Financing Constraints and Unemployment: Evidence from the Great Recession*

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This paper exploits the differential financing needs across industrial sectors and provides strong empirical evidence that financing constraints of small businesses in the United States are important in explaining the unemployment dynamics during the Great Recession. We show that workers in small firms are more likely to become unemployed during the 2007-09 financial crisis if they work in industries with high external financing needs. We find very similar results for the 1990-91 recession, but not for the 2001 recession, where only the former was associated with a reduction in loan supply. These findings further support the credit constraints hypothesis.

Keywords: Recession, external financial dependence, unemployment

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1 Introduction

Lending to small businesses in the United States has fallen dramatically since the onset of the Great Recession. Between the second quarter of 2008 and the second quarter of 2010, small business loans made by commercial banks declined by over $40 billion. Recent evidence suggests that much of the decline in new lending reflects changes in the supply of credit (Ivashina and Scharfstein 2010, Huang and Stephens 2011). Similarly, the responses to the Federal Reserve's Senior Loan Officer Opinion Survey on Bank Lending Practices indicate that banks have significantly tightened credit standards on Commercial and Industrial loans to small firms in thirteen consecutive quarters between 2007:Q1 and 2010:Q1.[1]

The decline in small business lending has received much attention from policy makers and the media, especially because of its potential link to the high rate of unemployment. Indeed, almost 80% of all firms in the U.S. have fewer than nine employees, and small firms employ roughly 50% of non-farm private sector workers.[2] Unlike larger firms, which have broader access to capital markets, small businesses are highly dependent on bank financing.[3] An important implication is that any kind of disruption in the flow of bank credit potentially may have significant real effects on the labor market.

In this paper we investigate the link between small-business lending and unemployment during the Great Recession in the United States. We identify credit supply effects by using industry-level measures of external financial dependence following the work of Rajan and Zingales (1998). If the reduction in small-business lending affects employment, then workers in smaller firms are more likely to be affected, primarily those working in firms that depend on

[1] Small business lending figures are from Consolidated Reports of Condition and Income, where small business loans are defined as loans with original amounts of $1 million or less. The responses to the Senior Loan Officer Opinion Survey on Bank Lending Practices are from Figure 1 in the October 2011 report.

[2] See the speech by Federal Reserve Chairman Bernanke on July 12, 2010 in Washington, D.C. and U.S. Census Bureau, Statistics of U.S. Businesses for 2007.

[3] See, for example, Petersen and Rajan 1994, Cole, Wolken, and Woodburn 1996, Berger, Klapper, and Udell 2001.

bank financing. We test our hypothesis by combining information on workers' firm size and employment status from the Current Population Survey with firms' financial information from Compustat and Survey of Small Business Finance. We then estimate the likelihood of becoming unemployed during the recent financial crisis across industrial sectors with different degrees of external financial dependence, separately for small and large firms.

Our approach is a triple difference-in-differences methodology which exploits variation across time, firm size, and firms' financing needs. The third difference is especially useful because it helps isolate factors that affect the likelihood of switching to unemployment differentially by firm size. It is possible, for example, that the reduction in the demand for goods and services during the recession fell disproportionately on small firms and therefore affected their likelihood of firing workers more than in large firms. Our estimates difference-out this potential effect as long as the disproportional decline in demand for small-firm's goods was similar across industries with different degrees of external financial dependence.

We find that during the Great Recession individuals are more likely to become unemployed if they work in sectors with high external financial dependence. In these sectors the impact of the recession on the likelihood of becoming unemployed is stronger for workers in smaller firms. By contrast, we do not find significant differences in unemployment propensity between workers of small and large firms in sectors with low external financial dependence. These results indicate that the reduction in bank lending to financially constrained firms during the recent financial crisis is associated with increased layoffs of workers. The findings are robust to different measures of external financial dependence.

While these results are consistent with a credit supply shock hypothesis, the biggest confounding factor is a reduction on the demand side. Potential borrowers may be reluctant to expand their businesses, or may consider downsizing because of changes in the demand for their goods and services during the recession. This would lead to a reduction in their demand for loans and an increase in layoffs of workers. This channel may explain our findings if

the reduction in the demand falls primarily on small, bank-dependent firms. Our methodology is specifically designed to address this issue as we divide firms by external financial dependence at the industry level. If small firms suffer larger declines in demand for their goods there is no evident reason this should primarily happen in sectors with high external financial dependence.

To provide further support to our interpretation of the findings, we repeat our analyses around the 2001 recession and the Savings and Loan (S&L) crisis that led to the 1990-91 recession. We exploit the fact that the 2001 recession did not originate in banks' balance sheets and was therefore not associated with a reduction in loan supply. However, the S&L crisis originated in the banking sector, like the Great Recession. It is therefore expected that if credit constraints are an important factor driving transitions to unemployment during a recession, they should be prevalent in 1990-91 but not in the 2001 recession.

The findings from the 2001 and 1990-1 recessions are fully consistent with our hypothesis. The estimates around the 2001 recession show almost identical changes in unemployment among small and large firms in industries with high and low external financial dependence. However, the estimates for the 1990-91 recession show very similar patterns to the estimates from the 2007-09 analysis, where transition to unemployment is more pronounced among small firms in industries with high external financial dependence. In our analysis of the 1990-91 recession, we also exploit regional variation and focus on New England. The S&L crisis was especially virulent in New England, a region that experienced sharp declines in real estate prices and whose banks faced large capital declines due to their exposure to real estate (Peek and Rosengren 1994). The results from this exercise show steeper increase in unemployment in New England as banks responded to their deteriorated financial condition by shrinking their balance sheets and reducing credit availability in a very similar fashion to the Great Recession.

All of these results are consistent with a credit supply contraction hypothesis and highlight the importance of banks' financial health for credit availability and their impact on the macroeconomy, along the lines of Bernanke (1983), Holmstrom and Tirole (1997), and Peek and Rosengren (2000). Our paper

also reinforces the conclusions in Gertler and Gilchrist (1994), who find that growth in sales, inventories, and bank debt of small manufacturing firms is more sensitive to monetary policy shocks than that of larger firms. Similarly, these findings are consistent with other studies that document the impact of credit constraints on investment spending (Fazzari, Hubbard, and Peterson 1988, Gertler and Hubbard 1988, Hoshi, Kashyap, and Scharfstein 1991, Whited 1992, Kashyap, Lamont, and Stein 1994, and Duchin, Ozbas, and Sensoy 2010) and employment (Sharpe 1994, Nickell and Nicolitsas 1999, Gozzi and Goetz 2010, Benmelech, Bergman, and Seru 2011, and Bascim, Baskaya, and Kilinc 2011). Methodologically, our paper differs from the latter papers in that we differentiate firms by both size and external financial dependence. Another difference is that we examine changes in employment focusing on the recent financial crisis as well as the 2001 and 1990-91 recessions.

The findings also relate to the vast literature that highlights the role of financial markets in shaping economic growth and in particular with papers that analyze the mechanisms through which finance affects real economic activity. Examples include Jayaratne and Strahan (1996), King and Levine (1993), Levine and Zervos (1998), Rajan and Zingales (1998), Guiso, Sapienza, and Zingales (2004), and Cetorelli and Strahan (2006). Similarly, recent empirical evidence strongly suggests that during recessions industries with higher external financial dependence are hit harder in terms of production growth (Braun and Larrain 2005), value added (Kroszner, Laeven, and Klingebiel 2007), capital formation, and number of establishments (Dell'Ariccia, Detragiache, and Rajan 2008). A recent study of 1,050 Chief Financial Officers conducted by Campello, Graham, and Harvey (2010) indicates that financially constrained firms planned deeper cuts in employment in the midst of the recent financial crisis.

Our paper's key contribution is to emphasize the channels underlying the important role of finance in real economic activity, as we show that small businesses have been laying off workers in the current recession due to credit constraints. This result naturally relates to the literature on the real effects of the credit supply shock during the Great Recession. Duchin et al (2010), for

example, find that investment declines significantly more for firms with low cash reserves during the crisis. Similarly, Almeida et al (2010) find that firms vulnerable to refinancing at the peak of the financial crisis reduce investment spending and bypass attractive investment opportunities.

We also contribute to the literature that focuses on the role of small businesses in job creation and labor markets. The academic literature in this area has mixed findings. Haltiwanger, Jarmin, and Miranda (2010), for example, show that small firms do not create jobs faster once firm age is accounted for. On the other hand, Neumark, Wall, and Zhang (2011) find an inverse relationship between net growth rates and firm size, though not in the manufacturing sector. Similarly, Moscarini and Postel-Vinay (2009) find that small businesses create more jobs in periods of high unemployment and recessions. Our paper highlights the importance of credit availability to achieve this outcome.

We suggest that policies aimed at making credit available to small business, such as the $30 billion Small Business Bill that was passed in 2010 or the loan guarantees by the Small Business Administration, would help stabilize the labor markets and economic activity in general. According to our findings, relieving financial constraints of small firms can prove an effective way to help reduce the layoffs of workers by financially constrained firms and may also help job creation by newly created firms that generally find it very hard to obtain bank credit.

In the next section we describe our empirical strategy, the data, and the construction of measures of external financial dependence by industrial sectors. In Section 3 we provide descriptive statistics of the data and present our main findings. Section 4 describes various robustness tests and Section 5 concludes.

