# Unemployment Insurance as an Automatic Economic Stabilizer —Evidence from Bank Lending

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October 2017

**Abstract**

We find that unemployment insurance (UI) is a double-edged sword from the perspective of bank lending. UI protection reduces income uncertainty and leads to a greater demand for bank credit, driven by more consumer loans and industrial and commercial loans. However, UI also increases the expected unemployment risk, dampening the demand for long-term mortgage loans. Unemployment insurance improves loan quality in normal

periods, but the association reverses in bad economic conditions. Mistaking higher UI as a positive signal, banks reduce their provisions. These factors combined lead to a more severe credit crunch during a recession for banks in states with higher UI. While improving bank profits, the increased credit demand can also elevate bank risk as borrowers' creditability deteriorates. Our results suggest that the contribution of UI as an automatic economic stabilizer should be evaluated more cautiously.

**Key words**: Unemployment Insurance, Automatic Economic Stabilizer, Bank Lending, Loan Quality, Procyclicality

**Unemployment Insurance as an Automatic Economic Stabilizer**

**—Evidence from Bank Lending**

## 1. Introduction

Unemployment insurance (UI hereafter) provides a temporary cash flow to unemployed workers. It helps them to buffer a negative income shock and smooth their consumption (Gruber 1997; Browning and Crossley 2001; Bloemen and Stancanelli 2005; Chetty and Szeidl 2007). As an important fiscal transfer program, it has long been recognized as an important component of automatic fiscal stabilization (Auerbach 2009; Feldstein 2009; Blanchard, Dell'Ariccia, and Mauro 2010). The benefits of UI extend beyond smoothing consumption for individuals. It also helps to reduce macroeconomic fluctuations (Di Maggio and Kermani 2017). In this study we examine the economic effects of UI and its contribution as an automatic economic stabilizer from the perspective of bank lending. Recent studies acknowledge that UI can affect bank loans through the financial channel. For example, Hsu, Matsa, and Melzer (2017) find that UI helps the unemployed to avoid mortgage default.

The most direct question regarding how UI affects bank lending is whether it affects the demand for bank credit. Ex ante, the prediction is unclear, as UI protects workers when they are unemployed but also increases their probability of being fired. On one hand, UI reduces workers' income uncertainty when they are unemployed. Engen and Gruber (2001) find that UI protection reduces workers' need for precautionary saving. They show that reducing UI benefits would increase gross financial asset holdings. Gormley, Liu, and Zhou (2010) document that a lack of insurance against large, negative wealth shocks is positively associated with a lower participation rate in the stock market

and higher saving rates. The increased consumption due to UI protection can increase the demand for bank credit. For example, the purchase of an automobile is usually financed by auto loans. What is more, the increase in aggregate consumption creates more business opportunities for local firms. Firms thus also require more bank lending to fund these investment opportunities. Agrawal and Matsa (2013) document an alternative channel through which UI may increase the demand for bank lending. They find that, due to UI protection, employees require a lower compensating premium for unemployment risk. This allows firms to increase their leverage under the trade-off theory as the cost of distress risk reduces.

On the other hand, prior studies also argue that UI can increase firms' propensity to fire workers (Topel 1983, 1984). Topel (1983) argues that the experience rating in determining employer taxes is incomplete. The value of benefits received by unemployed workers exceeds their incremental cost to firms, which creates incentives for firms to lay off workers. The increase in expected unemployment risk can thus depress their consumption and reduce their borrowing from banks. In summary, UI reduces income uncertainty but meanwhile increases the expected unemployment risk. UI protection thus creates two offsetting effects on workers' consumption demand and the incentive to borrow from banks. The net effect of UI on bank credit demand is therefore an empirical question.

Another interesting question is whether UI can affect the bank loan portfolio quality. In normal periods, when the aggregate unemployment rate is mild, borrowers' unemployment is generally idiosyncratic and short-lived. UI protection thus can help them to avoid loan default more effectively. Therefore, in normal periods UI can reduce

the occurrence of loan default. However, when the economy is trending downwards, the aggregate unemployment rises. The unemployment risk will systematically increase, leading to a higher rate of loan default. On the other hand, since UI benefits' duration is usually capped, the ability of UI to help repay interest can become depleted if the economy is in a long-lasting recession. Since workers borrow more when there are higher UI benefits, the probability of loan default is likely to be higher when there is an economic recession. Our second set of tests thus examines whether UI affects bank loan portfolio quality, especially when the economy is in a recession.

An important issue regarding the interaction of bank lending and the business cycle is the lending procyclicality. The contraction of bank lending during an economic recession potentially aggravates the volatility of business cycles. One cause of procyclicality is that, due to information asymmetry and market friction, the cost of a credit intermediary increases during an economic recession (Bernanke 1983). Banks' minimum regulatory capital regulation also contributes to the lending procyclicality, since it is costlier to replenish capital during a recession. Banks cut their lending to maintain their capital level (Bernanke, Lown, and Friedman 1991; Heuvel, 2009). UI can help to smooth consumption and help unemployed workers to avoid default; it potentially reduces lenders' concern about credit risk. It also helps to stabilize firms' performance and their ability to repay debt, as consumption is less sensitive to economic shocks. In this case banks are more willing to extend credit when the economy is following a downward trend compared with the situation with no UI protection. However, this benefit can be offset if there are riskier borrowers' due to the UI protection before the recession and the underestimation of their credit risk. When the economic downturn unfolds, and the true

risk of the borrowers is revealed, banks will cut their lending even more, leading to more severe lending procyclicality.

Following prior studies we exploit the exogenous change in state-level UI benefits to examine these questions using US commercial banks' data. We find that more generous UI leads to a higher bank credit demand after controlling bank-specific characteristics that may influence the supply of credit and macroeconomic conditions. A 1 standard deviation increase in the maximum weekly benefits leads to a 4.47 percent increase in bank loan growth and a 9.02 percent increase in the bank loan to asset ratio.

The decomposition of loan types indicates that the increase in lending is driven by the increase in commercial and industrial loans and individual consumer loans, while mortgage loans decrease significantly. This is consistent with two effects of UI. The reduction in income uncertainty due to UI protection allows workers to increase their consumption of less committed commodities. The externality in the consumption increase and the reduced requirement for a compensating premium allow firms to borrow more. However, the increase in unexpected unemployment risk may dampen workers' willingness to commit to large and long-term spending, like purchasing a house.

We find that loan portfolio quality improves during normal periods, as the level of non-performing loans in the total loans is negatively related to the generosity of UI. However, this relation reverses when the economy is in a recession. Banks in states with more generous UI have more non-performing loans during a recession. Using loan loss provision as a more subjective measure of loan quality, we find that more generous UI leads to lower provision. This indicates that workers may overborrow due to UI protection. UI protection is insufficient to protect them from default when the economy is

in a recession. From lenders' perspective, they may underestimate the risk of borrowers, as the increasing demand for credit can be a signal of strong economic performance.

The deterioration of loan quality and under reserving due to the distortion of UI indicates that banks are more vulnerable during an economic recession. This aggravates bank managers' concern about borrowers' credibility and their capital adequacy. Thus, they may reduce lending more severely when the economy is in a downturn. Consistent with this conjecture, we find that lending procyclicality is aggravated by UI. Banks in states with more generous UI cut lending more abruptly during a recession. What is more, the "capital crunch" is more severe when there is generous UI. We find that, when the economy is in a recession, banks in states with more generous UI have a higher association between lending and the regulatory capital ratio. In other words, a bank with lower regulatory capital tends to reduce lending more during recessions. Finally, we find that UI leads to higher bank risk and profitability. UI expands the credit demand and provides more profits for banks. However, UI can increase bank risk, as there are more riskier borrowers.

Taken together, our findings suggest that UI is a double-edged sword from the perspective of bank lending. It improves banks' profit and workers' access to bank loans. However, it also increases banks' risk and loan default when the economy is in a recession. The increase in lending procyclicality suggests that UI can have a negative effect on macroeconomic stability. This effect potentially reduces the benefits of UI in smoothing aggregate consumption documented in recent studies.

Our paper makes the following contributions. We first contribute to the literature that examines the economic consequences of UI. Recent studies reveal that UI can be a useful

tool to stabilize the macroeconomy by smoothing the aggregate consumption. Our study points out some potential negative effects that have been overlooked. Instead of refuting the benefits of UI, our study suggests that this benefit may be mitigated by the deterioration in loan quality in a recession and more procyclical lending.

