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Effects of a Credit Crunch on Employment by Sector in the U.S.: How have Recessions Associated with Credit Crunches Differed from Other Recessions?

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ABSTRACT. Economists debate how important credit availability is to sustaining real economic growth. Episodes of financial instability and tight credit create a "credit crunch." This paper investigates the effects of a credit crunch on employment in broad sectors of the U.S. economy. Monthly employment data is used to compare changes in employment by sector during recessions associated with a credit crunch and recessions not associated with a credit crunch. The results suggest that there is not a significant difference in how employment is affected in these broad sectors. The evidence supports the idea of a financial business cycle.

I. Introduction

In today's world of global financial markets, the importance of credit availability to sustaining real economic growth is much debated. The purpose of this paper is to examine how a reduction in credit availability, or a "credit crunch," affects employment in each supersector (hereafter "sector") of the United States. The findings may be of particular interest to theorists of the bank lending channel of monetary policy transmission or the "credit view". Firms in each sector may also want to know their vulnerability to a credit crunch so they could alter their business plans to better prepare for financial instability in the economy. Finally, given the current role of the federal government as a large spender, the information could be useful to help determine where to allocate the funds. Sectors more vulnerable to a credit crunch may warrant more government assistance than sectors that are hurting primarily as a result of fundamental economics.

Economists have long debated the question of what is the most influential channel of monetary policy transmission (Hubbard 2008, 642). The credit view or bank lending channel has become more influential in the last few decades as new financial instruments have been created. The credit view assumes that while monetary policy affects short-term interest rates directly, it also affects the availability and terms of new credit

supplied by financial institutions. Therefore, shifts in aggregate demand partly depend on these institutions' ability and willingness to lend. This theory assumes that banks and other lending institutions play a special role in the economy by providing credit to borrowers who rely on external financing (Bernanke 1993, 56).

Monthly employment data is used from each of the 14 sectors as identified by the U.S. Bureau of Labor Statistics (BLS) to analyze the effects on the broader categories of the U.S. economy. The BLS uses the North American Industry Classification System (NAICS) to "group establishments into industries based on the activity in which they are primarily engaged."

II. Role of Credit in the Macroeconomy

New Keynesians argue for the importance of credit in the economy while new classical and especially real business cycle theorists tend to diminish the role of money in general as having negligible real effects on the economy (Hubbard 2008, 614-618). Bernanke discusses the effect of the credit creation process, which he defines as "the process by which, in exchange for paper claims, the savings of specific individuals or firms are made available for the use of other individuals or firms" (1993, 50). The process is meant to efficiently direct an economy's savings into the most productive uses (51).

Financial intermediation is meant to facilitate the transfer of funds from people willing to give up consumption now to borrowers who want to spend more now. In return, the lender receives interest. The process is made more efficient by banks or other intermediaries who solve the problems of asymmetric and imperfect information between lenders and borrowers. Certain banks, or even specific loan officers at a bank, may specialize in a certain area of lending. They can use their expertise to evaluate potential borrowers much more efficiently than a typical household lender. Banks and similar intermediaries are "special" in their ability to efficiently transfer funds in this way (Bernanke 1993, 53).

As financial markets have evolved, traditional economic models have been adjusted to take into account the role of credit. For example, Bernanke and Blinder modify the conventional IS-LM model and add a third financial asset called "bank loans" in addition to "money" and "bonds." The model allows them to look at the effects of money demand shocks compared to credit demand shocks. They found that credit

demand has become more stable than money demand since 1979. Because of this, it may be more effective for a central bank to target credit levels and the health of credit markets in general (Bernanke and Blinder 1988, 438-439).

III. Defining a Credit Crunch

The purpose of this paper is to investigate the effects of a "credit crunch" on employment in the U.S. economy. Before going any further, it is important to note that there is some debate as to how to define a credit crunch. In general it has to do with the lack of credit availability. A controversy arises, however, when determining the cause of decreased credit availability. There are no universally accepted measurements of credit availability and much is left to anecdotal evidence (Owens and Schreft 1995, 64). Bernanke and Lown (1991) researched the recession of 1990-1991 and the accompanying decline in credit availability. They define a credit crunch as "a significant leftward shift in the supply curve of bank loans, holding constant both the safe real interest rate and the quality of potential borrowers" (207). Implicit in this definition is that a credit crunch must come from the supply side (banks) and not from the demand side (borrowers).