2 Empirical Strategy and Data

2.1 Empirical Strategy

Our econometric analysis is based on a specification of the following form,

$$\begin{aligned} y_{ijst} &= \alpha^d_{js} + \mathbf{x}'_{ijst}\boldsymbol{\theta}^d + \delta^d recession_t + \mu^d small_{ijst-1} + \\ &\quad \rho^d \left(recession_t \times small_{ijst-1}\right) + u^d_{ijst}, \end{aligned} \tag{1}$$

where y_{ijst} is an indicator that equals to one if person i – whose main industry of occupation in the previous year was j and who currently resides in state s – switched from employment to unemployment between the years $t-1$ and t. Employment in year $t-1$ means that the person was employed at some point during the previous year. Unemployment in year t means that the person is unemployed in the month of March of year t in the week before she was surveyed by the Current Population Survey. y_{ijst} takes the value of zero if person i is employed both in $t-1$ and t.[4]

α_{js} are industry-state fixed effects that control for industry-state time invariant observable and unobservable factors that impact the probability of switching from employment to unemployment. The vector of characteristics $\mathbf{x}$ controls for workers' observable differences in age, gender, ethnicity, and years of completed education. Controlling for these characteristics is important because the propensity of becoming unemployed in the 2007-09 recession has not been equal across age, gender, ethnicity, and education. According to the Bureau of Labor Statistics, the unemployment rate among ages 16-19 increased by 11 percentage points between January 2006 and January 2010, while the overall increase in the unemployment rate for the same period was 5 percentage points. Similarly, the unemployment rate among high-school dropouts aged 25+ increased by 8 percentage points, while for college graduates it increased

[4]Respondents to the Current Population Survey (CPS) self-report their employment status in the week before the interview. In the March supplement to the CPS, respondents are asked about the size of their main employer in the previous year. Respondents who provide information on the size of their main employer must have been employed at some point during the previous year, but there is no information on the exact period.

by less than 3 percentage points.[5]

We analyze the transition from employment to unemployment around three recession episodes in the United States: July 1990 – March 1991, March – November 2001, and December 2007 – June 2009. For each recession we use a five-year window of three years before the recession and two years during or following the recession. Importantly, we observe transition from employment to unemployment only in the month of March of every year. We estimate equation (1) separately for each recession episode. Thus, for the 1990 recession, the recession indicator in equation (1) equals to one in the years 1991-92 and equals to zero in the years 1988-90; for the 2001 recession, the indicators equals to one in the years 2001-02 and equals to zero in 1998-00; finally, for the analyses of the 2007-09 recession we define the recession indicator as one for the years 2008-09 and zero for the years 2005-07.

We define small firms as firms with at most 99 employees and large firms with 100+ employees. Later in the analyses we have a more granular definition of firm size. Information about the size of the employer is reported by the CPS respondents and refers to the main employer in the year prior to the survey. The small-firm indicator in equation (1) accounts for the fact that during non-recession times the transition from employment to unemployment may differ by firm size. To capture the differences in transition to unemployment by firm size during a recession, we interact small-firm indicator with a recession indicator. This is the main variable of interest in our analyses.

The contribution of this paper is the analysis of transition from employment to unemployment for workers during an economic downturn by firm size and external financial dependence. We define external financial dependence as the proportion of capital expenditures financed with external funds and mark every industry as having either "high" or "low" dependence on external finance, as explained in the next section. The specification in equation (1),

[5] In our specification ethnicity is an indicator that equals to one if the person is white and equals to zero otherwise. We use the following categories for years of completed education: 0-11, 12, 13-15, 16, and 17+. We use the categorical and not continuous version of years of completed education because of the redesign of the CPS in the early 1990s. See Polivka (1996) for details.

therefore, includes a full set of interaction terms between all the right-hand side variables and an indicator for being in an industry with high external financial dependence. For ease of illustration we represent the additional interaction terms in equation (1) by an upper index $d = \{\text{low,high}\}$ in all the regression parameters.

Thus, $\widehat{\rho}^{low}$ estimates the impact of a recession on transition from employment to unemployment among small firms relative to large firms in industries with low external financial dependence, whereas $\widehat{\rho}^{high}$ has the same interpretation for industries with high external financial dependence. Our main interest is in the difference between two point estimates,

$$\widehat{\rho}^{high} - \widehat{\rho}^{low} \tag{2}$$

The difference between the estimates exploits variation in unemployment propensity across three dimensions: time (before and after the recession), firm size (small and large), and external financial dependence (high and low). The third dimension is especially useful because it helps isolate factors that have a differential impact on unemployment by firm size. It is possible, for example, that the reduction in the demand for goods and services during the recession fell disproportionately more on small firms and therefore affected their unemployment level. The estimate in (2) differences-out this potential effect as long as the reduction in the demand is not differential by firms' external financial dependence.

We estimate equation (1) using Ordinary Least Squares. When assessing the statistical significance of the difference between $\widehat{\rho}^{high}$ and $\widehat{\rho}^{low}$, we cluster the standard errors by state and industry using the procedures in Liang and Zeger (1986) to adjust for potential group structure of the error term.[6]

[6] See Moulton (1986) and Bertrand, Duflo, and Mullainathan (2004) for further discussion about biases of standard errors with grouped data.

2.2 Data

The unemployment status of workers is obtained from the Current Population Survey (CPS). The CPS is a monthly survey of about 50,000 households conducted by the Bureau of the Census for the Bureau of Labor Statistics. The survey represents the civilian population in the United States and is the official source of U.S. unemployment statistics. In this paper we use the Annual Demographic Supplements to the CPS which are conducted every March. The March surveys are especially useful because they include information about the size of each individual's main employer in the year prior to the survey and her industry of occupation. Firm size is important because it helps us to categorize workers into small and large firms in terms the number of employees in the firm. Similarly, industry information is necessary because it helps us to assign measures of external financial dependence at the industry level based on separate calculation using Compustat firms.

The March CPS files are also very useful because they include characteristics of respondents, allowing us to control for these characteristics in the regression analyses. These demographics include age, gender, ethnicity, years of completed education, and state of residence. Finally, the CPS is a representative sample of the population. Each respondent in the CPS has a sampling weight which corresponds to the respondent's representation in the overall population. In all of our analyses we use the sampling weights provided by the CPS, thus recovering the representativeness of the CPS sample of respondents. We restrict the CPS sample to adult civilians aged 16+ in the year prior the survey (the year of employment) who work for wages and salary in the private sector. We exclude respondents whose main industry of occupation is in the financial sector or agriculture.

Information on the external financial dependence of the different industrial sectors is based on data from Compustat. To construct this measure, which was originally proposed by Rajan and Zingales (1998), we follow the procedures described in Cetorelli and Strahan (2006) and define external financial dependence as the proportion of capital expenditures financed with external funds. We use Compustat firms between the years 1980 and 1996 and separate

them based on the number of years they have been on Compustat. We only use firms that have been on Compustat for at least 10 years. The reason for this choice is to capture firms' demand for credit and not the amount of credit supplied to them. It has been widely documented that young firms are financially constrained and their debt is likely to be determined by the amount of credit offered to them and not by the optimal equity-to-debt ratio (see e.g., Fazzari et al 1988).

We sum across all years each firm's total capital expenditures minus cash flows from operations and then divide it by total capital expenditures. A negative value of the resulting ratio indicates that firms have free cash, whereas a positive value indicates that firms must issue debt or equity to finance investments. Next, we aggregate the firm-level ratios of external financial dependence using the median value for all firms in each two-digit Standard Industrial Classification (SIC) category. Finally, we match the two-digit SIC categories to the industrial categories in the CPS. The mapping between Compustat and CPS industrial categories is in the Appendix Table 4.

Table 2 in the Appendix reports measures of external financial dependence for each of the 60 industrial sectors in our sample. These measures essentially allows us to capture relatively exogenous factors that affect demand for external financing across different industrial sectors. Following Rajan and Zingales (1998), we argue there is a technological reason why some industries depend more on external finance than others. For example, industries may differ in the scale of the initial project, the gestation period, the cash harvest period, and the requirement for continuing investment. These technological factors determine the demand for external financing. It implies that, ceteris paribus, industries such as pipelines, metal mining, and home furniture – which require a lot of external funding – should be more affected by a credit supply shock than industries like leather and leather products, insurance carriers, and forestry.

We also calculate industries' financial dependence using the 1998 Survey of Small Business Finance (SSBF). The survey covers a sample of 3,561 small firms with fewer than 500 employees. The SSBF measure of financial depen-

dence captures bank dependence more accurately than the measure based on Compustat because it is based on small firms which primarily use bank loans. For each firm we calculate the share of assets financed with debt from financial institutions. Debt includes loans, capital leases and lines of credit (limit), as well as personal mortgages.[7] Bank dependence in each two-digit SIC category is equal to the median value of firms' share of assets financed with debt. Bank dependence is constructed for all industrial sectors in the SSBF and then matched to the industrial categories in the CPS.

Ideally, we would like to analyze changes in hiring and layoffs across firms with different size and dependence on external finance instead of looking only at the transition from employment to unemployment. Unfortunately, except for the Current Population Survey we were not able to find data that include both firm size and detailed industry information. The Business Employment Dynamics (BED) which contains information on job gains and losses for new/existing/closing establishments has information either by firm size or by industry, but not both. The Job Openings and Labor Turnover Survey (JOLTS) – which has information on job openings, hires, and separations – does not contain information on firm size. In the Business Dynamics Statistics (BDS) all the industries are collapsed into eight sectors. This is not granular enough to credibly match dependence on external finance from Compustat.

The analysis of unemployment in the Current Population Survey by firm size and dependence on external finance is also subject to limitations. Each worker's firm size is available in the year prior to the survey only if the individual was employed. Thus, firm size information is not available for individuals who were unemployed for the entire year prior to the survey and they are excluded from our analysis. This implies that long term unemployment spells are not captured in our calculations, which may underestimate the role of financing constraints. Because we are estimating transition to unemployment, we are also concerned about dropping individuals who were unemployed in the

[7] Mortgages include both commercial and residential mortgages if funds were used for business purposes. We use the limits on the lines of credit to better capture the supply of credit to those businesses. The results are robust to alternative definitions that exclude mortgages from debt and use the balance on the lines of credit instead of the limits.

previous year but are currently employed. The fraction of such individuals is not large, however, and does not affect our main results. We show this by assuming two extreme cases: first, we assigned all such workers to small firms, and second, to large firms. Making these two extreme assumptions did not change our main findings.

Similarly, we are not capturing very short term unemployment spells like individuals that lost a job in a small firm but are hired during the year by a large firm. For instance, some individuals may switch jobs from small firms in high external financial dependence industries to less bank dependent firms (employment to employment flows). Our estimates also miss jobs that would have been created by small firms if financing was available because our paper estimates the impact of credit constraints in job separation but not in job finding rates. Finally, we are not capturing flows in and out of the labor force.

Given these data limitations in the Current Population Survey and the other job data mentioned above, we supplement the analysis of transition to unemployment by looking at the impact of the recession on the number of establishments, differentially by firm size and external financial dependence. Essentially, the establishment analysis helps provide a more complete picture to better evaluate the aggregate implication of our main findings.

We use information on the number of establishments from the County Business Patterns (CBP), which is an annual count of establishments at the county level. Importantly, the CBP counts establishments by firm size and industry (3-digit NAICS). We sum the total number of establishment in a state-year-industry separately for small and large firms and divide the total number of establishment by the state population. We use the natural logarithm of the number of establishments per capita as the left-hand side variable in a specification similar to equation (1). As in the CPS, we define small firms as firms with at most 99 employees and assign measures of external financial dependence to the industrial sectors in the CBP using figures from Compustat. The mapping between the industrial sectors in these two data is in the Appendix Table 3.

