The Impact of China's Fiscal and Monetary Policy Responses to the Great Recession: An Analysis of Firm-Level Chinese Data

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Abstract: This paper investigates the effects of Chinese financial and fiscal policies designed to counter the worldwide Great Recession of 2008. We examine how policies designed to increase bank credit and health (i.e., asset liquidity, capital adequacy ratio, profitability, and bad loan ratio) influenced firm-level output, employment and investment. We also explore the impact of China's expansionary fiscal policy with regard to these firm-level variables. We find that the policy effects varied based on firm-level characteristics such as size, liability ratio, profitability, ownership and the industry in which the firm operates. With respect to the dynamic effects, our results suggest that Chinese financial and fiscal policies were generally effective in the short run, but their positive impacts ceased within two years.

JEL Classification: E32, E62, G21

Key Words: Banking System; 2008 Economic Stimulus Plan; The Great Recession; Chinese Recovery; Panel VAR Model; Firm-Level Investigation

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1. Introduction

The economic crisis of 2008 began in the United States but soon affected almost all developed and developing countries worldwide. In response, the United States enacted fiscal stimulus via the Economic Stimulus Act of 2008 and the American Recovery and Reinvestment Act of 2009 (ARRA). Additionally, the Federal Reserve reduced the federal funds rate to near zero and engaged in several rounds of "quantitative easing" programs that sought to facilitate credit flows and reduce the cost of credit (Rich, 2013). The European Union likewise undertook large-scale fiscal stimulus via the European Economic Recovery Plan (EERP) and the European Central Bank also acted aggressively by cutting interest rates and insect liquidity into the economy (Coenen et al., 2012; Coenen et al., 2013).

While global output was curtailed in the aftermath of the crisis, China's economy continued to expand, albeit at a far slower rate than it had in the years prior to the crisis. Specifically, China's reported GDP growth rate fell from around 15 percent in 2007 to around 9 percent in 2008. Its growth rate would almost certainly have declined much further had the nation not adopted aggressive countermeasures that were similar to those enacted in the United States and Europe. While the effects of countercyclical policies in Western nations have been widely analyzed, far less attention has been paid to the impact of such policies from the world's largest emerging nation.

China's central bank (The People's Bank of China) relaxed the credit constraints faced

by commercial banks, most of whom are state owned, by reducing reserve requirements, cutting the prime lending rate, and relaxing credit limits. To be specific, during the last quarter of 2008, China's central bank reduced reserve requirement ratios from 17.5% to 13.5% for small and medium-sized banks, and from 17.5% to 15.5% for large banks, and it reduced the prescribed one-year lending rate (commercial banks are typically allowed to set interest rates within a pre-specified range of the prescribed rate) from 7.47% to 5.31% (Cong et al., 2018). The credit limits faced by commercial banks were also eliminated in 2008. As a result of these actions, bank credit in China more than doubled from 4.7 trillion RMB (688 billion US dollars) in 2008 to 9.6 trillion in 2009, and it continued to grow in the years that followed.

In addition to aggressive monetary policy, the Chinese government also launched a 4 trillion RMB (US$586 billion) fiscal stimulus in November of 2008—an amount more than 12 percent of China's GDP.[4] In comparison in the United States, the American Recovery and Reinvestment Act of 2009 allocated around $800 billion, which was around 5 percent of the size of its GDP. While the stimulus programs of Western nations were largely funded through federal government debt, nearly three quarters of China's stimulus was funded by local governments. These governments secured loans via Local Government Financing Vehicles (LGFVs), which were state-owned enterprise, whereby the corresponding local

[4] The stimulus was distributed broadly in the following sectors: transport and power infrastructure (37.5 percent), construction responding to the Sichuan earthquake of 2008 (25 percent), creation of affordable housing (10 percent), technological innovation and structural adjustment (9.25 percent), rural village infrastructure (9.25 percent), environmental investment (5.25 percent) and health and education (3.75 percent).

government was the dominant shareholder. Bai et al. (2016) and Chen et al. (2017) argue that large debt burdens placed on local governments had deleterious effects in the years that followed.