Our study is also related to the literature that examines the moral hazard cost of distorting incentives due to UI. Prior studies mainly focus on its effect on the job searching incentive or the duration of unemployment spells (see Schmieder and Wachter 2016 for a recent literature review). Our study suggests that UI protection also distorts workers' risk assessment and increases their borrowing to a suboptimal level. Our analysis indicates that the welfare effect of UI from the bank lending perspective is controversial, which adds another parameter to be considered in the design of the optimal UI policy.

We also contribute to the finance literature that examines the determinants of bank lending along business cycles. Recent studies focus on the effect of capital, corporate governance, risk-taking incentive, geographic diversification, accounting treatment, and so on. Our study focuses on the social economic environment in which the banks are operating.

The rest of the paper proceeds as follows. We briefly describe the institutional background of unemployment insurance in the US, summarize the related studies on UI, and develop our hypotheses in Section 2. Section 3 describes our sample construction and summary statistics. Section 4 presents our empirical findings. Section 5 concludes.

## 2. Related studies and hypothesis development

In this section we first briefly describe the institutional background of the unemployment insurance in the US and then provide a literature review and present the hypothesis development of this study.

### 2.1 Background of unemployment insurance

Eligible workers who lose their jobs involuntarily can claim unemployment insurance under the unemployment insurance system in the United States. This temporary income typically can replace about 50 percent of the individual's prior wages for a limited period. In the majority of our sample periods, the maximum duration for which an unemployed worker can claim UI benefits is around 26 weeks. However, the maximum weekly benefits vary significantly across states, as the joint federal-state system allows each state to have the autonomy to set the program parameters. For example, in 2010 the maximum total benefit varied from about $28,000 in Massachusetts to $6,100 in Mississippi. The generosity of UI benefits has also changed substantially over time (Agrawal and Matsa 2013; Hsu, Matsa, and Melzer 2017).

We collect information on each state's benefit schedule from the US Department of Labor's publication "Significant Provisions of State UI Laws." Following Agrawal and Matsa (2013) and Hsu, Matsa, and Melzer (2017), we measure the generosity of UI benefits annually by taking the logarithm of the product of the maximum benefit duration weeks and maximum weekly benefit amount (*Log Total Benefits*). As shown by Agrawal and Masta (2013) and Hsu, Matsa, and Melzer (2017), this measure of UI generosity is significantly related to the actual regular UI benefits paid out, and this association is not directly explained by the state-level macroeconomic conditions, like the unemployment

rate, log of real GDP per capita, house price index growth, employed workers' average annual wage, and union coverage.

Numerous factors cause changes in UI generosity, like the underlying economic conditions and political factors. One concern for the analysis is that these factors might be correlated with bank lending and bank performance. Omitted variables may lead to endogeneity issues. While Hsu, Matsa, and Melzer (2017) find that various state macroeconomic variables and union coverage, conditional on state and year fixed effects, do not explain the determinants of UI generosity, we control bank and year-quarter fixed effects in all our regressions to alleviate the unobserved omitted variables concern (Ho, Huang, and Yen 2016; Robert and Whited, 2013). In a robustness check, we also use the replacement ratio as an alternative measure. The replacement ratio is calculated as the maximum total benefits, the product of the maximum weeks times the maximum weekly benefits, divided by the median state hourly wage.

We next summarize the prior studies that examine the economic consequences of UI for individual behaviors and the macroeconomy. Based on prior theoretical and empirical evidence, we propose our hypotheses on why and how unemployment insurance will affect bank lending, loan quality, bank profitability, and bank risk.

### 2.2 Hypothesis development

We first summarize the existing theoretical and empirical evidence and postulate the relation between UI and bank credit demand. The primary benefit of UI stems from its ability to smooth consumption for unemployed workers (Gruber 1997; Browning and Crossley 2001; Bloemen and Stancanelli 2005; Chetty and Szeidl 2007). UI helps to smooth not only the consumption on the individual level (Gruber 1997) but also the

aggregate consumption (Di Maggio and Kermani 2016). Unemployment insurance can smooth the aggregate demand by attenuating the fluctuations in disposable income (Brown 1955) or redistributing funds to individuals with a higher propensity to consume (Blinder 1975). UI has long been recognized as an important component of automatic stabilizers that can potentially help to buffer macroeconomic shocks.[1] Specifically, McKay and Reis (2013) show that redistributive polices, such as UI, can have a significant effect by dampening aggregate shocks when monetary policies do not fully respond to fluctuations in the aggregate activity. Di Maggio and Kermani (2017) examine the extent to which UI serves as an automatic stabilizer to mitigate the economy's sensitivity to shocks. They estimate that a 1 standard deviation increase in generosity attenuates the effect of adverse shocks on employment growth by 7% and on earnings growth by 6%. They document that consumption is less responsive to local labor market demand shocks in counties with more generous benefits. The reduction in income uncertainty will boost workers' consumption, reduce their saving, and increase their demand for bank credit (Engen and Gruber 2001; Gormley, Liu, and Zhou 2010). The increased consumption may lead to more investment opportunities and thus higher levels

[1] A discretionary fiscal policy is less preferable to a monetary policy in fighting the business cycle due to its much more severe implementation lag. However, an automatic fiscal stabilizer can bypass this limitation and provide a prompt response to an economic shock. Blanchard, Dell'Ariccia, and Mauro (2010) argue that better automatic stabilizers are crucial for a more effective macroeconomic policy. MacKay and Reis (2013) propose a business cycle model to study automatic stabilizers in general equilibrium. They capture the channels through which stabilizers mitigate the business cycle and quantify their importance. Other papers, like those by Auerbach and Feenberg (2000), Blinder (2004), Auerbach (2009), and Feldstein (2009), emphasize their importance in shaping the economy's response to shocks.

of commercial and industrial borrowing from firms to fund their capital expenditure and investment to expand their production. Consequently, an increase in UI can lead to an increased demand for bank credit. UI also encourages firms to increase their borrowing (Agrawal and Matsa 2014), as firms can afford higher leverage and higher distress risk when their employees are protected by UI.

On the other hand, unemployment insurance can dampen the demand for bank credit. First, the experiencing rate approach of UI is incomplete when firms only take a partial marginal cost for firing employees. This increases firms' incentive to lay off employees and increase the unemployment rate (Topel 1983, 1984). Risk-averse workers will reduce their consumption, increase their saving, and reduce their borrowing from banks to alleviate household financial risk. Second, more generous unemployment benefits may also distort the labor supply and increase unemployment spells (Moffitt 1985; Meyer 1990; Chetty 2008). UI can also discourage job creation (Hagedorn et al. 2013), which potentially reduces the customer base for banks. Thus, the net effect of UI on the bank credit demand is ambiguous. We propose the first null hypothesis that UI does not affect the demand for bank credit and the equilibrium amount of bank lending.

**Hypothesis 1**: *Unemployment insurance does not influence the bank credit demand and the equilibrium amount of bank lending.*

Another important question is whether UI affects loan portfolio quality. On one hand, UI can help workers to avoid loan default when they are unemployed (Hsu, Matsa, and Melzer 2017). If UI can effectively smooth out the aggregate consumption, it can also help to stabilize firms' profitability and their ability to repay interest and principal. However, UI may lead to distortion in borrowers' risk aversion preference and induce

less reliable individuals to increase their borrowing. Prior studies find that UI protection emboldens households to reduce their precautionary savings (Engen and Gruber 2001; Feldstein 2005) and take greater risk (Gormley, Liu, and Zhou 2010). More generous UI may also lead bank managers to be more optimistic about borrowers' ability to repay their debt. For example, Hsu, Matsa, and Melzer (2014) find that UI induces banks to expand the credit supply to risky borrowers. Thus, the riskiness of a loan portfolio can also increase as it includes more riskier borrowers.

It is also unclear how UI affects loan quality when the economy is in a recession. In normal periods more generous UI may lead riskier borrowers to enter the bank credit market or induce existing borrowers to increase their loans to a suboptimal level. However, when the economy is in a recession, the weak economy can last longer than the unemployed workers' maximum UI duration. The ability of UI to help borrowers to avoid default can be depleted and lead to higher levels of loan default. Furthermore, defaults tend to cluster when the economy is downward trending. If UI leads to riskier borrowers in normal periods, the possibility that borrowers will default at the same time during an economic downturn is also higher. We thus propose the following two hypotheses regarding the relation between UI and loan quality.