3 Results

3.1 Descriptive Statistics

Table 1 reports mean characteristics of mature Compustat firms by the median external financial dependence (EFD from now on) of their industry. Mature firms are firms that have been on Compustat for at least 10 years and are generally thought to be financially unconstrained. This implies that these firms should be able to undertake all profitable investment opportunities regardless of access to external financing. The table shows that growth of assets, capital expenditures, and sales for firms in low EFD industries is somewhat larger than firms with high EFD during the period 1980-1996. For example, the average real growth rate of assets of low EFD firms over the period 1980-1996 is 4.5% versus 1.9% for high EFD firms. However, the difference in growth rates of assets between the two groups of firms is statistically insignificant (column 3). The differences in growth rates of capital expenditures and sales between high and low EFD industries are insignificant as well. These figures suggest that the greater demand for external finance does not seem to reflect greater growth or investment opportunities. Instead, external finance reflects differences in financing needs mainly due to industry level technological reasons as was initially argued by Rajan and Zingales (1998).

Table 2 reports mean characteristics of workers by firm size and external financial dependence. We compare workers' age, gender, ethnicity, and years of completed education across small and large firms, separately for industries with high and low external financial dependence based on respondents to the 2005 March Current Population Survey. We find that small firms in both low and high EFD industries have slightly older workers and more whites. In industries with high external financial dependence, small firms have slightly more high-school drop-outs (4 percentage point difference). The gender composition across small and large firms is statistically identical.

The important result emerging from Table 2 is that differences in workers' characteristics between small and large firms are similar in industries with low and high external financial dependence. This is illustrated in column (7).

For example, there is a 2.15 and 1.25 age difference between workers in small and large firms in low and high EFD industries, respectively. However, 2.15 and 1.25 are not statistically different from each other. This is also true for workers' gender, ethnicity, and years of completed education. The "balancing" of workers' characteristics across firm size and external financial dependence is important for our analyses of transition to unemployment. It helps to rule out the possibility that workers in small firms in industries with high external financial dependence are more likely to become unemployed because they have different characteristics.

3.2 Estimates by Firm Size and External Financial Dependence

Our empirical strategy is to emphasize the differential impact of the recession on the probability of transition to unemployment using the variation in firm size and industries' financing needs. We illustrate this strategy in Table 3 using the specification in equation (1). The columns of the table are divided by workers' firm size and external financial dependence (EFD) of their industry. Small firms are firms with 1-99 employees, whereas large firms have at least 100 employees. Industries with low external financial dependence are industries with below median EFD.

The first two columns indicate an almost identical increase of 2.0 and 2.1 percentage points in unemployment propensity among workers in small and large firms in industries with low EFD. The next two columns, on the other hand, show that the recession has a more pronounced impact on the probability of becoming unemployment for workers in high EFD industries. In these industries, the unemployment likelihood among workers of small firms increased by 3.2 percentage points compared to 2.1 in large firms. That is a difference of 1.1 percentage points. The second row of the table shows that this difference is statistically significant at 1% confidence level.

The third row of Table 3 exploits the variation across the dimensions of firm size and external financial dependence by taking the difference between

the two differences in the second row. In the notation of equation (2) this triple difference is,

$$\widehat{\rho}^{high} - \widehat{\rho}^{low} = (.032 - .021) - (.020 - .021) = .012$$

The point estimate of .012 means that the relative impact of the recession on unemployment propensity of workers by firm size is 1.2 percentage points larger in industries with high financing needs. This difference is economically large. During the recession the unemployment rate doubled from 5.0 percent in December 2007 to 10.0 percent in December 2009 (Bureau of Labor Statistics). Thus a 1.2 percentage point change represents a quarter of the overall rise in unemployment rate during the recession. Moreover, this difference is not only economically large but also statistically significant at 5% after adjusting the standard errors for clustering by two-digit SIC category. This result suggests that financing constraints indeed played a key role in explaining increased layoffs of workers during the Great Recession.

One potential alternative interpretation of the findings in Table 3 is that the recession was especially harmful for the demand for goods and services produced by small businesses. This interpretation, however, seems unlikely given that the changes in unemployment in small and large firms in low EFD industries are the same.

Another possibility is that changes in demand fell disproportionately more on certain industries and these industries tend to have higher external financial dependence and a larger proportion of small firms. We explore this possibility across two dimensions. First, we account for industry-state fixed effects, thus estimating the changes in unemployment in small versus large firms within the same industry and state. The identifying assumption here is that changes in the demand were not differential by firm size within an industry in any given state. Second, we exclude the construction sector from the analysis realizing that the construction sector has especially suffered during the recession. Table 1 in the Appendix shows the results from this exercise. The construction sector has external financial dependence above the median and thus the results

in the first two columns of Table 1 in the Appendix are identical to Table 3. In high EFD industries, changes in unemployment propensity are smaller for workers in both small and large firms once the construction workers are excluded. Nevertheless, the differential impact of the recession by firm size is significant ($0.024 - 0.018 = 0.007$) both statistically and economically. The triple difference ($0.007 - (-0.001) = 0.008$) is significant as well, indicating that the potential demand changes for goods and services during the recession are not driving our findings.

3.3 Monotonicity Analysis

To test the monotonicity of our findings with respect to firm size and EFD, we plot the changes in workers' unemployment propensity in 2008-2009 relative to 2005-2007 in Figure 1. First, in panel (a) and (b), instead of separating firms into only two categories, we split the sample into three equal-sized buckets based on the distribution of external financial dependence. Workers in the lowest 33 percentiles of the EFD distribution belong to the "low" EFD bucket, whereas workers in the top 33 percentiles fall into the "high" EFD bucket. Workers between the 34th and the 65th percentiles are in the "medium" category. As before, we separate firms by two categories of firm size: 1-99 versus 100+ employees. The bars in Figure 1 represent point estimates of δ from the following specification:

$$y_{ijst} = \alpha_{js} + \mathbf{x}'_{ijst}\boldsymbol{\theta} + \delta recession_t + u_{ijst}, \tag{3}$$

where y_{ijst} is an indicator that equals to one if person i – whose main industry of occupation in the previous year was j and who currently resides in state s – switched from employment to unemployment between the years $t-1$ and t. α_{js} are industry-state fixed effects that control for industry-state time invariant observable and unobservable factors that impact the probability of switching from employment to unemployment. The vector of characteristics $\mathbf{x}$ controls for workers' observable differences in age, gender, ethnicity, and years of completed education. Finally, *recession* takes the value of unity in the

years 2008-2009 and equals zero in the years 2005-2007. We estimate equation (3) using Ordinary Least Squares because of concerns of bias of nonlinear estimates with fixed effects. We use sampling weights provided by the CPS to ensure representativeness of our sample.

We estimate δ in equation (3) six times for each category of firm size and for the three groups of external financial dependence. The results, shown on panels (a) and (b) in Figure 1, show that during the recession the unemployment propensity is changing *monotonically* with the degree of external financial dependence but *only* for small firms. In particular, we find that workers of small firms in low EFD industries were 1.7 percentage points more likely to become unemployed compared to 2.2 percentage points in the medium EGFD and almost 3 percentage points in the high EFD group. However, for large firm, there is no evidence for a monotonic relationship between the likelihood of becoming unemployed and external financial dependence.

Next, we test the monotonicity of our findings with respect to firm size. Specifically, we separate firms into three categories of size based on the number of employees: 1-99, 100-499, and 500+, and separate industries by the median external financial dependence. So, this time we estimate equation (3) separately by the two categories of external financial dependence and three categories of firm size. The results are presented in panels (c) and (d) of Figure 1. These figures show a clear-cut monotonic relationship between the propensity of becoming unemployed and firm size in high EFD industries. The largest changes in unemployment are for workers of the smallest firms (1-99 employees), whereas the smallest changes are for those in the largest firms (500+ employees). In particular, a high EFD industry worker of a firm with 1-99 employees is 2.7 percentage points more likely to become unemployed during the crisis, compared to 2.1 percentage points for those working in firms with 100-499 employees, and 1.4 percentage points in firms with 500+ employees. In industries with low external financial dependence, however, there is no relationship between firm size and the likelihood of becoming unemployed during the recession.

The monotonicity analyses provide further evidence for the channels that

drive the transitions to unemployment during the 2008-2009 financial crisis. We find a monotonic relationship between firm size and changes in unemployment propensity. Importantly, this relationship holds only for industries with ex-ante high external financial dependence. From a different angle, we find a monotonic relationship between external financial dependence and changes in unemployment . Strikingly, this relationship holds only for small firms. In other words, the likelihood of becoming unemployed is changing in a predictable manner with respect to firm size and external financial dependence, and only for firms in which we would expect this relationship to exist. These results provide additional support for the hypothesis that worker flows into unemployment during the financial crisis were driven by changes in the amount of credit supply.

4 Robustness Tests

So far our findings indicate that the financial crisis of 2008-2009 is especially harmful for small firms in industries with ex-ante high financing needs. Our interpretation is that the increased propensity of workers in these firms to become unemployment is driven by changes in the supply of credit. To provide further evidence for this hypothesis we repeat our empirical exercise for the 2001 recession and for the Savings and Loan (S&L) crisis that led to the 1990-91 recession. The 2001 recession was triggered by the bursting of the bubble in the technological sector and did not originate in banks' balance sheets. The 2001 recession, therefore, serves as a placebo test: if changes in unemployment in small, financially constrained firms are driven by changes in the supply of credit, then we should find no differential impact of the 2001 recession on unemployment by firms' size and external financial dependence. If, on the other hand, our main findings are driven by changes in the demand for goods and services or by other factors, such as changes in the value of firms' collateral, then we should more or less replicate the 2008-2009 findings using the 2001 recession.

The S&L crisis, however, is more like the Great Recession as it originated

in the banking sector and was also related to real estate market problems. The ensuing credit crunch and the recession in 1990-1991, therefore, constitutes an ideal scenario to test the robustness of our hypothesis. It is expected that if credit supply contraction is an important factor driving transitions to unemployment for bank dependent firms, then, we should also find differential effects by firms' size and external financial dependence in the 1990-1991 recession. In addition, this recession was characterized by a strong regional component, with certain regions, like New England, being most affected (Peek and Rosengren, 1994). To illustrate this, using FDIC data on bank failures and Summary of Deposits data, we obtain that New England accounted for just above 6 percent of total banks deposits in the U.S. while banks failures in New England in years 1990 and 1991 represented 17.5 percent of total deposits in failing banks. We exploit the regional variation of this recession by estimating differential effects for New England, where we expect our results to be stronger.

