**	0.707**		0.776**
			(0.252)	(0.310)		(0.310)
Δ young 06-10					0.090	
					(0.196)	
Δ Small bus loans						0.142***
						(0.052)
Observations	371	371	350	350	350	346
R^2	0.010	0.004	0.016	0.028	0.014	0.048
Weighted	y	y	y	y	y	y
Winsor	1−99	1−99	1−99	1−99	1−99	1−99

Notes: This table reports results from the following panel regressions:

$$\Delta y_i^{10-12} = \alpha + \beta_1 \Delta y_i^{06-10} + \beta_2 \Delta entry_i^{06-10} + \beta_3 \Delta HPI_i^{06-10} + \beta_4 DI_i^{06} + \beta_5 \Delta SBL_i^{06-10}.$$

Δy_i^{10-12} denotes the growth rate of employment in the between 2006 and 2010, Δy_i^{06-10} denotes the growth rate of employment during 2006-2010. $\Delta entry_i^{06-10}$ denotes the change in entry rate between 2006 and 2010, ΔHPI_i^{06-10} denotes the change in the house price index between 2006 and 2010 and DI_i^{06} denotes the debt to income ration in 2006. ΔSBL_i^{06-10} denotes the change in small business lending between 2006 and 2010. Subscript i denotes MSA. The table reports the coefficients, the number of observations, and the R^2. All variables are annual and winsorized (1 99). The number of observations varies in each regression because of data availability. Three stars (***) denote significance at the 1% confidence level, while two stars (**) and one (*) star denote significance at the 5% and 10% confidence levels.

Table 15: MSA Services

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Δ N 10-12					
Debt/Inc 06	-0.066***			-0.057***	-0.066***	-0.062***
	(0.012)			(0.014)	(0.014)	(0.015)
Δ N 06-10	-0.115***	-0.125***	-0.137***	-0.122***	-0.119***	-0.126***
	(0.025)	(0.026)	(0.026)	(0.025)	(0.025)	(0.025)
Δ HPI 06-10		-0.008		-0.015	-0.001	-0.027*
		(0.010)		(0.013)	(0.014)	(0.014)
Δ entry 06-10			0.556***	0.605***		0.620***
			(0.156)	(0.193)		(0.194)
Δ young 06-10					0.178	
					(0.122)	
Δ Small bus loans						0.086***
						(0.033)
Observations	371	371	350	350	350	346
R^2	0.132	0.066	0.100	0.165	0.147	0.176
Weighted	y	y	y	y	y	y
Winsor	1−99	1−99	1−99	1−99	1−99	1−99

Notes: This table reports results from the following panel regressions:

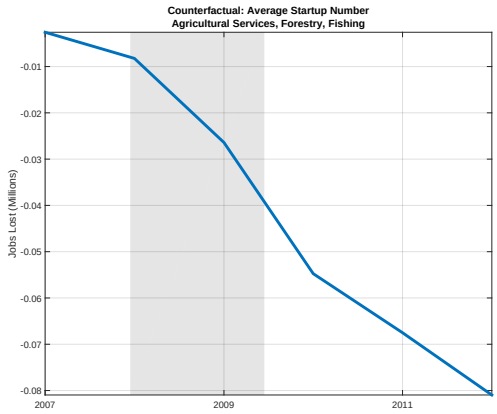
$$\Delta y_i^{10-12} = \alpha + \beta_1 \Delta y_i^{06-10} + \beta_2 \Delta entry_i^{06-10} + \beta_3 \Delta HPI_i^{06-10} + \beta_4 DI_i^{06} + \beta_5 \Delta SBL_i^{06-10}.$$

Δy_i^{10-12} denotes the growth rate of employment in the between 2006 and 2010, Δy_i^{06-10} denotes the growth rate of employment during 2006-2010. $\Delta entry_i^{06-10}$ denotes the change in entry rate between 2006 and 2010, ΔHPI_i^{06-10} denotes the change in the house price index between 2006 and 2010 and DI_i^{06} denotes the debt to income ration in 2006. ΔSBL_i^{06-10} denotes the change in small business lending between 2006 and 2010. Subscript i denotes MSA. The table reports the coefficients, the number of observations, and the R^2. All variables are annual and winsorized (1 99). The number of observations varies in each regression because of data availability. Three stars (***) denote significance at the 1% confidence level, while two stars (**) and one (*) star denote significance at the 5% and 10% confidence levels.

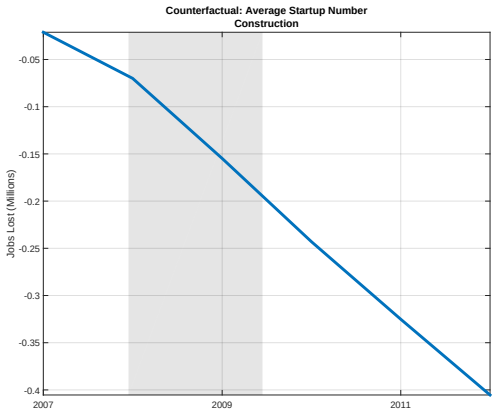
Appendix B Counterfactual by Industry

This shows the counterfactual of the decline in the entry rate by industry. Clearly the largest job losses occur in services and retail, which may not be surprising as these also constitute the largest sectors by employment.