**Hypothesis 2a**: *Unemployment insurance does not affect bank loan portfolio quality.*

**Hypothesis 2b**: *Unemployment insurance does not affect bank loan quality during a recession.*

We propose the preceding hypotheses from the demand side, in other words, how UI affects borrowers' behaviors. We now turn to the supply side and examine how UI can change supplier behavior, especially how it may alter banks' lending tendency over the

business cycle. Due to market imperfection, banks may cut their lending during an economic recession due to the increasing difficulty in providing credit intermediaries, that is, a "credit crunch" (Bernanke 1983). Under bad economic conditions, banks are concerned about the credibility of their borrowers. They only choose to lend to borrowers who are perceived to be safe. The "flight to quality" and "flight to liquidity" lead to more contraction in credit when there are more severe loan defaults.

Whether UI, given its role of smoothing consumption, can also help to smooth bank lending during an economic recession is thus an important question. While UI protection can help to maintain certain borrowers' ability to repay their debt, the magnitude of its influence will depend on the duration of the recession. What is more, banks may overestimate the credit quality, realize that borrowers may not seem to be as financially robust, and overact by cutting lending to maintain their performance. In other words, UI may aggravate the "credit crunch" during economic recessions, because it distorts borrowers' and lenders' anticipation of borrowers' ability to repay their debt during a recession. We thus predict that UI generosity is unrelated to bank lending during an economic recession:

**Hypothesis 3**: *Unemployment insurance is unrelated to bank lending during an economic recession.*

Due to the regulatory capital regulation, banks are required to maintain a minimum level of regulatory capital. The "capital crunch" theory argues that it is harder for banks to replenish their regulatory capital due to information asymmetry. Banks will cut lending during a recession, as it is easier to maintain their regulatory capital ratio (Heuvel 2007; Hansen, Kashyap, and Stein 2011). If UI increases the bank credit demand and borrowers'

ability to repay their debt during a recession, banks may be less worried about their borrowers and their ability to maintain their regulatory capital; thus, the capital crunch may be partly alleviated. On the other hand, if this anticipation is unwarranted and turns out to be false confidence, banks may react by cutting lending more, especially when their regulatory capital is low. Following Beatty and Liao (2012), we first examine whether the association between bank lending and regulatory capital is stronger during an economic recession, as the "capital crunch" theory suggests.

**Hypothesis 4a**: *The association between bank lending and regulatory capital is stronger during an economic recession.*

We then propose the null hypothesis that UI does not alter the association between bank lending and regulatory capital during an economic recession.

**Hypothesis 4b**: *UI does not change the association between bank lending and regulatory capital during an economic recession.*

Finally, we examine the implications of a change in lending due to UI for bank profitability and riskiness. For value-maximizing managers borrower quality seems to be improved, which encourages them to expand credit. Thus, more generous UI can lead to higher profitability. However, bank managers may overestimate borrowers' ability to repay their debt; deterioration in borrower quality can lead to higher bank risk. We thus propose that, if bank managers do not fully understand the source of the demand for credit and underestimate its risk, the increased lending may increase bank risk in exchange for higher profitability.

**Hypothesis 5**: *Bank risk and profitability are positively associated with UI generosity.*

## 3. Data and descriptive statistics

We obtain bank financial data from the CALL report. The data consist of US commercial banks from the first quarter of 1989 to the fourth quarter of 2013. All continuous variables are winsorized at the top and bottom 5 percent. After deleting missing variables, the final sample contains 894,864 bank-quarter observations with 17,192 unique banks. The state level of GDP and the unemployment rates are from the Bureau of Economic Analysis. The Coincident Index at the state level is from the Federal Reserve Bank of St. Louis.

Table 1 Panel A presents the summary statistics of our main variables. The maximum benefits that an eligible unemployed worker can claim are $315 dollars per week. The majority of the states have a maximum of 26 weeks of UI protection. The main variation in the unemployment insurance comes from the maximum weekly benefits. As for bank characteristics, the average loan growth rate is around 2 percent per quarter. Loans account for 59.55 percent of bank total assets. The deposit to loan ratio is 1.5778, and the average ROA is 0.57 percent. The average Tier 1 risk-weighted regulatory capital is 8.18 percent. The capital asset ratio is 10.2 percent, which indicates that the banking industry is highly leveraged. The main loan type is the loan secured by real estate, which accounts for 59.65 percent of the total loans. Commercial and industrial loans and consumer loans account for 9.7 percent and 13.24 percent, respectively. Table 1 Panel B presents the distribution of observations by year. The number of observations drops over time, which is a result of industry consolidation (Avraham, Selvaggi, and Vickery 2011).

## 4. Empirical results

### 4.1 Unemployment insurance and the demand for bank credit

Following Dinç (2005), Ivashina and Scharfstein (2010), Puri, Rocholl, and Steffen (2011), and Ho et al. (2016), we use the following regression model to examine our first hypothesis:

$$\Delta Loan_{i,t}(Loan_{i,t}) = \alpha_1 + \alpha_2 Log\ Total\ Benefits_{i,t} + \alpha_3 Size_{i,t} + \alpha_4 Loan/Deposits_{i,t} + \alpha_5 ROA_{i,t} + \alpha_6 Tier1_{i,t} + \alpha_7 Capratio_{i,t} + Macro\ Economic\ Conditions + Bank\ fixed\ effects + Year\text{-}quarter\ fixed\ effects + \epsilon_{i,t}$$

where the dependent variable is loan growth ($\Delta Loan_{i,t}$) or the level of loans in the total assets ($Loan_{i,t}$) for bank *i*, quarter *t*. The main independent variable is the logarithm of total unemployment benefits (*log(Weeks* × *Benefits)*). We include several control variables for bank characteristics that may determine the supply of bank credit. *Size* is the logarithm of the total assets, *ROA* is the net income divided by the total assets, *Tier1* is the Tier 1 risk-weighted regulatory capital ratio, *Loan/Deposits* is the total loans divided by the total deposits, and *Capratio* is the capital to asset ratio, defined as the total equity divided by the total assets. In all the regressions, we include bank fixed effects and year-quarter fixed effects. As for macroeconomic conditions, we include the state-level GDP growth and unemployment rate or the state-level Coincident Index. The Coincident Index combines four state-level indicators to summarize the current economic conditions. The four state-level variables are nonfarm payroll employment, average hours worked in manufacturing by production workers, unemployment rate, and wage and salary disbursements deflated by the consumer price index (US city average). The trend for each state's index is set to the trend of its gross domestic product. The long-term growth in a

state's index matches the long-term growth in its GDP. The inclusion of bank and year-quarter fixed effects represents a generalization of the difference-in-difference design that allows causal inference (Bertrand and Mullainathan 2003; Angrist and Pischke 2009; Armstrong, Balakrishnan, and Cohen 2012). We adjust the standard errors by clustering at the bank level (Petersen 2009).

Table 2 shows the test results. We find that higher unemployment benefits lead to both higher loan growth and higher total lending. Column (1) shows that the coefficient for *Log Total Benefits* is 0.0056 (t = 4.63). A 1 standard deviation increase in *Log Total Benefits* leads to an increase in loan growth of 0.19 percent, which is also economically significant and reasonable as the mean loan growth is 2 percent per quarter.

More generous UI benefits are also associated with a higher loan to asset ratio, as shown in Table 2, column (4) to column (6). The coefficient for *Log Total Benefits* in Table 2, column (4) is 0.0113 (t = 3.43). A 1 standard deviation increase in *Log Total Benefits* leads to a 0.388 percent increase in total bank lending out of total assets. Note that the quarterly loan growth is around 2 percent. Our results remain the same when we include state-level macroeconomic conditions as a control.

As regards the control variables, we find that larger banks have a lower loan growth rate but a higher proportion of loans in their total assets. Banks with a higher deposit to loan ratio have a lower loan growth rate and a lower loan to asset ratio. Banks' ROA is positively related to their loan growth and loan to asset ratio. While the Tier 1 risk-weighted capital ratio is positively related to the total loans and loan growth, these relations are not statistically significant. A higher capital to asset ratio is positively associated with higher loan growth and a lower total loan to asset ratio.

An interesting question concerns the kind of credit demand that drives the increase in loan growth and total lending. As we previously argued, the main reason that UI can lead to a higher demand for bank credit is through an increase in consumption and potentially increased business opportunities; we thus predict that the increases in loan growth and total loans are driven by the increases in consumer credit and commercial loans. On the other hand, UI may increase the unemployment risk for workers. This may reduce their incentive to commit to long-term consumption and reduce long-term borrowing from banks, especially mortgage loans (Chetty and Szeidl 2007).