Hubbard uses a definition that is only slightly different in wording, but is broader in scope. His definition is "a decline in either the ability or the willingness of banks to lend at any particular interest rate" (Hubbard 2008, 640). Notice that this allows for the weakness of potential borrowers' balance sheets to be a factor in causing a credit crunch, which is quite different from Bernanke and Lown's narrower definition. Both definitions allow for other exogenous shocks like increased regulation or credit controls to be the cause since this causes a *leftward shift* in the supply of bank loans according to the first definition and a decline in the *ability* of banks to lend according to the second definition.

Other economists argue that credit crunches are a typical stage of every business cycle. Their claim is that a financial business cycle occurs simultaneously with the typical business cycle. According to Sinai, the financial cycle adds two stages to the widely accepted economic business cycle. He claims that there is a pre-crunch period where instability in the financial system is felt by households, businesses, and financial institutions. A crunch or financial crisis is the ultimate result, or turning point, in every economic downturn. The second additional stage

introduced by this view is the reliquification stage where enough liquidity is built up to restructure the balance sheets of households and businesses. The result of this stage is the recovery/expansion stage of the typical business cycle (Sinai 1992, 8-10).

It is important to identify the beginning and ending dates for credit crunches. Because the definition is debatable among economists, the dates are also debatable. Research done by Owens and Schreft (1995) gives a widely accepted timeline to identify when they believed credit crunches occurred between 1960 and 1992 (65). Their definition is "a period of sharply increased non-price credit rationing" (Owens and Schreft 1995, 63). They point out that the word *sharply* is important and is what makes a credit crunch differ from a typical stage of tight credit that usually accompanies a recession. They also agree with Hubbard that it may or may not be independent of the quality of potential borrowers (Owens and Schreft 1995, 64). The dates as determined by their research will be used for studying the effects of credit crunches on employment up until 1992.

TABLE 1

U.S. Credit Crunch Periods: 1969-Present

Recession w/ Credit Crunch	Credit Crunch Dates (by Quarter)	Recession Date (by month)
1969	1969:II - 1969:8IV	1969:12 - 1970:11
1980	1980:I - 1980:II	1980:1 - 1980:7
1990-1992	1990:II - 1992:IV	1990:7 - 1991:3
2007-Present	2007:IV - Present	2007:12 - Present

Recession without Credit Crunch		Recession Date (by month)
1973-1975	NA	1973:11 - 1975:3
1981-1982	NA	1981:7 - 1982:11
2001	NA	2001:3 - 2001:11

Because there may have been a credit crunch after 1992, another source is needed to determine when one may have occurred. There was a period of tight credit in the fall of 1998 in the U.S., but there is not much supporting research that would label this a crunch. In the last two

years, financial conditions have deteriorated. There is much supporting research that concludes we are presently in a credit crunch. It appears that this period of sharply increased non-price rationing began after September 2007 when Countrywide, a large U.S. mortgage broker, reported large losses and two European banks closed hedge funds that were in trouble (Mizen 2008, 533). September 2007 will be the beginning date used in this paper for the current credit crunch. The official beginning and ending dates for recessions in the U.S. come from the National Bureau of Economic Research.

IV. Literature Review

There has been much research done that attempts to quantify the effect of financial crises on real economic activity. One such paper by Dell' Ariccia, Detragiache, and Rajan (2008) looks at the impact of banking crises on specific industries in a cross-section of countries. It is difficult to separate the effects of a banking crisis from the effects of a recession. They attempt to do so by comparing the output growth of industries more dependent on external finance with those less dependent during a banking crisis. Banking crises across countries are identified by relying on case studies done in other research. There are two different variables that measure dependence on external finance. The first is by the percentage of investment not financed by retained earnings. The second is by the average firm size in each industry. The second approach assumes that smaller firms are more dependent on domestic bank financing (90). They find that banking crises do have independent real effects on the economy as more financially dependent firms perform relatively worse during these episodes. They also find that the effect is larger in developing countries because access to foreign finance is limited (107-108).