Table 4 reports our triple difference point estimates from equation (2), except that the *recession* indicator now takes the value of unity in the years 2001-2002 and takes the value of zero in the years 1998-2000. We find that, during the 2001 recession, the probability of becoming unemployment was also significantly higher as shown by the positive and significant coefficients for the four groups of firms. Note though that these coefficients are smaller than our estimates for the Great Recession, as might be expected. Turning to the differential analysis by firm size and EFD, we find that workers in low EFD industries were 0.6 percentage points more likely to become unemployed if they were in small firms and by 1.2 percentage points if they were in large firms. The difference at -0.007 is statistically significant at the 1% level . On the other hand, in high EFD industries the unemployment propensity has increased by 0.6 and 0.8 percentage points for small and large firms, respectively. This difference is statistically insignificant , thus, for high EFD industries there is no differential change in unemployment propensity by firm size. The triple difference ($-0.003-(-0.007) = 0.004$) is also insignificant as well. The results in Table 4 show that financing constraints become insignificant in explaining

the employment patterns of small or large firms during the 2001 recession. This is exactly in line with our prior based on the fact that the 2001 recession was concentrated in the technological sector, and banks and therefore the credit supply were largely unaffected during that crisis.

Table 5 reports the results for the S&L crisis. We define the *recession* indicator to take the value of unity in the years 1991-1992 and takes the value of zero in years 1988-1990. Like in the other recessions, the probability of becoming unemployment clearly goes up. More interestingly, we uncover significant differences across small and large firms in industries with high and low external financial dependence. Our estimates for the 1990-91 recession show an almost identical pattern to those based on the Great Recession. The probability to become unemployed during this recession is 1.7 percentage points higher for individuals in small firms in industries with high external financial dependence. This difference is statistically significant and economically as well. In Table 6 we report the results for New England (Panel A) and the rest of the U.S. (Panel B). Consistent with the idea that the credit crunch was more severe in the north-eastern regions, our triple interaction coefficient is much larger in New England (3.9 percentage points) than for the rest of the U.S. (1.6 percentage points).

To illustrate our findings through these various recessions, in Figure 2 we plot the year-by-year proportion of workers who switched from employment to unemployment between years t and t-1 by firm size and external financial dependence using the March Current Population Surveys from 1988 to 2011. The left plot is for industries with low EFD and the right plot is for high EFD industries. The dark lines represent unemployment rate among workers in small firms (1-99 employees), while the light lines are for workers in large firms (100+ employees).

This figure graphically depicts the phenomena we are capturing in our models. It is evident from the figure that unemployment propensity increases in recession periods. However, the evolution of the likelihood to transition from employment to unemployment between the four groups shows some remarkable differences. For low EFD industries, the unemployment trends for workers in

small and large firms move very closely, indicating that for low EFD industries the recession has no differential impact on unemployment by firm size. In high EFD industries, on the other hand, the unemployment likelihood is bigger for small and large firms, especially during recession periods.

The analysis of these two recessions provides additional assurance that changes in unemployment rate in small, finance-dependent firms during the 2008-2009 financial crisis are mainly driven by changes in the supply of credit. These results are consistent with Duchin et al (2010) who show a steep decline in the supply of credit to firms in industries that depend on external finance. They find this effect only during the 2008-2009 financial crisis and not during the 2001 recession, which aligns with our results.

As a final robustness check we construct measures of bank dependence using the 1998 Survey of Small Business Finance. For each firm we calculate the share of assets financed with debt from financial institutions, as explained in Section 2.2. Bank dependence in each two-digit SIC category is equal to the median value of firms' share of assets financed with debt. It is constructed for all industrial sectors and not just manufacturing. We split the industries by the median dependence on banks. Industries with below median bank dependence have low bank dependence, whereas industries with above median bank dependence have high bank dependence.

The results in Table 7 are very similar to the results in the previous tables. There is no differential impact of the recession on unemployment by firm size in industries with low bank dependence. The difference is equal to $0.017-0.020 = 0.003$ which is not statistically different from zero. In industries with high bank dependence, on the other hand, the probability of becoming unemployed rises by 1.2 ($= 0.039 - 0.028$) percentage points more for workers of small firms. The triple difference (0.009) is statistically significant at the 10% level and is very similar in magnitude to the triple differences using our main measure of external financial dependence. Overall, the results in Table 7 show that our core findings are robust to the measure of external financial dependence.

Probably the main limitation of the analysis of this paper is that we cannot extrapolate the coefficients from our reduced form regression to derive aggre-

gate implications. This is driven by the fact that we miss some potentially important flows in labor markets because we focus only on the transition of workers from employment to unemployment, as described in detail in the Data Section. These limitations become especially binding when thinking about policies to help the labor market where unemployment rate remains at a very high level.

In order to obtain a more complete picture, we complement our core findings by collecting data on the number of establishments from County Business Patterns.[8] The idea is to use the change in the number of establishments as measure of employment changes. If firms go out of business it will be captured as a drop in number of establishments. We estimate a model similar to our baseline specification with the exception that the dependent variable is the natural logarithm of the ratio of number of establishments to total population in a given industry, state and year. The results can be found in Table 8. We confirm the expected result that the number of establishments contracted during the Great Recession. We also find that this contraction was stronger among firms in industries with high EFD, where the number of large establishments dropped by 4 percent compared to 5.2 percent of small firms. The contraction was smaller in low EFD industries and very similar between large and small firms (3.5 and 3.6, respectively). The triple difference is statistically significant at the 5% level and implies that the number of small establishments contracted by 1.3 percentage points more in high EFD industries. A back of the envelope calculation using the average number of establishments per capita before the recession and the average number of employees in a small establishment, we compute that credit constraints may account for a decrease of about 76,200 establishments which would imply that about 700,000 jobs have been lost. This number is very similar to those implied by our main findings in Table 3. In particular, according to our initial estimates, financial constraints of small firms contributed about 0.55 percentage points to the overall unemployment rate, which correspond to about 750,000 jobs. Although both

[8]Ideally, we would like to study the total changes in employment. See Section 2.2 for a discussion of the data limitations that prevent us from doing such an analysis.

of these calculations are based on a partial equilibrium framework and miss any associated general equilibrium effects, they still provide a useful benchmark for highlighting the importance of financial constraints from an aggregate employment perspective.

5 Concluding Remarks

This paper shows that small business financing constraints are important drivers of the observed unemployment dynamics around the Great Recession. In particular, our results show that workers who worked in small firms in industries with higher external financial dependence were more likely to become unemployed during the financial crisis. On the other hand, we do not find significant differences in unemployment propensity between small and large firms in sectors with low external financial dependence. These results indicate that the reduction in bank lending to financially constrained firms during the Great Recession is associated with increased layoffs of workers.

These findings are robust to various alternative measures of financial dependence, as well as to using the 2001 recession as a placebo test and the 1990-1 recession as a robustness test. These tests based on previous recessions are especially interesting as they highlight the importance of bank health and capital constraints for credit availability and their impact on the macroeconomy. Specifically, we show that financing constraints are significant drivers of employment patterns of small or large firms in the 1990-91 recession but not in the 2001 recession. This is exactly in line with our prior based on the fact that the 2001 recession was concentrated in the technological sector, and banks were largely unaffected by that crisis, compared to the problems faced by the banking industry during the Savings and Loan crisis that lead to the 1990-91 recession. This finding also provides additional assurance that our empirical strategy captures credit supply shocks, and not demand shocks associated with the Great Recession.

The policy implications of these findings are especially important. They suggest that small business financing constraints may be significantly hamper-

ing job creation, and as such highlight an important dimension of the current debate on policies related to supporting small business lending to stimulate economic growth. We suggest that policies aimed at making credit available to small business, such as the recent $30 billion Small Business Bill or the loans guaranteed by the Small Business Administration, would help stabilize the labor markets and economic activity in the United States.

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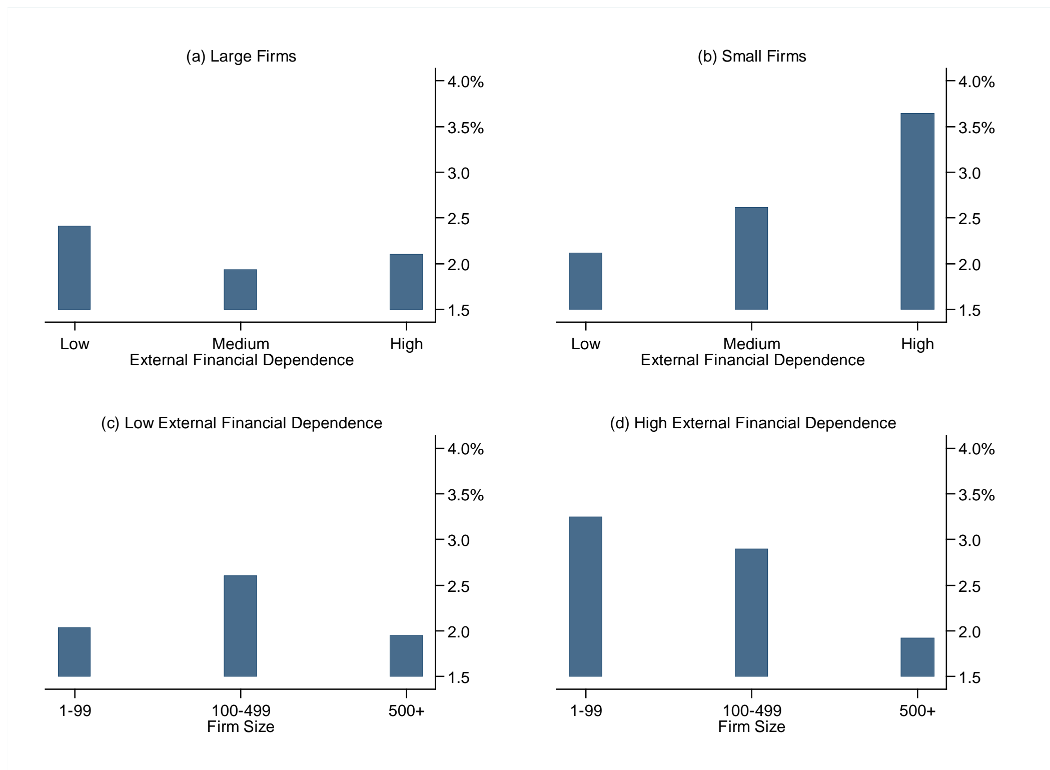
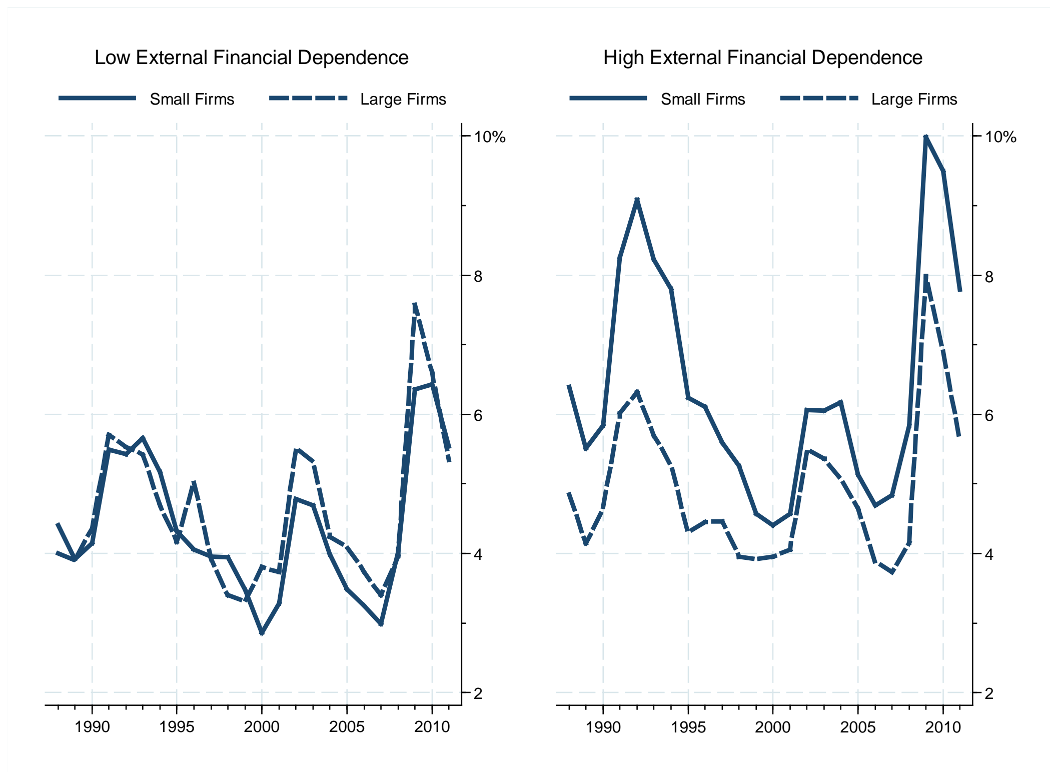
Figure 1 – Monotonicity by External Financial Dependence and Firm Size