We present the results in Table 3, in which we decompose the total loans into three components: commercial and industrial loans (*C&I*), loans for individual consumption (*Consumer*), and loans secured by real estate (*RealEstate*). Consistent with our prediction, we find that more generous UI leads to more commercial and industrial loans and consumer loans. The coefficient for *Log Total Benefits* is 0.0287 (t = 5.77) in column (1) and 0.0264 (t = 6.57) in column (2). This indicates that a 1 standard deviation increase in *Log Total Benefits* increases commercial and industrial lending and individual consumer loans by 0.9 percent. We find a reduction in real estate loans following an increase in UI generosity. While prior studies find that UI can help existing borrowers to avoid defaulting on their mortgage loans, it does not necessarily spur the demand for mortgage loans. Our conjecture is that UI increases the unemployment risk for workers. Anticipating an increase in unemployment risk may deter them from initiating a mortgage loan from a bank. The results remain the same when we control the state-level macroeconomic conditions (not tabulated).

### 4.2 Unemployment insurance and loan portfolio quality

To examine whether UI affects loan quality, we replace the dependent variable with the proportion of non-performing loans in the total loans ($NPL_{t+1}$). The test results are shown in Table 4. Column (1) of Table 4 shows that an increase in unemployment benefits leads to fewer non-performing loans. The estimated coefficient for *Log Total Benefits* is -0.0079 (t = -8.56). A 1 standard deviation increase in *Log Total Benefits* leads to a 0.247 percent decrease in non-performing loans in the total loans. On average, the result shows that more generous unemployment benefits reduce loan default. However, during economic recessions, the loan quality decreases with the generosity of unemployment benefits, as the estimated coefficient for the interaction term of *Log Total Benefits* and *Recession* is 0.0008 (t = 2.12) in Table 4, column (2). During an economic recession, non-performing loans increase with the generosity of unemployment insurance. While Hsu, Matsa, and Melzer (2017) find that UI generosity helps the unemployed to avoid mortgage default, our result suggests that it may lead to more non-performing loans on the bank level.

Columns (3) and (4) of Table 4 use an alternative measure to capture the downward trend of state-level economic conditions. While *recession* captures the business cycle at the country level, each state may enter and exit a recession differently, and the magnitude of the recession varies significantly. We thus use a state-level indicator, *Negative Coincident Index Growth*, to capture the state-level economic condition. While negative Coincident Index growth is not a sufficient condition to indicate that a state is in a recession, it increases the noise of the measure and bias against our finding. Columns (3) and (4) of Table 4 show that, using this alternative measure, we still find that banks in

states with more generous UI have more non-performing loans when there is negative Coincident Index growth. This further strengthens the possibility that UI aggravates the deterioration of loan quality when the economy is downward trending.

Our results suggest that UI may lead to more non-performing loans when the economy is following a downward trend. If bank managers can see through the increased risk, they can be more cautious in credit risk management. One tool is to recognize greater provision to absorb the losses. To examine how bank managers perceive the riskiness of loan portfolios following an increase in UI generosity, we use loan loss provision as an alternative and more subjective measure of loan quality. Banks possess a rich set of information through relationship lending. This includes "hard information," like financial statements and tax returns, and "soft information," which banks collect through interactions with borrowers and the local community (Petersen and Rajan 1994; Grunert, Norden, and Weber 2005). This information allows bank managers to assess their credit risk accurately and enables them to recognize the expected credit losses in a timelier manner. Beatty and Liao (2011) find that banks that recognize loan loss provision in a timelier manner are less likely to cut lending during an economic recession. Khan and Ozel (2016) find that loan loss provision contains forward-looking information and can help to predict local future economic conditions.

We use the following regression following Beatty and Liao (2011) and Bushman and Williams (2012):

$$LLP_{i,t} = \alpha_0 + \alpha_1 Log\ Total\ Benefits_{i,t} + a_2\, \Delta NPL_{t-2} + a_3\, \Delta NPL_{i,t-1} + a_4\, \Delta NPL_{i,t} + a_5\, \Delta NPL_{i,t+1} + a_6\, \Delta Loan_{i,t} + a_7\, Ebllp_{i,t} + a_8\, Size_{i,t} + a_9\, Tier1_{i,t} + Bank\ fixed\ effects + Year\text{-}quarter\ fixed\ effects + \epsilon_{i,t}$$

where $\Delta NPL$ is the quarterly growth rate of non-performing loans. We include the lead one quarter, concurrent, and lagged one and two quarter non-performing loan change rate.

Table 5 shows the test results. Column (1) indicates that more generous UI leads to a lower level of loan loss provision. The estimated coefficient for *Log Total Benefits* is -0.0006 (t = -3.70). A 1 standard deviation increase in *Log Total Benefits* leads to a 0.02 percent decrease in loan loss provision out of the total loans. During a recession period, banks recognize a higher level of provision due to increased non-performing loans. The control of recession indicator does not change the coefficient for UI benefits. We find that during recession periods banks in states with more generous UI benefits do not recognize more provisions (not tabulated).

The findings in Table 4 suggest that banks in more generous UI states have more non-performing loans. Thus, these banks should increase their provisions. On the contrary, the results in Table 5 suggest that banks in more generous UI states are less prepared with loan loss reserves. One possibility is that bank managers are overoptimistic about their borrowers' credibility and underestimate their riskiness.

In summary, our results certainly suggest that UI increases the demand for bank credit. The increase in the bank credit demand is mainly driven by riskier borrowers. Their risk is revealed during economic recessions and leads to more non-performing loans. Bank managers underestimate such risk and are less prepared to absorb loan losses. The increase in non-performing loans during economic recessions has important implications for banks' willingness to extend credit and the magnitude of the business cycle. We now turn to the supplier side and examine the consequences of UI for the supply of credit during a recession.

### 4.3 UI and bank lending during an economic recession

Banks tend to tighten their lending during a recession, leading to a credit crunch. In other words, the credit supply shifts left, holding other conditions constant. Unemployment benefits potentially help to smooth the credit crunch if they alleviate lenders' concern about borrowers' ability to repay their debt. However, the opposite case, that UI aggravates the credit crunch, is also possible. As the test results in our preceding section show, banks in high-UI states tend to have more non-performing loans, and banks in general are not well prepared. This may exacerbate their concern about borrower default and further tighten their lending, leading to a more severe credit crunch.

To test whether UI leads to a more severe credit crunch during an economic recession, we use the following regression:

$$\Delta Loan_{i,t} = \alpha_1 + \alpha_2 Log\ Total\ Benefits_{i,t} + \alpha_3 Recession_t + \alpha_4 Recession * Log\ Total\ Benefits_{i,t} + \alpha_5 Size_{i,t} + \alpha_6 Loan/Deposits + \alpha_7 ROA_{i,t} + \alpha_8 Tier1_{i,t} + \alpha_9 Capratio_{i,t} + Bank\ fixed\ effects + Year\text{-}quarter\ fixed\ effects + \epsilon_{i,t}$$

where *Recession* is an indicator that equals one if the economy is in a recession following the definition of NBER Business Cycle Dates. Our main variable of interest is the interaction term of *Recession* and *Log Total Benefits*.

Column (1) of Table 6, Panel A shows that loan growth indeed reduces during an economic recession. On average, loan growth is 0.86 percent lower than in non-recession periods. After controlling for economic recessions, the *Log Total Benefits* variable remains positive and significant, as in column (2). Column (3) presents the test results including the interaction terms of *Recession* and *Log Total Benefits*. The coefficient for

the interaction term is -0.0018 (t = -2.73). This indicates that, during an economic recession, states with more generous unemployment benefits have a lower loan growth rate. While prior studies find a positive effect in that UI can smooth consumption, our results suggest that UI can lead to more procyclical bank lending, which may contribute to the fluctuations of the business cycle. Panel B of Table 6 shows similar results when we use *Negative Coincident Index Growth* to capture the state-level economic condition. Similarly, we find that loan growth is lower when the state-level Coincident Index is negative. Furthermore, banks in states with higher UI have even lower loan growth, as the estimated interaction term of *Log Total Benefits* and *Negative Coincident Index* is negative and significant (-0.0037, t = -7.24).