In research that uses only U.S. economic data (which may be more relevant for this paper) Guichard and Turner (2008) attempt to quantify the effects of financial instability on output. The authors construct a financial conditions index that accounts for six different variables that are known to have an effect on economic activity: real short-term interest rates, real long-term interest rates, the real effective exchange rate, bond spreads, stock market capitalization and real housing wealth, and lending standards (7-8). The lending standards variable comes from data from the Federal Reserve Senior Loan Officer Survey. Its inclusion is what sets this research apart. It is reasonable to assume that this variable is one of

the better measures of the tightness of credit in the economy. In their regression, the coefficient for the lending standards variable is correctly signed and statistically significant. In particular, a ten percentage point tightening in the survey responses (which means that ten percent of loan officers surveyed decreased their willingness to lend) reduces GDP growth by about a ¼ of a percent after four to six quarters (9). Similar research by Lown and Morgan (2006) also find a statistically significant real shock to GDP as a result of tightening credit standards as measured by the same survey (1581).

V. Methodology

The objective of this paper is to determine if employment in each sector is affected differently by a recession that is accompanied by a credit crunch than by a recession not accompanied by a credit crunch in the United States. It may be worthwhile to look into the question to better understand the role of credit in the economy and allow firms and governments to make more informed decisions. Monthly employment data was used as a measurement for each sector because this statistic is often used as a proxy for economic activity. I chose to use the 14 supersectors as identified by the BLS. Four of these are goods-producing: Natural Resources and Mining, Construction, Manufacturing- Durable, and Manufacturing- Non Durable. The remaining ten supersectors are service-providing industries: Wholesale Trade, Retail Trade, Transportation and Warehousing, Utilities, Information, Financial Activities, Professional and Business Services, Education and Health Services, Leisure and Hospitality Services, and Other Services.

Employment levels were used instead of the unemployment rate because the latter can change over time as a result of changes in labor participation rates, which can be affected by multiple exogenous factors. In addition, unemployment by sector only takes account of experienced workers and cannot assign new entrants to any specific sector. Participation rates are not available by sector. Employment data comes from the Bureau of Labor Statistics and is seasonally adjusted. The natural log of the employment amounts will be used so that the difference (gap) from their long-term trend will be in percentage terms, giving a gap between actual and potential level of employment.

To compare the employment levels with their long term "natural rate", a moving average was used. This was achieved by averaging the

previous and subsequent 120 months (ten years each way) for each month to create a smooth, moving 20 year trend for each month. The trend of the natural log of the employment level found for each month should give an accurate measure of where employment would trend to. In order to include the most recent economic downturn and credit crunch in the analysis, a forecast for the future 120 months was needed to serve as a measure of future values. The natural log of employment in each sector was regressed on a constant and twelve lags to construct these forecasts. A regression was run to find growth coefficients for each sector and these were used to make the forecast. The use of forecasted data to create a moving trend is known as padding. This measure of the trend follows a method used by Stock and Watson (2007) to generate activity gaps to evaluate inflation forecasts. Because monthly data is available as far back as 1939 and this paper only looks at employment data after 1960, it was not necessary to backcast to find the moving average for the earliest years in this study. Also, it would not have been beneficial to use data before 1948 when computing the moving average because of the influence of World War II.

The moving average for each sector was considered the natural log of full-employment, a level that was used as a potential growth rate specific to each sector. The natural log of the actual monthly employment data was then taken dating back to 1960. Comparing these two levels, the percentage deviation from full-employment in each sector is found by subtracting the natural log of the moving average for each date from the natural log of the actual employment level at that date. The difference between the two levels is the "gap" referred to earlier. A negative number shows a growth rate that is lower than expected and a positive number shows a higher growth rate than expected. In each sector, the deviation from trend in recessions with a credit crunch was compared to recessions without a credit crunch. Since 1960, there have been four recessions associated with a credit crunch and three recessions not associated with a credit crunch, according to Owens and Schreft (1995) and Mizen (2008).

There are multiple ways to view the results. The method used in this research examines the change in deviation from trend one year prior to a recession compared to the deviation during the recession. This method takes into account changes in employment relative to pre-recessionary levels. The average deviation from trend of the 12 months prior to the beginning of the recession was subtracted from the average deviation

from trend throughout all months during that recession. The result gives a change in deviation from trend. A negative number shows falling employment growth and a positive number shows rising employment growth. Therefore, each recession has a single change in deviation from long-term trend employment for every sector. These percentages can be examined to see the effect on employment in each sector.