Additionally, since a large portion of Chinese enterprises is state owned (SOEs), the dispersion of China's stimulus was far more politically directed than it was in Western nations. Wen and Wu (2019) show that China's stimulus consisted in large part of soaring fixed asset investments made by Chinese SOEs. Indeed Liu et al. (2018) show that SOEs received more bank loans and invested more than non-SOEs during the period following the crisis of 2008. Huang et al. (2019) also show that Chinese non-SOEs are often discriminated against with respect to securing bank loans as compared to SOEs. Cong et. al. (2018) note that SOE's are generally less productive than privately owned enterprises. They argue that while private firms were the main drivers of China's rapid growth between 2000 and 2007, the fact that they received disproportionately less of the stimulus could have dampened the policy's success. In short, it has been noted that the directors of the Chinese stimulus were concerned not just with economic objectives but also political ones (Cull and Xu, 2003; Allen et al., 2005; Firth et al., 2009; Chen et al., 2013). Many influential papers have shown that the credit allocation of government lending is often distorted by political considerations, resulting in less efficiency (Dinc, 2005; Khwaja and Mian, 2005; Sapienza, 2004).

While there were differences in the nature of the policy responses of China and other major geopolitical areas such as the European Union and the United States, they were

united in their attempts to stimulate aggregate demand via the credit channel. Still, the broader financial literature has shown that it is not just the *quantity* of credit, but also its *quality* (i.e. the efficiency of financial intermediation) that affects economic growth (Hasan et al., 2009; Koetter and Wedow, 2010). In a study of another major financial crisis, that of the 1930s, Bernanke (1983) highlights the role that the quality of credit intermediation (or lack thereof) played in propagating the Great Depression in the United States. In light of these studies, our focus is not just on the impact of quantitative monetary factors (money supply and quantity of credit), but we also focus heavily on the effects of qualitative factors affecting bank health (e.g., asset liquidity, capital adequacy ratio, profitability, and bad loan ratio). Given the nuances of the Chinese system highlighted above, it will be interesting to determine the extent that quantity and quality of credit affected China's economic performance during the Great Recession and the subsequent recovery period.

In this paper, we employ firm-level data in an attempt to identify the effects of China's fiscal and monetary responses to the crisis of 2008.[5] While Liu et al. (2018) and Huang et al. (2019) explore how these policies affected firm-level investment in China, our work expands their analysis by examining the determinants of firm-level output, employment, and investment It is important to note that these three variables have significant dynamic interactions. Specifically, an increase in a firm's employment and investment positively affects firm output. At the same time, an increase in firm output promotes the growth of

[5] While fiscal and monetary policies are often treated distinct from one another, the Chinese banking system played an essential role in funding the government's aggressive fiscal stimulus in an attempt to promote economic recovery (Wen and Wu, 2014; Liu et al., 2018).

employment and investment. Thus, we employ a panel vector autoregression (VAR) analysis which allows for these relationships. We find that key variables related to banking health such as asset liquidity, capital adequacy ratio, profitability, and bad loan ratio, as well as credit supply, are important determinants of a firm's output, employment, and investment. We also find evidence for government spending positively affecting these three firm activities. Our results suggest that China's fiscal and monetary response to the Great Recession helped mitigate the effects of the Great Recession and promoted faster economic recovery in the years that followed that event.