The credit crunch stems not only from lenders' concern about credit quality but also from the concern about the regulatory capital level, that is, a capital crunch (Bernanke, Lown, and Friedman 1991). To test the capital crunch hypotheses, we use the following regression following Bernanke, Lown, and Friedman (1991), Kishan and Opiela (2000, 2006), and Beatty and Liao (2011):

$$\Delta Loan_{i,t} = \alpha_1 + \alpha_2 Recession_{i,t} + \alpha_3 Tier1_{i,t} + a_4\ Recession_{i,t} * Tier1_{i,t} + \alpha_5 Size_{i,t} + \alpha_6 Loan/Deposits_{i,t} + \alpha_7 ROA_{i,t} + \alpha_8 Capratio_{i,t} + Bank\ fixed\ effects + Year\text{-}quarter\ fixed\ effects + \epsilon_{i,t}$$

We divide the sample into two subsamples based on whether a state has a higher or lower UI than the sample median in each quarter. The credit crunch theory predicts that the association between bank lending and the regulatory capital ratio is stronger during an economic recession; thus, $a_4$ is predicted to be positive. If banks are more concerned

about their loan quality and the ability to main their regulatory capital ratio, $a_4$ should be larger in states with more generous UI.

The test results are shown in Table 7. Column (1) of Table 5, Panel A shows the association between loan growth (*ΔLoan*) and Tier 1 risk-weighted regulatory capital (*Tier1*) in the full sample. While Tier 1 capital is not significantly related to loan growth in non-recession periods, we find a positive and significant association between Tier 1 capital and loan growth during economic recession periods. The coefficient for the interaction term of Tier 1 capital and the recession indicator is 0.0183 (t = 3.60). Consistent with the prediction of the credit crunch theory, banks with lower Tier 1 capital are more likely to have reduced their loan issuances to maintain their capital ratio.

We divide the sample into two sub-samples based on the ranking of the state-level unemployment generosity each quarter. Column (2) of Table 7, Panel A shows the results for banks located in states with relatively high unemployment benefits. Similarly, we find that the coefficient for the interaction term between the recession indicator and the Tier 1 regulatory capital is 0.0160 (t = 2.32). Column (3) of Table 7, Panel A shows that banks in states with a lower level of unemployment insurance benefits also have a positive and significant coefficient for the interaction term. The estimated coefficient is 0.0109 (t = 1.99). What is more, the magnitude of the coefficient for the interaction term in states with high UI is 47 percent larger than the coefficient in states with lower UI. In other words, more generous unemployment insurance potentially increases the concern about loan quality during economic recessions, leading to a more severe credit crunch. It also aggravates the credit crunch due to the concern about capital adequacy. Panel B of Table 7 shows similar results when we use the *Negative Coincident Index* as an alternative

measure of the state-level indicator of bad economic conditions. We find that only in states with high UI benefits is the association between lending and regulatory capital positive during bad economic conditions.

**4.4 Unemployment insurance, bank profitability, and risk**

Finally, we examine whether UI affects bank profitability and bank risk. Following Demirgüç-Kunt and Huizinga (2010) and Goetz, Laeven, and Levine (2016), we use the *Z-score* to measure bank risk. The *Z-score* is measured as follows:

$$Z_{i,t} = (ROA_{i,t} + Capratio_{i,t})/\sigma_{i,t}(ROA)$$

where *ROA* is the return on assets, *Capratio* is the capital asset ratio, and $\sigma_{i,t}(ROA)$ is the standard deviation of the *ROA*. A higher measure thus indicates that a bank is less risky. The control variables that potentially affect bank risk and profitability include *Size*, non-performing loans as part of total loans (*NPL*), non-interest income as part of net income (*NII*), loans secured by real estate (*RealEstate*), commercial and industrial loans (*C&I*), loans for individual consumption (*Consumer*), loan to asset ratio (*Loan/Assets*), capital asset ratio (*Capratio*), *Loan commitments*, and *Transaction Deposits*. We also include bank and year-quarter fixed effects in the regression.

Table 8 column (1) presents the association between UI benefits and bank risk (*Zscore*). The coefficient for *Log Total Benefits* is -1.3090 (t = -1.84), which indicates that more generous UI leads to higher bank risk. On the other hand, UI also increases bank profitability (*ROA*), as shown in column (2). The coefficient for *Log Total Benefits* is 0.0003 (t = 1.81). These results again show that UI is a double-edged sword. It increases bank profitability but at the same time leads to higher bank risk.

### 4.5 Alternative measure of unemployment insurance generosity

We use the replacement ratio to examine the robustness of our main tests. To calculate the replacement ratio, we collect the median state-level hourly wages from the Occupational Employment Statistics (OES), Bureau of Labor Statistics. The replacement ratio (*Replacement Ratio*) is then calculated as *log(Weeks* $x$ *Benefits/Median Hourly Wage)*. Different from the raw monetary amount of UI benefits, this measure captures the hours of work that the UI benefits replace. The test results using the *Replacement Ratio* are shown in Table 9. Due to the availability of state-level wage data, the sample is from 2001. Like the findings using *Log Total Benefits*, we find that a high *Replacement Ratio* still leads to greater loan growth during normal periods, lesser loan growth and more non-performing loans during an economic recession, or negative Coincident Index growth. Our main results are thus robust to the alternative measure.

## 5. Conclusion

We find a potential negative effect of unemployment insurance on bank lending quality and the procyclicality of bank lending. Unemployment insurance reduces income uncertainty and helps unemployed workers to avoid default. This increases their consumption and demand for bank credit. The increase in consumption creates an externality to firms. They require higher bank loans to fund their investments. The aggregate demand for bank credit increases. However, UI also potentially increases the expected unemployment risk, which diminishes the commitment to large and long-term spending. UI reduces the demand for mortgage loans. While UI leads to fewer loan defaults during normal periods, it increases loan defaults during economic recessions. One possibility is that in normal periods UI protection induces riskier borrowers to

initiate borrowing from banks or increases existing borrowers' loans to a suboptimal level. Banks underestimate this risk, as higher UI leads to lower provisions to absorb potential credit losses.

With more loan defaults and being under reserved, banks in states with higher UI are more concerned about their performance and capital adequacy ratio during bad economic conditions. This leads them to tighten their lending further, resulting in a more severe credit crunch. In other words, more generous UI aggravates lending procyclicality and potentially reduces the benefits of smoothing consumption. Finally, the increased credit demand due to UI protection increases bank profitability. However, a riskier customer base leads to higher risk. Our results reveal that UI has potential negative effects from the bank lending perspective. This adds more evidence that UI may lead to the distortion of economic behaviors besides a reduced job searching incentive and lengthened unemployment spells. The optimal design of the UI policy should also consider its effect through the financial channel. Finally, the contribution of UI as an automatic economic stabilizer should be appraised cautiously.

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**Table 1: Summary statistics**

The sample includes 894,864 bank year-quarter observations from the first quarter of 1989 to the fourth quarter of 2013 from the CALL report. The unique number of banks is 17,192. Panel A presents the summary statistics of the variables. *Benefits* is the maximum weekly unemployment benefits in US dollars. *Weeks* is the maximum number of weeks for which eligible workers can claim. *Log Total Benefits* is the logarithm of the product of *Benefits* and *Weeks*. *ΔLoan* is the quarterly loan growth rate. *Loan/Assets* is the ratio of total loans divided by total assets. *Size* is the logarithm of total assets. *Deposit/Loan* is the ratio of total deposits divided by total loans. *ROA* is the net income divided by the total assets. *Tier1* is the Tier 1 risk-based capital ratio, which is replaced with the capital asset ratio (*Capratio*) if missing. *Capratio* is the capital asset ratio as the total equity capital divided by the total assets. *C&I* is the proportion of commercial and industrial loans in the total loans. *Consumer* is the proportion of loans to individuals for household, family, and other personal expenditures. *RealEstate* is loans secured by real estate.