Note - The plots show changes in unemployment rate following the 2007-09 recession by external financial dependence and firm size. The upper plots are divided into three categories based on the distribution external financial dependence: below the 33rd percentile, 34th-66th percentile, and 67th percentile and above. Plot (a) includes firms with at least 100 employees, whereas plot (b) includes firms with at most 99 employees. The lower plots are divided into three categories of firm size based on the number of workers in the firm: 1-99, 100-499, and 500+. Plot (c) includes industries with below median external financial dependence. Plot (d) includes industries with external financial dependence above the median. External financial dependence equals the proportion of capital expenditures financed with external funds. External financial dependence is calculated using mature Compustat firms for the period 1980-1996. The bars represent estimates from 12 separate OLS regression where the dependent variables is an indicator that equals to one if a person transitioned from employment to unemployment between years *t-1* and *t*. Each regression controls for workers' characteristics and state-industry (2-digit SIC) fixed effects. Workers' characteristics include age, gender, ethnicity, and years of completed education (0-11 years, 12, 13-15, or 16). All estimates are weighted by sampling weights provided by the Current Population Survey.

Figure 2 – Likelihood of Transition from Employment to Unemployment



Note - The plots show year-by-year proportion of workers who switched from employment to unemployment between years *t* and *t-1* by firm size and external financial dependence. "Small" firms have at most 99 employees. External financial dependence equals the proportion of capital expenditures financed with external funds. A negative value (low external financial dependence) indicates that firms have free cash flow. A positive value indicates that firms must issue debt or equity to finance their investment. External financial dependence is calculated at 2-digit Standard Industrial Classification codes using mature Compustat firms for the period 1980-1996 using the procedures described in Cetorelli and Strahan [2006].

Source - March Current Population Surveys, 1988-2011.

Table 1 – Characteristics of Firms by External Financial Dependence

	External Financial Dependence		
	Low	High	Difference
	(1)	(2)	(3)
Assets growth	.045	.019	-.026
			(.016)
Capital expenditures growth	.201	.134	-.067
			(.082)
Sales growth	.066	.042	-.024
			(.031)

Note - The table reports characteristics of Compustat firms by external financial dependence of their industry. Column (3) reports the difference between the first two columns. Robust standard errors are in parentheses. The results are based on 4,847 mature Compustat firms in the years 1980-1996. Mature firms are firms that have been in Compustat for at least 10 years. The growth rates of assets, capital expenditures, and sales are median values of year-to-year real ($1997, CPI adjusted) growth rates over the period 1980-1996. External financial dependence equals the proportion of capital expenditures financed with external funds. A negative value (low external financial dependence) indicates that firms have free cash flow. A positive value indicates that firms must issue debt or equity to finance their investment. External financial dependence is calculated at a 2-digit Standard Industrial Classification codes using mature Compustat firms for the period 1980-1996 using the procedures described in Cetorelli and Strahan [2006].

Table 2 – Characteristics of Labor by Firm Size and External Financial Dependence

	External Financial Dependence						
	Low			High			
	Small Firms	Large Firms	Diff.	Small Firms	Large Firms	Diff.	(6)-(3) =
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Age	41.75	39.60	2.15	41.13	39.88	1.25	-.90
			(.87)**			(.71)*	(1.12)
Male	.59	.60	-.01	.70	.67	.03	.04
			(.04)			(.03)	(.05)
White	.84	.78	.07	.86	.81	.05	-.01
			(.02)***			(.02)***	(.03)
High-school drop-out	.13	.14	-.01	.15	.11	.04	.05
			(.03)			(.02)**	(.03)
Number of workers	17.6M	17.5M		34.5M	38.3M		

Note - The table reports mean characteristics of respondents to the 2005 March Current Population Survey (CPS). The figures are reported by firm size and external financial dependence of the industry. Columns (1)-(3) include only industries with low external financial dependence, whereas columns (4)-(6) are for industries with high external financial dependence. Column (3) reports the difference between columns (1) and (2). Column (6) reports the difference between columns (4) and (5). The last column reports the difference between columns (6) and (3). Robust standard errors are in parentheses. "Small" firms have at most 99 employees. External financial dependence equals the proportion of capital expenditures financed with external funds. A negative value (low external financial dependence) indicates that firms have free cash flow. A positive value indicates that firms must issue debt or equity to finance their investment. External financial dependence is calculated at a 2-digit Standard Industrial Classification codes using mature Compustat firms for the period 1980-1996 using the procedures described in Cetorelli and Strahan [2006]. All figures in the table are weighted by the sampling weights provided by the CPS. The number of workers in the last row is the sum of the sampling weights of the 2005 March CPS sample. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

Table 3 – Transition to Unemployment following the December 2007 Recession

	External Financial Dependence			
	Low		High	
	Small Firms	Large Firms	Small Firms	Large Firms
	(1)	(2)	(3)	(4)
Recession	.020	.021	.032	.021
	(.002)***	(.003)***	(.003)***	(.002)***
Differences:				
Small – Large	–.001		.011	
	(.004)		(.003)***	
(Small – Large)^{High} – (Small – Large)^{Low}	.012			
	(.005)**			
Observations	61,572	61,860	118,824	131,621

Note - The dependent variable is an indicator that equals to one if a person transitioned from employment to unemployment between years *t-1* and *t*. The table reports Ordinary Least Squares estimates. All estimates are from a single regression that controls for workers' characteristics and state-industry (2-digit SIC) fixed effects. Workers' characteristics include age, gender, ethnicity, and years of completed education (0-11 years, 12, 13-15, or 16). Standard errors are adjusted for clustering at state-industry (2-digit SIC) level and appear in parentheses. All estimates are weighted by probability sampling weights provided by the CPS. "Recession" equals to one in the years 2008-09 and equals to zero in the years 2005-07. "Small" firms have at most 99 employees. External financial dependence equals the proportion of capital expenditures financed with external funds. A negative value (low external financial dependence) indicates that firms have free cash flow. A positive value indicates that firms must issue debt or equity to finance their investment. External financial dependence is calculated at 2-digit Standard Industrial Classification codes using mature Compustat firms for the period 1980-1996 using the procedures described in Cetorelli and Strahan [2006]. ** and *** indicate statistical significance at the 5% and 1% levels, respectively.

Table 4 – Transition to Unemployment following the March 2001 Recession

	External Financial Dependence			
	Low		High	
	Small Firms	Large Firms	Small Firms	Large Firms
	(1)	(2)	(3)	(4)
Recession	.006	.012	.006	.008
	(.002)**	(.002)***	(.002)***	(.002)***
Differences:				
Small – Large	–.007		–.003	
	(.002)***		(.002)	
$(\text{Small} - \text{Large})^{High} - (\text{Small} - \text{Large})^{Low}$	.004			
	(.003)			
Observations	48,934	53,076	93,496	110,102

Note - The dependent variable is an indicator that equals to one if a person transitioned from employment to unemployment between years *t-1* and *t*. The table reports Ordinary Least Squares estimates. All estimates are from a single regression that controls for workers' characteristics and state-industry (2-digit SIC) fixed effects. Workers' characteristics include age, gender, ethnicity, and years of completed education (0-11 years, 12, 13-15, or 16). Standard errors are adjusted for clustering at state-industry (2-digit SIC) level and appear in parentheses. All estimates are weighted by probability sampling weights provided by the CPS. "Recession" equals to one in the years 2001-02 and equals to zero in the years 1998-00. "Small" firms have at most 99 employees. External financial dependence equals the proportion of capital expenditures financed with external funds. A negative value (low external financial dependence) indicates that firms have free cash flow. A positive value indicates that firms must issue debt or equity to finance their investment. External financial dependence is calculated at 2-digit Standard Industrial Classification codes using mature Compustat firms for the period 1980-1996 using the procedures described in Cetorelli and Strahan [2006]. ** and *** indicate statistical significance at the 5% and 1% levels, respectively.