Because we employ firm-level data, we also investigate which types of firms were most impacted by China's financial and fiscal policies. Several studies have focused on the role firm characteristics play on credit constraints (Whited and Wu, 2006; Huang, 2008; Firth et al., 2009; Chan et al., 2012; Poncet et al., 2010; Shen et al., 2015; Liu et al., 2018; Cong et al., 2018). We examine firm size, liability ratio, profitability, ownership, and industry, and we find that a healthy banking system and enhanced credit supply have positive and significantly stronger effects on larger firms and SEOs than they do on small and privately-owned firms. Regarding a firm's liability ratios, a healthy banking system and a larger supply of credit have the most impact on the high- and medium-liability firms. Additionally, we find that expansionary monetary policy was most beneficial to those Chinese firms that had the highest profitability. With respect to fiscal policy, increases in government expenditures positively affected firm-level output, employment, and investment, regardless of the size, liability ratio, profitability, ownership and the industry

to which firms belonged, although the magnitude of these effects varies based upon firm characteristics.

We also find that, consistent with China's "top ten industry revitalization plan" of 2009, some industries benefited more than others from China's policy response.[6] Agriculture, utilities, manufacturing, transportation, and warehousing industries, which are heavily supported by bank credit in China, benefited the most. Additionally, our results suggest that the increased credit was funneled disproportionately to the real estate and construction industries, which contributed to overheating in the Chinese housing market as is consistent with Deng et al. (2011). We also show that changes in net exports and the financial market performance of the United States differentially affected Chinese firms based on their characteristics.

Ouyang and Peng (2015) use a treatment-and-control effect to estimate the effects of the 2008 Chinese economic stimulus package and their results suggest that the stimulus created a temporary boost in economic activities for about two years. This suggests that the stimulus policy may have had differential effects during the short and long runs. Thus, we compare the roles of China's financial and fiscal policies during both the Great Recession (2008-2009) and the recovery period (2010-2014). We find that the impacts of these policies are substantially larger during the Great Recession period. Our results suggest that

[6] The existing literature has also focused on the roles of financial development on certain industries (Kletzer and Bardhan, 1987; Rajan and Zingales, 1998; Wurgler, 2000). This paper is connected to such studies as well by showing that industries such as agriculture, utility, manufacturing and transportation and warehousing industries are heavily supported by banking credit in China, in line with the government policies. Within this picture, it is also shown that a large amount of credit is provided for real estate and construction industries due to vast investment profits, feeding the overheating in the Chinese housing market.

the stimulus plan mitigated some effects of the Great Recession, however, the policy impact was temporary and diminished quickly.

Our final step is to employ impulse-response functions to explore the dynamic interaction of firm-level output, employment, and investment and the dynamic effects of financial and fiscal policies between 2008 and 2014. Our results suggest that firm-level output, employment, and investment responded positively to the shocks created by financial and fiscal policies, however, these positive shocks end within two years.

The remainder of this paper is organized as follows. Section 2 provides empirical methodology and data. Section 3 reports the empirical results. Section 4 concludes.

2. Empirical methodology and data

2.1 Economic channels and regression models

Figure 1 illustrates the potential transmission channel of the impact of the health of the Chinese banking system on the health of the Chinese economy. The supply of credit in the financial system depends not just on the money supply, but also upon the health of the banking system as measured by liquidity, capital adequate ratio, bank profitability and the ratio of nonperforming loans to total loans (bad loan ratio). The supply of credit affects firms' levels of output, employment, and investment. Firm outcomes are also influenced by fiscal policies and external economic factors, such as the level of net exports and US financial market performance.

While external factors influence firm-level output, employment and investment, these variables also interact and influence one another. Specifically, an increase in employment or investment contributes to output growth, while an increase in output reversely leads to growth in employment and investment. With respect to the interaction of employment and investment, these variables may have substitutive (negative) or complementary (positive) relationships, or both, but, in any case, they certainly influence one another. Regarding justification of the endogenous and exogenous variables, we suppose that aggregate economic and financial variables affect the firm-level output, employment and investment; however, firm-level variables do not have a significant feedback effect on the aggregate economic variables. Our model is consistent with Love and Zicchino (2006), who apply a similar panel VAR model to explore the effects of broad financial factors on firm-level investment in the 36 countries with over 8,000 firms, whereby the financial factors are regarded as exogenous. Thus, given the relationships illustrated in Figure 1, we treat firm output, employment, and investment as endogenous variables and banking indicators, government expenditures, and external economic factors as exogenous variables.