In order to compare recessions with a credit crunch to recessions without a credit crunch, the changes in deviation from trend were averaged by sector. Therefore, each sector has a statistic for average change in deviation for recessions with a credit crunch and recessions without a credit crunch. These numbers show how the growth rate of employment changed in each recession for each specific sector. If a credit crunch negatively affects employment in a sector, we would expect this percentage to be lower (more negative) than the average for recessions without a credit crunch.

A second method used to investigate the effects of a credit crunch on employment uses raw employment data (seasonally adjusted) to compare employment growth by sector to aggregate employment growth. For each recession, the growth rate of aggregate employment is calculated and used as a benchmark to gauge how individual sectors contributed to negative employment growth. Every sector in each recession will have a single statistic for difference from aggregate employment growth rate. A negative value indicates a lower growth rate for that sector than aggregate employment and a positive value indicates a higher growth rate. If a sector consistently shows a larger negative difference from aggregate employment growth during recessions associated with a credit crunch than those recessions without, it would provide evidence that it is disproportionately affected when credit is less available.

VI. Results

The first technique used in this paper provides evidence that there is not a significant difference in how employment by sector is affected during recessions associated with credit crunches compared with other recessions. Changes in deviation from trend one year prior to a recession compared to the deviation during the recession are not consistently different enough in any sectors to show significant evidence that employment is affected differently. The results can be found in Table 2.

TABLE 2

Change in Average Deviation from Trend
(Avg. Deviation During Recession - Avg. Deviation 1 Year Prior to Recession)

	Recessions with a Credit Crunch					Recession w/out a Credit Crunch			
	1969	**1980**	**1990**	**2007**	**Avg.**	**1973**	**1981**	**2001**	**Avg.**
Mining	-1.98%	4.70%	2.96%	5.12%	**2.70%**	7.49%	7.48%	0.81%	**5.26%**
Construction	-1.81%	-2.50%	-6.95%	-5.88%	**-4.28%**	-3.91%	-7.90%	-0.65%	**-4.16%**
Man-Durable	-6.26%	-2.72%	-2.91%	-2.52%	**-3.60%**	-1.11%	-5.33%	-4.60%	**-3.68%**
Man-Non Du	-1.46%	-1.34%	-0.72%	0.74%	**-0.70%**	-2.54%	-2.29%	-2.63%	**-2.48%**
Whole Trade	-0.40%	-0.18%	-1.82%	-0.71%	**-0.78%**	0.85%	-2.19%	-3.09%	**-1.48%**
Retail Trade	-0.79%	-1.45%	-2.42%	-1.00%	**-1.41%**	-1.34%	-2.29%	-1.13%	**-1.59%**
Trans & Warehs	-0.83%	-1.18%	-0.56%	-0.76%	**-0.83%**	0.71%	-3.87%	-2.07%	**-1.74%**
Utilities	1.83%	0.89%	0.51%	1.02%	**1.06%**	0.40%	2.26%	0.86%	**1.17%**
Information	-1.78%	-0.85%	-0.09%	-0.69%	**-0.85%**	-0.65%	-2.48%	-1.34%	**-1.49%**
Financial	0.13%	0.55%	-1.50%	-2.35%	**-0.79%**	-1.06%	-1.65%	0.69%	**-0.67%**
Prof Services	-1.28%	-0.19%	-2.97%	-1.95%	**-1.60%**	-0.34%	-1.88%	-3.86%	**-2.03%**
Ed & Health Srvs.	-0.95%	0.14%	0.20%	-0.10%	**-0.18%**	-0.02%	-1.91%	0.58%	**-0.45%**
Leisure &Hospitality	-0.60%	-1.41%	-1.31%	-1.28%	**-1.15%**	-1.17%	-2.43%	-0.50%	**-1.36%**
Other Services	-0.93%	0.12%	-1.23%	-0.57%	**-0.68%**	-0.06%	-1.59%	0.44%	**-0.40%**

Two sectors that do show greater negative deviation from trend during credit crunches are the construction and financial service sectors. These results seem to be consistent with economic forces that occur during a credit crunch. Construction relies heavily on external financing and firms may have to decrease employment when credit is less available. Financial services firms are naturally hard hit during credit crunches as lending decreases. In this case, the need for loan officers and other supporting employees may decrease and lead to decreased employment. The difference is very small and inconsistent, however, so one cannot conclude it results directly from a credit crunch.