Panel A: Summary statistics of the key variables

| | N | Mean | Std | Q1 | Median | Q3 |
|---|---|---|---|---|---|---|
| *Benefits* | 894864 | 315 | 113 | 237 | 291 | 376 |
| *Weeks* | 894864 | 26.0684 | 0.8720 | 26 | 26 | 26 |
| *Log Total Benefits* | 894864 | 8.9552 | 0.3431 | 8.7262 | 8.9211 | 9.1877 |
| *ΔLoan* | 894864 | 0.0201 | 0.0488 | -0.0111 | 0.0156 | 0.0459 |
| *Loan/Assets* | 894864 | 0.5955 | 0.1579 | 0.4983 | 0.6134 | 0.7090 |
| *Size* | 894864 | 11.4532 | 1.3174 | 10.5535 | 11.3088 | 12.1665 |
| *Deposit/Loan* | 894864 | 1.5778 | 0.6586 | 1.1927 | 1.4014 | 1.7320 |
| *ROA* | 894864 | 0.0057 | 0.0068 | 0.0027 | 0.0054 | 0.0091 |
| *Tier1* | 894864 | 0.0818 | 0.1466 | 0.0027 | 0.0824 | 0.1124 |
| *Capratio* | 894864 | 0.1020 | 0.0393 | 0.0791 | 0.0933 | 0.1143 |
| *C&I* | 894864 | 0.0974 | 0.1229 | 0.0000 | 0.0528 | 0.1633 |
| *Consumer* | 894864 | 0.1324 | 0.1216 | 0.0464 | 0.0998 | 0.1807 |
| *RealEstate* | 894864 | 0.5965 | 0.2151 | 0.4507 | 0.6124 | 0.7580 |

Panel B: Frequency of observations by year

| Year | # of observations | Year | # of observations |
|---|---|---|---|
| 1989 | 51,893 | 2002 | 32,964 |
| 1990 | 50,414 | 2003 | 32,369 |
| 1991 | 48,901 | 2004 | 31,680 |
| 1992 | 47,259 | 2005 | 31,028 |
| 1993 | 45,582 | 2006 | 30,492 |
| 1994 | 43,811 | 2007 | 29,992 |

| | | | |
|---|---|---|---|
| 1995 | 41,730 | 2008 | 29,518 |
| 1996 | 39,792 | 2009 | 28,839 |
| 1997 | 37,917 | 2010 | 27,688 |
| 1998 | 36,510 | 2011 | 26,655 |
| 1999 | 35,289 | 2012 | 26,447 |
| 2000 | 34,418 | 2013 | 20,034 |
| 2001 | 33,642 | # of unique banks | 17,192 |

**Table 2. Unemployment insurance and bank lending**

The table presents the relation between unemployment insurance and bank lending. The dependent variables are the quarterly loan growth (*ΔLoan*) in columns (1) to (3) and the ratio of total loans to total assets (*Loan/Assets*) in columns (4) to (6). The main variable of interest is *Log Total Benefits*, which is the logarithm of the product of *Weeks* and *Benefits*. The control variables include *Size*, *Deposit/Loan*, *ROA*, *Tier1*, and *Capratio*. *ΔGDP* is the quarterly state-level GDP growth rate. *UNEMP* is the state-level unemployment rate. *Coincident Index Growth* is the state-level change of the Coincident Index. We estimate all the regressions using bank and quarter fixed effects and clustering at the bank level. The *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

| | (1) *ΔLoan* | (2) *ΔLoan* | (3) *ΔLoan* | (4) *Loan/Assets* | (5) *Loan/Assets* | (6) *Loan/Assets* |
|---|---|---|---|---|---|---|
| *Log Total Benefits* | 0.0056 | 0.0059 | 0.0057 | 0.0113 | 0.0109 | 0.0115 |
| | (4.63)*** | (4.98)*** | (4.73)*** | (3.43)*** | (3.33)*** | (3.51)*** |
| *Size* | -0.0044 | -0.0044 | -0.0044 | 0.0109 | 0.0110 | 0.0112 |
| | (-11.85)*** | (-12.07)*** | (-11.91)*** | (10.34)*** | (10.41)*** | (10.51)*** |
| *Deposit/Loan* | -0.0141 | -0.0139 | -0.0141 | -0.1858 | -0.1858 | -0.1856 |
| | (-38.96)*** | (-38.92)*** | (-38.95)*** | (-97.37)*** | (-97.40)*** | (-97.19)*** |
| *ROA* | 0.4204 | 0.3593 | 0.4186 | 0.6105 | 0.6322 | 0.6178 |
| | (21.46)*** | (18.51)*** | (21.30)*** | (16.96)*** | (17.49)*** | (17.14)*** |
| *Tier1* | 0.0001 | 0.0003 | 0.0001 | 0.0034 | 0.0035 | 0.0035 |
| | (0.11) | (0.24) | (0.11) | (0.94) | (0.95) | (0.97) |
| *Capratio* | 0.0981 | 0.0946 | 0.0979 | -0.4361 | -0.4371 | -0.4376 |
| | (14.57)*** | (14.47)*** | (14.52)*** | (-19.75)*** | (-19.76)*** | (-19.76)*** |
| *ΔGDP* | | 0.0460 | | | -0.0619 | |
| | | (14.22)*** | | | (-9.62)*** | |
| *UNEMP* | | -0.0042 | | | 0.0004 | |
| | | (-34.05)*** | | | (1.30) | |
| *Coincident Index Growth* | | | 0.0666 | | | -0.3895 |
| | | | (6.43)*** | | | (-22.20)*** |

| | | | | | | |
|---|---|---|---|---|---|---|
| Bank FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year-quarter FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Number of observations | 894,864 | 893642 | 892736 | 894,864 | 893642 | 892736 |
| Adjusted $R^2$ | 0.176 | 0.181 | 0.176 | 0.900 | 0.900 | 0.901 |

**Table 3. Unemployment insurance and the decomposition of loan types**

The table shows the relation between unemployment insurance and different types of bank loans. The dependent variables are the proportion of commercial and industrial loans to total loans (*C&I*) in column (1), the proportion of loans for individual consumption (*Consumer*) in column (2), and loans secured by real estate (*RealEstate*) in column (3). The main variable of interest is *Log Total Benefits*, which is the logarithm of the product of *Weeks* and *Benefits*. The control variables include *Size*, *Deposit/Loan*, *ROA*, *Tier1*, and *Capratio*. We estimate all the regressions using bank and quarter fixed effects and clustering at the bank level. The *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

| | (1)<br>*C&I* | (2)<br>*Consumer* | (3)<br>*RealEstate* |
|---|---|---|---|
| *Log Total Benefits* | 0.0287 | 0.0264 | -0.0161 |
| | (5.77)*** | (6.57)*** | (-2.60)*** |
| *Size* | -0.0188 | -0.0135 | 0.0227 |
| | (-14.20)*** | (-9.58)*** | (10.85)*** |
| *Deposit/Loan* | -0.0013 | 0.0094 | -0.0180 |
| | (-1.27) | (7.39)*** | (-10.49)*** |
| *ROA* | -0.1983 | 0.1544 | -0.2033 |
| | (-5.41)*** | (3.96)*** | (-3.62)*** |
| *Tier1* | -0.0028 | -0.0020 | -0.0025 |
| | (-2.37)** | (-0.63) | (-2.08)** |
| *Capratio* | -0.0447 | -0.0696 | -0.1400 |
| | (-2.55)** | (-4.18)*** | (-6.06)*** |
| Bank FE | Yes | Yes | Yes |
| Year-quarter FE | Yes | Yes | Yes |
| Number of observations | 894,864 | 894,864 | 894,864 |
| Adjusted $R^2$ | 0.767 | 0.802 | 0.857 |

**Table 4. Unemployment insurance and bank loan quality**

The dependent variable is *NPL*, the proportion of non-performing loans in the total loans in columns (1) to (4). The main explanatory variable is *Log Total Benefits*. *Recession* is an indicator that equals one if the economy is in a recession according to the NBER's Business Cycle Date Committee and zero otherwise. *Negative Coincident Index* is an indicator that equals one if the state-level Coincident Index growth is negative and zero otherwise. We estimate all the regressions using bank and quarter fixed effects and clustering at the bank level. The *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| *Log Total Benefits* | -0.0079 | -0.0080 | -0.0075 | -0.0078 |
| | (-8.56)*** | (-8.69)*** | (-8.36)*** | (-8.70)*** |
| *Recession* | 0.0081 | 0.0003 | | |
| | (9.28)*** | (0.09) | | |
| *Log Total Benefits × Recession* | | 0.0008 | | |
| | | (2.12)** | | |
| *Negative Coincident Index Growth* | | | | -0.0175 |
| | | | | (-6.71)*** |
| *Log Total Benefits × Negative Coincident Index Growth* | | | | 0.0020 |
| | | | | (6.89)*** |
| *Size* | 0.0035 | 0.0035 | 0.0035 | 0.0035 |
| | (14.87)*** | (14.88)*** | (14.90)*** | (14.92)*** |
| *Deposit/Loan* | -0.0009 | -0.0009 | -0.0009 | -0.0009 |
| | (-4.57)*** | (-4.56)*** | (-4.55)*** | (-4.58)*** |
| *ROA* | -0.9222 | -0.9221 | -0.9204 | -0.9201 |
| | (-60.60)*** | (-60.59)*** | (-60.31)*** | (-60.31)*** |
| *Tier1* | 0.0000 | 0.0000 | 0.0005 | 0.0005 |
| | (0.31) | (0.31) | (0.33) | (0.33) |
| *Capratio* | -0.0393 | -0.0393 | -0.0395 | -0.0394 |
| | (-9.52)*** | (-9.51)*** | (-9.55)*** | (-9.54)*** |
| Bank FE | Yes | Yes | Yes | Yes |
| Year-quarter FE | Yes | Yes | Yes | Yes |
| Number of observations | 894864 | 894864 | 892736 | 892736 |
| Adjusted $R^2$ | 0.450 | 0.450 | 0.448 | 0.448 |