Table 5 – Transition to Unemployment following the July 1990 Recession

	External Financial Dependence			
	Low		High	
	Small Firms	Large Firms	Small Firms	Large Firms
	(1)	(2)	(3)	(4)
Recession	.015	.019	.033	.020
	(.003)***	(.003)***	(.004)***	(.002)***
Differences:				
Small – Large	–.004		.013	
	(.004)		(.004)***	
$(\text{Small – Large})^{High} – (\text{Small – Large})^{Low}$	.017			
	(.006)***			
Observations	42,538	45,031	88,396	97,811

Note - The dependent variable is an indicator that equals to one if a person transitioned from employment to unemployment between years *t-1* and *t*. The table reports Ordinary Least Squares estimates. All estimates are from a single regression that controls for workers' characteristics and state-industry (2-digit SIC) fixed effects. Workers' characteristics include age, gender, ethnicity, and years of completed education (0-11 years, 12, 13-15, or 16). Standard errors are adjusted for clustering at state-industry (2-digit SIC) level and appear in parentheses. All estimates are weighted by probability sampling weights provided by the CPS. "Recession" equals to one in the years 1991-92 and equals to zero in the years 1988-90. "Small" firms have at most 99 employees. External financial dependence equals the proportion of capital expenditures financed with external funds. A negative value (low external financial dependence) indicates that firms have free cash flow. A positive value indicates that firms must issue debt or equity to finance their investment. External financial dependence is calculated at 2-digit Standard Industrial Classification codes using mature Compustat firms for the period 1980-1996 using the procedures described in Cetorelli and Strahan [2006]. *** indicates statistical significance at the 1% level.

Table 6 – Transition to Unemployment following the July 1990 Recession, by Region

	External Financial Dependence			
	Low		High	
	Small Firms	Large Firms	Small Firms	Large Firms
	(1)	(2)	(3)	(4)
	Panel A: New England			
Recession	.038	.026	.080	.029
	(.009)***	(.008)***	(.015)***	(.008)***
Differences:				
Small – Large	.012		.051	
	(.012)		(.013)***	
(Small – Large)^{High} – (Small – Large)^{Low}	.039			
	(.018)**			
Observations	4,005	4,744	8,071	8,533
	Panel B: Rest of the U.S.			
Recession	.013	.019	.030	.019
	(.003)***	(.003)***	(.004)***	(.002)***
Differences:				
Small – Large	–.005		.011	
	(.004)		(.004)***	
(Small – Large)^{High} – (Small – Large)^{Low}	.016			
	(.006)***			
Observations	38,533	40,287	80,325	89,278

Note - The dependent variable is an indicator that equals to one if a person transitioned from employment to unemployment between years *t-1* and *t*. Panel A includes only the following states: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont. Panel B excludes these states. The table reports Ordinary Least Squares estimates. Within each panel, the estimates are from a single regression that controls for workers' characteristics and state-industry (2-digit SIC) fixed effects. Workers' characteristics include age, gender, ethnicity, and years of completed education (0-11 years, 12, 13-15, or 16). The table reports Ordinary Least Squares estimates. Standard errors are adjusted for clustering at state-industry (2-digit SIC) level and appear in parentheses. All estimates are weighted by probability sampling weights provided by the CPS. "Recession" equals to one in the years 1991-92 and equals to zero in the years 1988-90. "Small" firms have at most 99 employees. External financial dependence equals the proportion of capital expenditures financed with external funds. A negative value (low external financial dependence) indicates that firms have free cash flow. A positive value indicates that firms must issue debt or equity to finance their investment. External financial dependence is calculated at 2-digit Standard Industrial Classification codes using mature Compustat firms for the period 1980-1996 using the procedures described in Cetorelli and Strahan [2006]. ** and *** indicate statistical significance at the 5% and 1% levels, respectively.

Table 7 – Transition to Unemployment following the December 2007 Recession

	Bank Dependence			
	Low		High	
	Small Firms	Large Firms	Small Firms	Large Firms
	(1)	(2)	(3)	(4)
Recession	.020	.017	.039	.028
	(.002)***	(.002)***	(.004)***	(.003)***
Differences:				
Small – Large	.003		.012	
	(.003)		(.004)***	
$(\text{Small} - \text{Large})^{High} - (\text{Small} - \text{Large})^{Low}$	.009			
	(.004)*			
Observations	101,712	113,514	78,684	79,967

Note - The dependent variable is an indicator that equals to one if a person transitioned from employment to unemployment between years *t-1* and *t*. The table reports Ordinary Least Squares estimates. All estimates are from a single regression that controls for workers' characteristics and state-industry (2-digit SIC) fixed effects. Workers' characteristics include age, gender, ethnicity, and years of completed education (0-11 years, 12, 13-15, or 16). Standard errors are adjusted for clustering at state-industry (2-digit SIC) level and appear in parentheses. All estimates are weighted by probability sampling weights provided by the CPS. "Recession" equals to one in the years 2008-09 and equals to zero in the years 2005-07. "Small" firms have at most 99 employees. Bank dependence is the share of assets financed with debt. We use the 1998 Survey of Small Business Finance (SSBF) to calculate measures of bank dependence for each 2-digit SIC industry. Industries with"low" bank dependence are industries with below median share of assets financed with debt. "High" bank dependence industries have above median share of assets financed with debt. * and *** indicate statistical significance at the 10% and 1% levels, respectively.

Table 8 – The Impact of the December 2007 Recession on Log Establishments Per Capita

	External Financial Dependence			
	Low		High	
	Small Firms	Large Firms	Small Firms	Large Firms
	(1)	(2)	(3)	(4)
Recession	–.035	–.036	–.052	–.040
	(.005)***	(.004)***	(.002)***	(.003)***
Differences:				
Small – Large	.001		–.012	
	(.005)		(.003)***	
$(\text{Small – Large})^{High}$ – $(\text{Small – Large})^{Low}$	–.013			
	(.006)**			
Observations	37,635	30,108	67,210	53,768

Note – The dependent variable is the natural logarithm of the number of establishment per capita in an industry/state/year. The table reports Ordinary Least Squares estimates. All estimates are from a single regression that controls for state-industry (3-digit NAICS) fixed effects. Standard errors are adjusted for clustering at the state-industry (3-digit NAICS) level and appear in parentheses. "Recession" equals to one in the years 2008-09 and equals to zero in the years 2005-07. "Small" firms have at most 99 employees. External financial dependence equals the proportion of capital expenditures financed with external funds. A negative value (low external financial dependence) indicates that firms have free cash flow. A positive value indicates that firms must issue debt or equity to finance their investment. External financial dependence is calculated at a 2-digit Standard Industrial Classification codes using mature Compustat firms for the period 1980-1996 using the procedures described in Cetorelli and Strahan [2006]. The mapping between the industrial codes in Compustat and the industrial codes in the County Business Patterns is detailed in the Appendix Table 3. Number of establishments is from County Business Patterns for the years 2005-2009. Population estimates are from the U.S. Census Bureau. ** and *** indicate statistical significance at the 5% and 1% levels, respectively.

Appendix Table 1 – Basic Results without the Construction Sector

	External Financial Dependence			
	Low		High	
	Small Firms (1)	Large Firms (2)	Small Firms (3)	Large Firms (4)
Recession	.020	.021	.024	.018
	(.002)***	(.003)***	(.002)***	(.002)***
Differences:				
Small – Large	–.001		.007	
	(.004)		(.002)***	
$(\text{Small – Large})^{High}$ – $(\text{Small – Large})^{Low}$	.008			
	(.004)*			
Observations	61,572	61,860	88,869	123,774

Note – This table excludes the Construction sector. The dependent variable is an indicator that equals to one if a person transitioned from employment to unemployment between years *t-1* and *t*. The table reports Ordinary Least Squares estimates. All estimates are from a single regression that controls for workers' characteristics and state-industry (2-digit SIC) fixed effects. Workers' characteristics include age, gender, ethnicity, and years of completed education (0-11 years, 12, 13-15, or 16). Standard errors are adjusted for clustering at state-industry (2-digit SIC) level and appear in parentheses. All estimates are weighted by probability sampling weights provided by the CPS. "Recession" equals to one in the years 2008-09 and equals to zero in the years 2005-07. "Small" firms have at most 99 employees. External financial dependence equals the proportion of capital expenditures financed with external funds. A negative value (low external financial dependence) indicates that firms have free cash flow. A positive value indicates that firms must issue debt or equity to finance their investment. External financial dependence is calculated at 2-digit Standard Industrial Classification codes using mature Compustat firms for the period 1980-1996 using the procedures described in Cetorelli and Strahan [2006]. * and *** indicate statistical significance at the 10% and 1% levels, respectively.

Appendix Table 2 – External Financial Dependence by Industrial Sectors

Industry	SIC	EFD
Forestry	08	-4.63
Insurance carriers	63	-3.96
Leather and leather products	31	-0.96
Tobacco products	21	-0.92
Apparel and other finished products made from fabrics and similar materials	23	-0.61
Educational services	82	-0.55
Social services	83	-0.43
Miscellaneous repair services	76	-0.25
Food and kindred products	20	-0.24
Fabricated metal products, except machinery and transportation equipment	34	-0.24
Furniture and fixtures	25	-0.23
Stone, clay, glass, and concrete products	32	-0.20
Miscellaneous manufacturing industries	39	-0.20
Apparel and accessory stores	56	-0.16
Business services	73	-0.16
Local and suburban transit and interurban highway passenger transportation	41	-0.12
Personal services	72	-0.12
Printing, publishing, and allied industries	27	-0.07
Communications	48	-0.07
Engineering, accounting, research, management, and related services	87	-0.05
Measuring, analyzing, and controlling instruments; photographic, medical, and optical goods	38	-0.04

Note - This table reports measures of external financial dependence for each industry at the 2-digit SIC category. External financial dependence equals the proportion of capital expenditures financed with external funds. A negative value indicates that firms have free cash flow, whereas a positive value indicates that firms must issue debt or equity to finance their investment. External financial dependence is calculated using mature COMPUSTAT firms for the period 1980-1996. Mature firms are firms that have been on Compustat for at least 10 years.

Appendix Table 2 – External Financial Dependence by Industrial Sectors (cont.)