The second method used also provides evidence that there is not a significant difference in how employment by sector is affected by recessions associated with credit crunches. No sectors showed consistently large negative differences from aggregate employment growth rates during recessions associated with credit crunches compared to other recessions. Table 3 shows the results. The descriptive statistics provide evidence that employment is not affected disproportionately for any of the sectors.

TABLE 3

Sector Employment Growth Compared to Aggregate Employment Growth

	Recessions with a Credit Crunch					Recession w/out a Credit Crunch			
	1969	**1980**	**1990**	**2007**	**Avg.**	**1973**	**1981**	**2001**	**Avg.**
Mining	0.10%	4.37%	-0.02%	8.56%	**3.25%**	14.16%	-8.92%	0.30%	**1.85%**
Construction	0.40%	-4.34%	-6.17%	-7.41%	**-4.38%**	-11.17%	-4.71%	0.64%	**-5.08%**
Man-Durable	-8.92%	-4.91%	-3.07%	-6.26%	**-5.79%**	-7.64%	-10.62%	-5.70%	**-7.99%**
Man-Non Dur	-0.85%	-1.48%	-0.07%	-2.30%	**-1.17%**	-6.30%	-2.32%	-3.27%	**-3.96%**
Whole Trade	2.63%	1.25%	-0.09%	-0.29%	**0.87%**	4.45%	0.72%	-0.15%	**1.68%**
Retail Trade	2.69%	0.86%	-0.46%	-0.26%	**0.71%**	3.60%	3.07%	0.49%	**2.39%**
Trans & Warehs	2.12%	-1.46%	1.01%	-0.97%	**0.18%**	-0.53%	-2.66%	-2.44%	**-1.88%**
Utilities	4.24%	3.27%	0.71%	5.67%	**3.48%**	2.86%	6.91%	1.79%	**3.85%**
Information	-0.35%	-0.59%	1.02%	0.11%	**0.05%**	-1.58%	-1.24%	-3.12%	**-1.98%**
Financial	4.89%	3.02%	0.87%	-0.06%	**2.18%**	4.64%	4.45%	2.39%	**3.83%**
Prof Services	2.85%	2.34%	-0.59%	-1.55%	**0.76%**	4.94%	4.08%	-2.06%	**2.32%**
Ed & Health Srvs.	4.38%	3.49%	4.74%	6.40%	**4.75%**	7.80%	6.05%	4.33%	**6.06%**
Leisure &Hospitality	3.28%	1.29%	0.99%	1.36%	**1.73%**	4.37%	3.85%	1.65%	**3.29%**

New classical economic theory is consistent with the findings in this research. The view that monetary variables have negligible real effects on economic activity is supported by employment statistics during recessions since 1969. The work of Sinai (1992), Minsky (1975), and other proponents of a financial business cycle is also consistent with the results from this study. It may be possible that credit crunches are a part of every business cycle, and do not have significantly different effects from recessions that do not experience a credit crunch. While the severity of financial instability varies from cycle to cycle, these economists claim that a credit crunch is part of a systemic financial cycle.

The methodology used in this research may be inadequate to fully determine how credit crunches affect employment by sector in the U.S. Because the sectors are so broadly categorized, the average firm size in each sector is not taken into account. Research has shown that smaller firms are disproportionately affected by lack of credit availability (Dell' Ariccia, Detragiache, and Rajan 2008, 90), but this study makes no assumptions about average firm size in each sector. There is often a lag between employment and economic growth. Because this research uses employment as a proxy for economic activity, it may have been useful to

look at data past when recessions occurred. Econometric research using time-series data would be useful to investigate the lag effect on employment levels.

VII. Conclusion

Global financial markets have become increasingly complex in recent decades. Episodes of financial instability labeled as "credit crunches" may appear to have special effects on employment. However, employment by sector during recessions associated with a credit crunch does not appear to be affected significantly different than recessions without a credit crunch. The results are consistent with both new classical economic theory and the financial business cycle theory. Evidently, it may be difficult to distinguish sectors that are more vulnerable to employment loss during periods labeled as a credit crunch. Further research may be beneficial to look for significant financial variables affecting employment by sector. A regression could be run using various financial measures as independent variables and employment by sector as the dependent variable.

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