**Table 5. Unemployment insurance and loan loss provision**

The dependent variable is *LLP*, the ratio of loan loss provision and beginning-of-period total loans. The main explanatory variable is *Log Total Benefits. Recession* is an indicator that equals one if the economy is in a recession according to the NBER's Business Cycle Dating Committee. *Ebllp* is the earnings before loan loss provision divided by the total assets. *ΔNPL* is the quarterly growth rate of non-performing loans, where the subscript indicates quarters relative to the current quarter's growth rate. *ΔLoan* is the quarterly loan growth rate. *Size* is the logarithm of the total assets. *Tier1* is the Tier 1 risk-based capital ratio. *ΔGDP* is the quarterly state-level GDP growth rate. *UNEMP* is the state unemployment ratio. *Coincident Index Growth* is the quarterly Coincident Index growth rate. We estimate all the regressions using bank and quarter fixed effects and clustering at the bank level. The *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

| | $LLP_t$ | $LLP_t$ |
|---|---|---|
| *Log Total Benefits* | -0.0006 | -0.0007 |
| | (-3.70)*** | (-3.89)*** |
| *Recession* | 0.0046 | 0.0021 |
| | (21.07)*** | (9.63)*** |
| *Ebllp* | 0.0270 | 0.0333 |
| | (5.61)*** | (7.03)*** |
| $\Delta NPL_t$ | 0.1124 | 0.1109 |
| | (33.29)*** | (32.99)*** |
| $\Delta NPL_{t-1}$ | 0.1313 | 0.1297 |
| | (38.44)*** | (38.16)*** |
| $\Delta NPL_{t-2}$ | 0.1387 | 0.1368 |
| | (44.45)*** | (44.04)*** |
| $\Delta NPL_{t+1}$ | 0.0196 | 0.0198 |
| | (6.39)*** | (6.47)*** |
| *ΔLoan* | -0.0127 | -0.0117 |
| | (-55.73)*** | (-52.77)*** |
| *Size* | 0.0006 | 0.0007 |
| | (11.44)*** | (12.04)*** |
| *Tier1* | -0.0000 | -0.0009 |
| | (-1.35) | (-1.39) |
| *ΔGDP* | | -0.0035 |
| | | (-7.48)*** |
| *UNEMP* | | 0.0007 |
| | | (36.17)*** |
| *Coincident Index Growth* | | -0.0035 |
| | | (-2.10)** |

| | | |
|---|---|---|
| Bank FE | Yes | Yes |
| Year-Quarter FE | Yes | Yes |
| Number of observations | 894849 | 892721 |
| Adjusted $R^2$ | 0.349 | 0.356 |

**Table 6. Unemployment insurance and bank lending during an economic recession**

The table presents the relation between unemployment insurance and bank lending during an economic recession. The dependent variable is the quarterly loan growth rate (*ΔLoan*). The independent variables include *Log Total Benefits, Recession, Size, Deposit/Loan, ROA, Tier1*, and *Capratio*. *Recession* is an indicator that equals one if the economy is experiencing a recession as classified by the NBER and zero otherwise. *Negative Coincident Index Growth* is an indicator that equals one if the quarterly state Coincident Index growth is negative and zero otherwise. The main variable of interest is the interaction of *Log Total Benefits* and *Recession* or *Negative Coincident Growth*. We estimate all the regressions using bank and quarter fixed effects and clustering at the bank level. The *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

**Panel A**: Bank lending during an economic recession

| | (1) *ΔLoan* | (2) *ΔLoan* | (3) *ΔLoan* |
|---|---|---|---|
| *Log Total Benefits* | | 0.0056 | 0.0058 |
| | | (4.63)*** | (4.83)*** |
| *Recession* | -0.0086 | -0.0126 | 0.0039 |
| | (-10.21)*** | (-10.68)*** | (0.63) |
| *Log Total Benefits × Recession* | | | -0.0018 |
| | | | (-2.73)*** |
| *Size* | -0.0044 | -0.0044 | -0.0044 |
| | (-11.86)*** | (-11.85)*** | (-11.87)*** |
| *Deposit/Loan* | -0.0141 | -0.0141 | -0.0141 |
| | (-38.89)*** | (-38.96)*** | (-38.96)*** |
| *ROA* | 0.4211 | 0.4204 | 0.4202 |
| | (21.50)*** | (21.46)*** | (21.44)*** |
| *Tier1* | 0.0000 | 0.0000 | 0.0000 |
| | (0.10) | (0.11) | (0.11) |
| *Capratio* | 0.0983 | 0.0981 | 0.0981 |
| | (14.59)*** | (14.57)*** | (14.57)*** |
| Bank FE | Yes | Yes | Yes |
| Year-quarter FE | Yes | Yes | Yes |
| Number of observations | 894864 | 894864 | 894864 |
| Adjusted $R^2$ | 0.176 | 0.176 | 0.176 |

**Panel B**: Bank lending during negative Coincident Index growth

| | (1) *ΔLoan* | (2) *ΔLoan* | (3) *ΔLoan* |
|---|---|---|---|

| | | | |
|---|---|---|---|
| *Log Total Benefits* | | 0.0058 | 0.0064 |
| | | (4.80)*** | (5.25)*** |
| *Negative Coincident Index Growth* | -0.0009 | -0.0010 | 0.0321 |
| | (-4.66)*** | (-4.85)*** | (7.01)*** |
| *Negative Coincident Index Growth* × *Log Total Benefits* | | | -0.0037 |
| | | | (-7.24)*** |
| *Size* | -0.0044 | -0.0044 | -0.0044 |
| | (-11.92)*** | (-11.92)*** | (-11.93)*** |
| *Deposit/Loan* | -0.0141 | -0.0141 | -0.0141 |
| | (-38.87)*** | (-38.94)*** | (-38.94)*** |
| *ROA* | 0.4201 | 0.4193 | 0.4188 |
| | (21.38)*** | (21.33)*** | (21.31)*** |
| *Tier1* | 0.0001 | 0.0001 | 0.0001 |
| | (0.10) | (0.11) | (0.11) |
| *Capratio* | 0.0979 | 0.0977 | 0.0977 |
| | (14.52)*** | (14.50)*** | (14.50)*** |
| Number of observations | 892736 | 892736 | 892736 |
| Adjusted $R^2$ | 0.176 | 0.176 | 0.176 |

**Table 7. Unemployment insurance and capital crunch**

The table shows how unemployment insurance affects the association between bank lending and the Tier 1 risk-based capital ratio during an economic recession. The dependent variable is the quarterly loan growth rate (*ΔLoan*). Panel A shows whether the association between bank lending and Tier 1 capital is stronger during an economic recession. Panel B shows the association between bank lending and Tier 1 capital during negative Coincident Index growth. Column (1) presents the full-sample result. We divide the sample into two subsamples based on whether a state has relatively higher unemployment benefits than the sample median in each quarter. Column (2) shows the results for banks in states with relative higher UI benefits, while column (3) shows the results for banks in states with lower UI benefits. All the regressions include bank and quarter fixed effects and clusters at the bank level. The *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