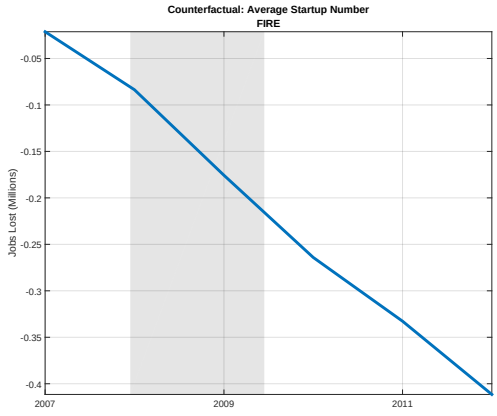
Figure A-1: **Decomposition Counterfactual**



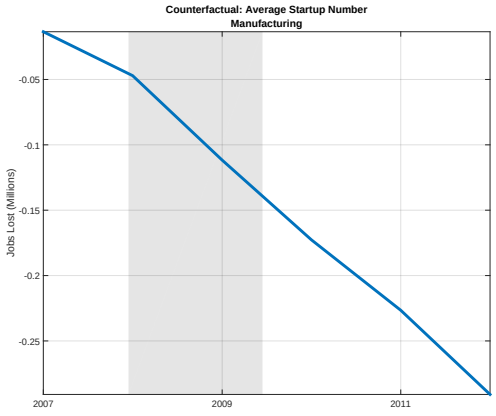
(a) Agriculture



(b) Construction

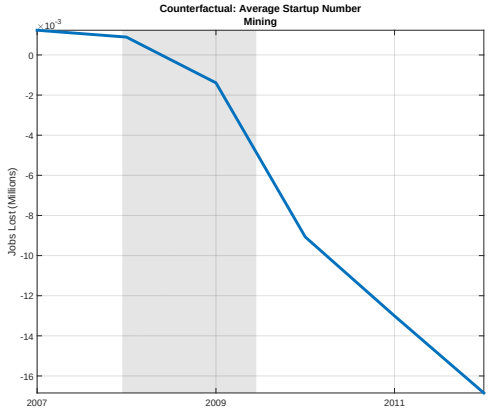


(c) FIRE

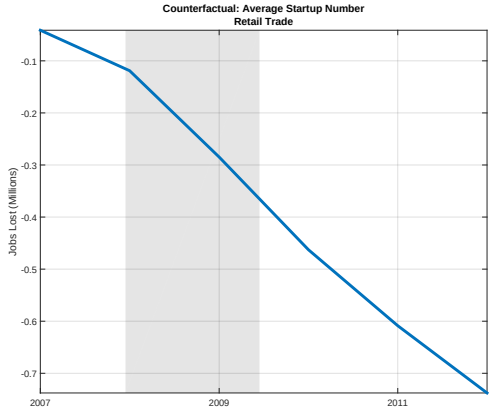


(d) Manufacturing

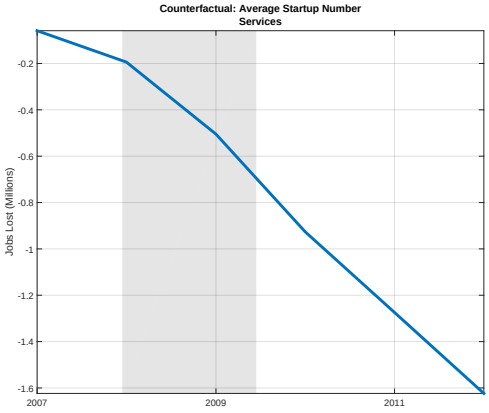
Figure A-2: **Decomposition Counterfactual cont.**



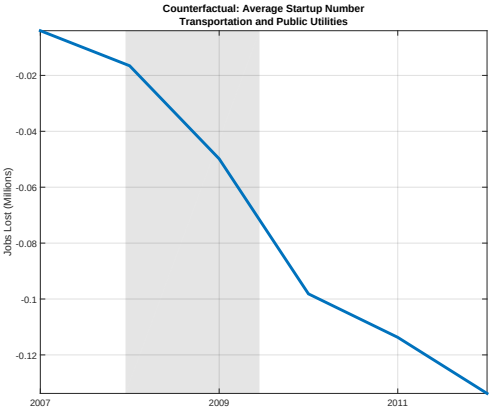
(a) Mining



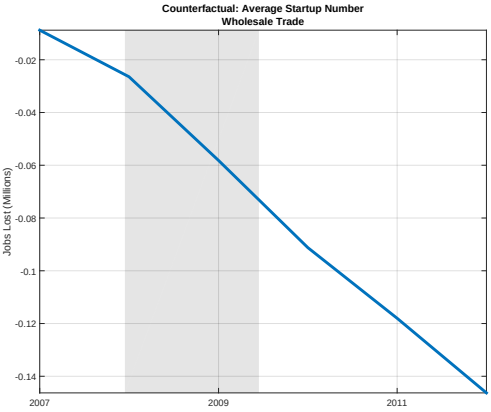
(b) Retail



(c) Services



(d) Transportation and Utilities



(e) Wholesale