Industry	SIC	EFD
Transportation equipment	37	0.00
Transportation services	47	0.01
Industrial and commercial machinery and computer equipment	35	0.01
Primary metal industries	33	0.03
Agriculture	01-02-07	0.03
Railroad transportation	40	0.04
Lumber and wood products, except furniture	24	0.04
Rubber and miscellaneous plastics products	30	0.04
Mining and quarrying of nonmetallic minerals, except fuels	14	0.05
Paper and allied products	26	0.06
Petroleum refining and related industries	29	0.09
Wholesale trade: non-durable goods	51	0.10
Textile mill products	22	0.10
Motor freight transportation and warehousing	42	0.10
General merchandise stores	53	0.12
Coal mining	12	0.13
Miscellaneous retail	59	0.16
Food stores	54	0.16
Motion pictures	78	0.17
Amusement and recreation services	79	0.21
Electronic and other electrical equipment and components, except computer equipment	36	0.22
Electric, gas, and sanitary services	49	0.24
Eating and drinking places	58	0.25
Chemicals and allied products	28	0.28
Fishing, hunting, and trapping	09	0.31
Wholesale trade: durable goods	50	0.32
Health services	80	0.35
Real estate	65	0.38
Hotels, rooming houses, camps, and other lodging places	70	0.38
Oil and gas extraction	13	0.40
Automotive dealers and gasoline service stations	55	0.41
Automotive repair, services, and parking	75	0.43
Building materials, hardware, garden supply, and mobile home dealers	52	0.47
Transportation by air	45	0.48
Construction	15-16-17	0.57
Water transportation	44	0.67
Home furniture, furnishings, and equipment stores	57	0.69
Metal mining	10	0.96
Pipelines, except natural gas	46	1.00

Note - This table reports measures of external financial dependence for each industry at the 2-digit SIC category. External financial dependence equals the proportion of capital expenditures financed with external funds. A negative value indicates that firms have free cash flow, whereas a positive value indicates that firms must issue debt or equity to finance their investment. External financial dependence is calculated using mature COMPUSTAT firms for the period 1980-1996. Mature firms are firms that have been on Compustat for at least 10 years.

Appendix Table 3 – Mapping Industrial Codes between Compustat and QCEW/CBP

Industry (2-digit SIC code)	Industry (3-digit NAICS code)
Agricultural Production – Crops (1)	Crop Production (111)
Agricultural Production – Livestock (2)	Animal Production (112)
Agricultural Services (7)	Support Activities for Agriculture and Forestry (115)
Forestry (8)	Forestry and Logging (113)
Fishing, Hunting, and Trapping (9)	Fishing, Hunting and Trapping (114)
Metal Mining (10); Coal Mining (12); Nonmetallic Minerals, except Fuels (14)	Mining, except Oil and Gas (212); Support Activities for Mining (213)
Oil and Gas Extraction (13)	Oil and Gas Extraction (211)
General Building Contractors (15)	Construction of Buildings (236)
Heavy Construction Contractors (16)	Heavy and Civil Engineering Construction (237)
Special Trade Contractors (17)	Specialty Trade Contractors (238)
Food and Kindred Products (20)	Food Manufacturing (311)
Tobacco Manufactures (21)	Beverage and Tobacco Product Manufacturing (312)
Textile Mill Products (22)	Textile Mills (313); Textile Product Mills (314)
Apparel and Other Textile Products (23)	Apparel Manufacturing (315)
Lumber and Wood Products (24)	Wood Product Manufacturing (321)
Furniture and Fixtures (25)	Furniture and Related Product Manufacturing (337)
Paper and Allied Products (26)	Paper Manufacturing (322)
Printing and Publishing (27)	Printing and Related Support Activities (323); Publishing Industries, except Internet (511); Internet Publishing and Broadcasting (516)
Chemicals and allied products (28)	Chemical Manufacturing (325)
Petroleum and coal products (29)	Petroleum and Coal Products Manufacturing (324)

Rubber and Miscellaneous Plastics Products (30)	Plastics and Rubber Products Manufacturing (326)
Leather and Leather Products (31)	Leather and Allied Product Manufacturing (316)
Stone, Clay, Glass, and Concrete Products (32)	Nonmetallic Mineral Product Manufacturing (327)
Primary Metal Industries (33)	Primary Metal Manufacturing (331)
Fabricated Metal Products (34)	Fabricated Metal Product Manufacturing (332)
Industrial Machinery and Equipment (35); Electrical and Electronic Equipment (36); Instruments and Related Products (38)	Machinery Manufacturing (333); Computer and Electronic Product Manufacturing (334); Electrical Equipment, Appliance, and Component Manufacturing (335)
Transportation Equipment (37)	Transportation Equipment Manufacturing (336)
Miscellaneous Manufacturing Industries (39)	Miscellaneous Manufacturing (339)
Railroad Transportation (40)	Rail Transportation (482)
Local and Interurban Passenger Transit (41)	Transit and Ground Passenger Transportation (485)
Motor Freight Transportation and Warehousing (42)	Truck Transportation (484); Couriers and Messengers (492); Warehousing and Storage (493)
Water Transportation (44)	Water Transportation (483)
Transportation by Air (45)	Air Transportation (481)
Pipelines, except Natural Gas (46)	Pipeline Transportation (486)
Transportation Services (47)	Support Activities for Transportation (488)
Communications (48)	Broadcasting, except Internet (515); Telecommunications (517)
Electric, Gas, and Sanitary Services (49)	Utilities (221); Waste Management and Remediation Services (562)
Wholesale Trade – Durable goods (50)	Merchant Wholesalers, Durable Goods (423); Wholesale Electronic Markets and Agents and Brokers (425)
Wholesale Trade – Nondurable Goods (51)	Merchant Wholesalers, Nondurable Goods (424)
Building Materials, Hardware, Garden Supply, and Mobile Home Dealers (52)	Building Material and Garden Equipment and Supplies Dealers (444)

General Merchandise Stores (53)	General Merchandise Stores (452)
Food Stores (54)	Food and Beverage Stores (445)
Automotive Dealers and Gasoline Service Stations (55)	Motor Vehicle and Parts Dealers (441); Gasoline Stations (447)
Apparel and Accessory Stores (56)	Clothing and Clothing Accessories Stores (448)
Furniture, Home Furnishings and Equipment Stores (57)	Furniture and Home Furnishings Stores (442); Electronics and Appliance Stores (443)
Eating and Drinking Places (58)	Food Services and Drinking Places (722)
Miscellaneous Retail (59)	Health and Personal Care Stores (446); Sporting Goods, Hobby, Book, and Music Stores (451); Miscellaneous Store Retailers (453); Non-store Retailers (454)
Security, Commodity Brokers, and Services (62)	Securities, Commodity Contracts, and Other Financial Investments and Related Activities (523)
Insurance carriers (63); Insurance Agents, Brokers, and Service (64)	Insurance Carriers and Related Activities (524)
Real Estate (65)	Real Estate (531)
Holding and Other Investment Offices (67)	Lessors of Nonfinancial Intangible Assets, except Copyrighted Works (533); Management of Companies and Enterprises (551)
Hotels, Rooming Houses, Camps, and Other Lodging Places (70)	Accommodation (721)
Personal Services (72)	Personal and Laundry Services (812)
Business Services (73)	Internet Service Providers, Web Search Portals, and Data Processing Services (518); Other Information Services (519); Rental and Leasing Services (532); Administrative and Support Services (561)
Automotive Repair, Services, and Parking (75); Miscellaneous Repair Services (76)	Repair and Maintenance (811)
Motion Pictures (78)	Motion Picture and Sound Recording Industries (512)
Amusement and Recreational Services (79)	Scenic and Sightseeing Transportation (487); Performing Arts, Spectator Sports, and Related Industries (711); Amusement, Gambling, and Recreation Industries (713)
Health Services (80)	Ambulatory Health Care Services (621); Hospitals (622); Nursing and Residential Care Facilities (623)

Educational Services (82)	Educational Services (611)
Social Services (83)	Social Assistance (624)
Museums, Art Galleries, Botanical and Zoological Garden (84)	Museums, Historical Sites, and Similar Institutions (712)
Engineering and Management Services (87)	Professional, Scientific, and Technical Services (541)

Note - The table lists the mapping of 2-digit SIC industries in Compustat to industrial codes in the Quarterly Census of Employment and Wages and County Business Patterns.

Appendix Table 4 – Mapping Industrial Codes between Compustat and the Current Population Survey

Industry (2-digit SIC code)	Industry (3-digit Industrial Code from the CPS)
Agricultural Production—Crops (1); Agricultural Production—Livestock (2); Agricultural Services (7)	Agriculture (105)
Forestry (8)	Forestry (116)
Fishing, hunting, and trapping (9)	Fisheries (126)
Metal mining (10)	Metal mining (206)
Coal mining (12)	Coal mining (216)
Oil and gas extraction (13)	Crude petroleum and natural gas extraction (226)
Nonmetallic minerals, except fuels (14)	Nonmetallic mining and quarrying, except fuel (236)
General Building Contractors (15); Heavy Construction Contractors (16)	Construction (246)
Food and kindred products (20)	Meat products (406); Dairy products (407); Canning and preserving fruits, vegetables, and sea foods (408); Grain-mill products (409); Bakery products (416); Confectionery and related products (417); Beverage industries (418); Miscellaneous food preparations and kindred products (419); Not specified food industries (426)
Tobacco manufactures (21)	Tobacco manufactures (429)
Textile mill products (22)	Knitting mills (436); Dyeing and finishing textiles, except knit goods (437); Carpets, rugs, and other floor coverings (438); Yarn, thread, and fabric mills (439); Miscellaneous textile mill products (446); Synthetic fibers (466)
Apparel and other textile products (23)	Apparel and accessories (448); Miscellaneous fabricated textile products (449)
Lumber and wood products (24)	Logging (306); Sawmills, planing mills, and millwork (307); Miscellaneous wood products (308)
Furniture and fixtures (25)	Furniture and fixtures (309)
Paper and allied products (26)	Pulp, paper, and paperboard mills (456); Paperboard containers and boxes (457); Miscellaneous paper and pulp products (458)
Printing and publishing (27)	Printing, publishing, and allied industries (459)
Chemicals and allied products (28)	Drugs and medicines (467); Paints, varnishes, and related products (468); Miscellaneous chemicals and allied products (469)
Petroleum and coal products (29)	Petroleum refining (476); Miscellaneous petroleum and coal products (477)