**Panel A: Capital crunch during an economic recession**

| | (1) | (2) | (3) |
|---|---|---|---|
| | Full sample | High UI | Low UI |
| | *ΔLoan* | *ΔLoan* | *ΔLoan* |
| *Recession* | -0.0115 | -0.0116 | -0.0117 |
| | (-10.00)*** | (-7.75)*** | (-8.19)*** |
| *Recession × Tier1* | 0.0183 | 0.0160 | 0.0109 |
| | (3.60)*** | (2.32)** | (2.32)** |
| *Size* | -0.0044 | -0.0035 | -0.0044 |
| | (-11.78)*** | (-7.76)*** | (-8.43)*** |
| *Deposit/Loan* | -0.0141 | -0.0147 | -0.0160 |
| | (-38.98)*** | (-34.83)*** | (-30.78)*** |
| *ROA* | 0.4200 | 0.4686 | 0.2761 |
| | (21.47)*** | (20.66)*** | (8.83)*** |
| *Tier1* | -0.0002 | -0.0007 | 0.0082 |
| | (-0.17) | (-1.20) | (1.41) |
| *Capratio* | 0.0967 | 0.1078 | 0.0601 |
| | (14.47)*** | (13.42)*** | (7.08)*** |
| Number of observations | 894864 | 515648 | 379216 |
| Adjusted $R^2$ | 0.176 | 0.190 | 0.200 |

**Panel B: Capital crunch during negative Coincident Index growth**

| | (1) | (2) | (3) |
|---|---|---|---|
| | Full sample | High UI | Low UI |

| | *ΔLoan* | *ΔLoan* | *ΔLoan* |
|---|---|---|---|
| *Negative Coincident Index Growth* | -0.0020 | -0.0018 | -0.0020 |
| | (-5.67)*** | (-4.61)*** | (-4.70)*** |
| *Negative Coincident Index Growth × Tier1* | 0.0158 | 0.0289 | 0.0057 |
| | (3.60)*** | (6.94)*** | (1.09) |
| *Size* | -0.0044 | -0.0042 | -0.0040 |
| | (-11.82)*** | (-8.29)*** | (-6.73)*** |
| *Deposit/Loan* | -0.0141 | -0.0133 | -0.0167 |
| | (-38.92)*** | (-29.93)*** | (-28.23)*** |
| *ROA* | 0.4185 | 0.4122 | 0.4061 |
| | (21.30)*** | (15.43)*** | (14.37)*** |
| *Tier1* | -0.0002 | -0.0010 | 0.0061 |
| | (-0.22) | (-1.99)** | (1.61) |
| *Capratio* | 0.0960 | 0.0778 | 0.1231 |
| | (14.44)*** | (10.17)*** | (11.43)*** |
| Number of observations | 892736 | 468135 | 424601 |
| Adjusted $R^2$ | 0.176 | 0.184 | 0.184 |

**Table 8. Unemployment insurance, bank risk, and profitability**

The dependent variable in column (1) is the lead *Zscore*, a measure of bank risk. The *Zscore* is calculated as the sum of the capital asset ratio (*Capratio*) and the *ROA* divided by the standard deviation of *ROA*. The dependent variable in column (2) is the lead *ROA*. *Log Total Benefits* is the main variable of interest. *Size* is the logarithm of the total assets. *NPL* is the proportion of non-performing loans in the total loans. *NII* is the proportion of non-interest income in the total operating income. *RealEstate* is loans secured by real estate, *C&I* is commercial and industrial loans, and *Consumer* is loans for individual consumption. *Loan/Assets* is the ratio of total loans to total assets. *Capratio* is the capital asset ratio. *Loan Commitments* is the loan commitments divided by the sum of the loan commitments and total loans. *Transaction deposits* is the share of transaction deposits in the total deposits. We estimate all the regressions using bank and quarter fixed effects and clustering at the bank level. The *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

| | (1) | (2) |
|---|---|---|
| | $Zscore_{t+1}$ | $ROA_{t+1}$ |
| *Log Total Benefits* | -1.3090 | 0.0003 |
| | (-1.84)* | (1.81)* |
| *Size* | 2.5676 | 0.0015 |
| | (13.11)*** | (22.25)*** |
| *NPL* | -85.5764 | -0.0954 |
| | (-31.81)*** | (-70.42)*** |
| *NII* | -11.3106 | 0.0120 |
| | (-9.81)*** | (23.70)*** |
| *RealEstate* | 0.4732 | -0.0003 |
| | (0.58) | (-1.05) |
| *C&I* | 2.9843 | -0.0017 |
| | (3.04)*** | (-6.03)*** |
| *Consumer* | 3.9894 | -0.0000 |
| | (3.65)*** | (-0.11) |
| *Loan/Assets* | -6.6453 | 0.0035 |
| | (-10.94)*** | (17.56)*** |
| *Capratio* | 115.6570 | 0.0069 |
| | (34.90)*** | (5.62)*** |
| *Loam Commitments* | -5.4395 | 0.0005 |
| | (-5.77)*** | (1.43) |
| *Transaction Deposits* | 9.6470 | 0.0040 |
| | (12.28)*** | (16.24)*** |
| Number of observations | 894583 | 894583 |

| | | |
|---|---|---|
| Adjusted $R^2$ | 0.544 | 0.507 |

**Table 9. Alternative measure of unemployment insurance generosity**

The sample consists of bank-quarter observations from 2001 to 2013 due to the availability of data on state-level average hourly wages. *Replacement Ratio* is calculated as (*log(Weeks*Benefits/State Median Hourly Wage)*). The state-level wage data are from the OES (Occupational Employment Statistics) survey, Bureau of Labor Statistics. *Recession* is an indicator that equals one if the economy is in a recession according to the NBER's Business Cycle Dating Committee. *Negative Coincident Index* is an indicator that equals one if the state-level Coincident Index growth is negative. Other variables are defined as in Table 1. All the regressions include bank and quarter fixed effects. The standard errors are adjusted for clustering at the bank level. The *t*-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

| | (1) *ΔLoan* | (2) *ΔLoan* | (3) *ΔLoan* | (4) $NPL_{t+1}$ | (5) $NPL_{t+1}$ | (6) $NPL_{t+1}$ | (7) $NPL_{t+1}$ |
|---|---|---|---|---|---|---|---|
| *Replacement Ratio* | 0.0229 | 0.0239 | 0.0240 | -0.0248 | -0.0251 | -0.0239 | -0.0243 |
| | (10.81)*** | (11.22)*** | (11.27)*** | (-16.47)*** | (-16.38)*** | (-16.13)*** | (-16.20)*** |
| *Recession* | | 0.0265 | | -0.0068 | -0.0156 | | |
| | | (3.84)*** | | (-11.38)*** | (-3.78)*** | | |
| *Replacement Ratio × Recession* | | -0.0048 | | | 0.0013 | | |
| | | (-4.65)*** | | | (2.16)** | | |
| *Negative Coincident Index Growth* | | | 0.0374 | | | 0.0006 | -0.0117 |
| | | | (5.90)*** | | | (4.74)*** | (-3.28)*** |
| *Replacement Ratio × Negative Coincident Index Growth* | | | -0.0060 | | | | 0.0019 |
| | | | (-6.24)*** | | | | (3.46)*** |
| *Size* | -0.0137 | -0.0137 | -0.0136 | 0.0050 | 0.0050 | 0.0050 | 0.0050 |
| | (-15.44)*** | (-15.45)*** | (-15.40)*** | (9.56)*** | (9.57)*** | (9.50)*** | (9.51)*** |
| *Deposit/Loan* | -0.0219 | -0.0219 | -0.0219 | -0.0005 | -0.0004 | -0.0004 | -0.0004 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | (-26.30)*** | (-26.33)*** | (-26.28)*** | (-1.18) | (-1.16) | (-1.12) | (-1.11) |
| *ROA* | 0.4433 | 0.4437 | 0.4453 | -1.0196 | -1.0197 | -1.0184 | -1.0188 |
| | (17.96)*** | (17.98)*** | (18.03)*** | (-47.24)*** | (-47.25)*** | (-47.16)*** | (-47.19)*** |
| *Tier1* | 0.0003 | 0.0003 | 0.0003 | 0.0008 | 0.0008 | 0.0008 | 0.0008 |
| | (0.17) | (0.17) | (0.17) | (0.55) | (0.54) | (0.56) | (0.56) |
| *Capratio* | 0.1043 | 0.1040 | 0.1043 | -0.0569 | -0.0568 | -0.0575 | -0.0574 |
| | (10.65)*** | (10.63)*** | (10.65)*** | (-10.23)*** | (-10.21)*** | (-10.33)*** | (-10.31)*** |
| *Number of Observations* | 381348 | 381348 | 380529 | 381348 | 381348 | 380529 | 380529 |
| *Adjusted* $R^2$ | 0.222 | 0.222 | 0.222 | 0.508 | 0.508 | 0.506 | 0.506 |