Rubber and miscellaneous plastics products (30)	Rubber products (478)
Leather and leather products (31)	Leather: tanned, curried, and finished (487); Footwear, except rubber (488); Leather products, except footwear (489)
Stone, clay, glass, and concrete products (32)	Glass and glass products (316); Cement, concrete, gypsum and plaster products (317); Structural clay products (318); Pottery and related products (319); Miscellaneous nonmetallic mineral and stone products (326)
Primary metal industries (33)	Blast furnaces, steel works, and rolling mills (336); Other primary iron and steel industries (337); Primary nonferrous industries (338); Not specified metal industries (348)
Fabricated metal products (34)	Fabricated steel products (346); Fabricated nonferrous metal products (347)
Industrial machinery and equipment (35)	Agricultural machinery and tractors (356); Office and store machines and devices (357); Miscellaneous machinery (358)
Electrical and electronic equipment (36)	Electrical machinery, equipment, and supplies (367)
Transportation equipment (37)	Motor vehicles and motor vehicle equipment (376); Aircraft and parts (377); Ship and boat building and repairing (378); Railroad and miscellaneous transportation equipment (379)
Instruments and related products (38)	Professional equipment and supplies (386); Photographic equipment and supplies (387); Watches, clocks, and clockwork-operated devices (388)
Miscellaneous manufacturing industries (39)	Miscellaneous manufacturing industries (399); Not specified manufacturing industries (499)
Railroad Transportation (40)	Railroads and railway express service (506)
Local and interurban passenger transit (41)	Street railways and bus lines (516); Taxicab service (536)
Motor freight transportation and warehousing (42)	Trucking service (526); Warehousing and storage (527)
U.S. Postal Service (43)	Postal service (906)
Water transportation (44)	Water transportation (546)
Transportation by air (45)	Air transportation (556)
Pipelines, except natural gas (46)	Petroleum and gasoline pipe lines (567)
Transportation services (47)	Services incidental to transportation (568)
Communications (48)	Telephone (578); Telegraph (579); Radio broadcasting and television (856)
Electric, gas, and sanitary services (49)	Electric light and power (586); Gas and steam supply systems (587); Electric-gas utilities (588); Water supply (596); Sanitary services (597); Other and not specified utilities (598)

Wholesale trade--durable goods (50)	Motor vehicles and equipment (606); Electrical goods, hardware, and plumbing equipment (616); Machinery, equipment, and supplies (617)
Wholesale trade--nondurable goods (51)	Drugs, chemicals, and allied products (607); Dry goods apparel (608); Food and related products (609); Petroleum products (618); Farm products--raw materials (619)
Building materials, hardware, garden supply, & mobile (52)	Hardware and farm implement stores (686); Lumber and building material retailing (687)
General merchandise stores (53)	General merchandise stores (646); Five and ten cent stores (647)
Food stores (54)	Food stores, except dairy products (636); Dairy products stores and milk retailing (637)
Automotive dealers and gasoline service stations (55)	Motor vehicles and accessories retailing (667); Gasoline service stations (668)
Apparel and accessory stores (56)	Apparel and accessories stores, except shoe (656); Shoe stores (657)
Furniture, home furnishings and equipment stores (57)	Furniture and house furnishing stores (658); Household appliance and radio stores (659)
Eating and drinking places (58)	Eating and drinking places (679)
Miscellaneous retail (59)	Drug stores (669); Liquor stores (688); Retail florists (689); Jewelry stores (696); Fuel and ice retailing (697); Miscellaneous retail stores (698); Not specified retail trade (699)
Depository Institutions (60); Non-depository Credit Institutions (61)	Banking and credit agencies (716)
Security, commodity brokers, and services (62)	Security and commodity brokerage and investment companies (726)
Insurance carriers (63)	Insurance (736)
Real estate (65)	Real estate (746)
Hotels, rooming houses, camps, and other lodging plac (70)	Hotels and lodging places (836)
Personal services (72)	Laundering, cleaning, and dyeing services (846); Dressmaking shops (847); Shoe repair shops (848); Miscellaneous personal services (849)
Business services (73)	Advertising (806); Miscellaneous business services (808)
Automotive repair, services, and parking (75)	Auto repair services and garages (816)
Miscellaneous repair services (76)	Miscellaneous repair services (817)

Motion pictures (78)	Theaters and motion pictures (857)
Amusement and recreational services (79)	Bowling alleys, and billiard and pool parlors (858)
Amusement and recreational services (79)	Miscellaneous entertainment and recreation services (859)
Health services (80)	Medical and other health services, except hospitals (868); Hospitals (869)
Legal services (81)	Legal services (879)
Educational services (82)	Educational services (888)
Social services (83)	Welfare and religious services (896)
Membership organizations (86)	Nonprofit membership organizations (897)
Engineering and management services (87)	Accounting, auditing, and bookkeeping services (807); Engineering and architectural services (898)
Private households (88)	Private households (826)
Miscellaneous services (89)	Miscellaneous professional and related services (899)
Agricultural Production--Crops (1); Agricultural Production--Livestock (2); Agricultural Services (7)	Agriculture (105)
Forestry (8)	Forestry (116)
Fishing, hunting, and trapping (9)	Fisheries (126)
Metal mining (10)	Metal mining (206)
Coal mining (12)	Coal mining (216)
Oil and gas extraction (13)	Crude petroleum and natural gas extraction (226)
Nonmetallic minerals, except fuels (14)	Nonmetallic mining and quarrying, except fuel (236)
General Building Contractors (15); Heavy Construction Contractors (16)	Construction (246)
Food and kindred products (20)	Meat products (406); Dairy products (407); Canning and preserving fruits, vegetables, and seafoods (408); Grain-mill products (409); Bakery products (416); Confectionery and related products (417); Beverage industries (418); Miscellaneous food preparations and kindred products (419); Not specified food industries (426)
Tobacco manufactures (21)	Tobacco manufactures (429)
Textile mill products (22)	Knitting mills (436); Dyeing and finishing textiles, except knit goods (437); Carpets, rugs, and other floor coverings (438); Yarn, thread, and fabric mills (439); Miscellaneous textile mill products (446); Synthetic fibers (466)
Apparel and other textile products (23)	Apparel and accessories (448); Miscellaneous fabricated

	textile products (449)
Lumber and wood products (24)	Logging (306); Sawmills, planing mills, and millwork (307); Misc wood products (308)
Furniture and fixtures (25)	Furniture and fixtures (309)
Paper and allied products (26)	Pulp, paper, and paperboard mills (456); Paperboard containers and boxes (457); Miscellaneous paper and pulp products (458)
Printing and publishing (27)	Printing, publishing, and allied industries (459)
Chemicals and allied products (28)	Drugs and medicines (467); Paints, varnishes, and related products (468); Miscellaneous chemicals and allied products (469)
Petroleum and coal products (29)	Petroleum refining (476); Miscellaneous petroleum and coal products (477)
Rubber and miscellaneous plastics products (30)	Rubber products (478)
Leather and leather products (31)	Leather: tanned, curried, and finished (487); Footwear, except rubber (488); Leather products, except footwear (489)
Stone, clay, glass, and concrete products (32)	Glass and glass products (316); Cement, concrete, gypsum and plaster products (317); Structural clay products (318); Pottery and related products (319); Miscellaneous nonmetallic mineral and stone products (326)
Primary metal industries (33)	Blast furnaces, steel works, and rolling mills (336); Other primary iron and steel industries (337); Primary nonferrous industries (338); Not specified metal industries (348)
Fabricated metal products (34)	Fabricated steel products (346); Fabricated nonferrous metal products (347)
Industrial machinery and equipment (35)	Agricultural machinery and tractors (356); Office and store machines and devices (357); Miscellaneous machinery (358)
Electrical and electronic equipment (36)	Electrical machinery, equipment, and supplies (367)
Transportation equipment (37)	Motor vehicles and motor vehicle equipment (376); Aircraft and parts (377); Ship and boat building and repairing (378); Railroad and miscellaneous transportation equipment (379)
Instruments and related products (38)	Professional equipment and supplies (386); Photographic equipment and supplies (387); Watches, clocks, and clockwork-operated devices (388)
Miscellaneous manufacturing industries (39)	Miscellaneous manufacturing industries (399); Not specified manufacturing industries (499)
Railroad Transportation (40)	Railroads and railway express service (506)
Local and interurban passenger transit (41)	Street railways and bus lines (516); Taxicab service (536)

Motor freight transportation and warehousing (42)	Trucking service (526); Warehousing and storage (527)
U.S. Postal Service (43)	Postal service (906)
Water transportation (44)	Water transportation (546)
Transportation by air (45)	Air transportation (556)
Pipelines, except natural gas (46)	Petroleum and gasoline pipe lines (567)
Transportation services (47)	Services incidental to transportation (568)
Communications (48)	Telephone (578); Telegraph (579); Radio broadcasting and television (856)
Electric, gas, and sanitary services (49)	Electric light and power (586); Gas and steam supply systems (587); Electric-gas utilities (588); Water supply (596); Sanitary services (597); Other and not specified utilities (598)
Wholesale trade--durable goods (50)	Motor vehicles and equipment (606); Electrical goods, hardware, and plumbing equipment (616); Machinery, equipment, and supplies (617)
Wholesale trade--nondurable goods (51)	Drugs, chemicals, and allied products (607); Dry goods apparel (608); Food and related products (609); Petroleum products (618); Farm products--raw materials (619)
Building materials, hardware, garden supply, & mobile (52)	Hardware and farm implement stores (686); Lumber and building material retailing (687)
General merchandise stores (53)	General merchandise stores (646); Five and ten cent stores (647)
Food stores (54)	Food stores, except dairy products (636); Dairy products stores and milk retailing (637)
Automotive dealers and gasoline service stations (55)	Motor vehicles and accessories retailing (667); Gasoline service stations (668)
Apparel and accessory stores (56)	Apparel and accessories stores, except shoe (656); Shoe stores (657)
Furniture, home furnishings and equipment stores (57)	Furniture and house furnishing stores (658); Household appliance and radio stores (659)
Eating and drinking places (58)	Eating and drinking places (679)
Miscellaneous retail (59)	Drug stores (669); Liquor stores (688); Retail florists (689); Jewelry stores (696); Fuel and ice retailing (697); Miscellaneous retail stores (698); Not specified retail trade (699)
Depository Institutions (60); Non-depository Credit Institutions (61)	Banking and credit agencies (716)

Security, commodity brokers, and services (62)	Security and commodity brokerage and investment companies (726)
Insurance carriers (63)	Insurance (736)
Real estate (65)	Real estate (746)
Hotels, rooming houses, camps, and other lodging places (70)	Hotels and lodging places (836)
Personal services (72)	Laundering, cleaning, and dyeing services (846); Dressmaking shops (847); Shoe repair shops (848); Miscellaneous personal services (849)
Business services (73)	Advertising (806); Miscellaneous business services (808)

Note - The table lists the mapping of 2-digit SIC industries in Compustat to the 1950 Census industrial codes in IPUMS Current Population Survey files.