[Figure 1]

In order to capture theses transmission channels, our empirical strategy is to use a panel VAR at the firm level to estimate the effects of the banking system, government expenditures, and external economic factors on the firm output, employment, and

investment. The advantage of the panel VAR is that it can examine endogenous interactions among one set of variables while also accounting for the exogenous influences of another set of variables. We estimate the system of dynamic panel models shown in equations 1 through 3.

$$OUTPUT_{it} = \sum_{j-1}^{k} \alpha_j^{o,1} OUTPUT_{it-j} + \sum_{j-1}^{k} \alpha_j^{o,2} EMP_{it-j} + \sum_{j-1}^{k} \alpha_j^{o,3} INVEST_{it-j} + b_1^o HEA_{t-1} + b_2^o LOAN_{t-1}$$
$$+ b_3^o SPEN_{t-1} + b_4^o TRADE_{t-1} + b_5^o STOCK_{t-1} + \alpha_i^o + \varepsilon_{it}^o \quad (1)$$

$$EMP_{it} = \sum_{j-1}^{k} \alpha_j^{o,1} OUTPUT_{it-j} + \sum_{j-1}^{k} \alpha_j^{e,2} EMP_{it-j} + \sum_{j-1}^{k} \alpha_j^{e,3} INVEST_{it-j} + b_1^e HEA_{t-1} + b_2^e LOAN_{t-1}$$
$$+ b_3^e SPEN_{t-1} + b_4^e TRADE_{t-1} + b_5^e STOCK_{t-1} + \alpha_i^e + \varepsilon_{it}^e \quad (2)$$

$$INVEST_{it} = \sum_{j-1}^{k} \alpha_j^{i,1} OUTPUT_{it-j} + \sum_{j-1}^{k} \alpha_j^{i,2} EMP_{it-j} + \sum_{j-1}^{k} \alpha_j^{i,3} INVEST_{it-j} + b_1^i HEA_{t-1} + b_2^i LOAN_{t-1}$$
$$+ b_3^i SPEN_{t-1} + b_4^i TRADE_{t-1} + b_5^i STOCK_{t-1} + \alpha_i^i + \varepsilon_{it}^i \quad (3)$$

where *OUTPUT*, *EMP*, and *INVEST* refer to the logs of firm-level output, employment, and investment, respectively and α represents a firm-level fixed effect.[7] While these are the only three firm-level variables we examine in our baseline regressions, in expansions of the model we also consider the impact of firm size, the firm's liability ratio, the firm's profitability, and the nature of the firm's ownership (government or private sector).

The remaining five variables in equations 1 through 3, *HEA*, *LOAN*, *SPEN*, *TRADE*, and *STOCK*, vary over time but are common across firms. The key exogenous variables

[7] In line with the results from the moment and model selection criteria (MMSC, Andrews and Lu, 2001), we set the number of lags k for output, employment and investment equal to three in order to maximize the statistics. The result is shown in Table A1 in Appendix. The panel fixed-effects are removed by using the Helmert transformation, also known as forward orthogonal deviation (Arellano and Bover, 1995).

are *HEA*, *LOAN*, *SPEN* as these will help investigate how both the health of the Chinese financial system and Chinese fiscal policy affected Chinese firms' output, employment, and investment. *HEA* is a banking health proxy, which is built through factor analysis using banking asset liquidity (*LIQ*)[8], capital adequacy ratio (*CAPT*), profitability (*PROF*) —defined as the return on equity of Chinese banking system—and bad loan ratio (*BAD*).[9] The construction of the aggregate *HEA* proxy is necessary, since these key individual variables are correlated with one another making it problematic to include them together in one regression. *LOAN* is the quantity of total loans divided by GDP—this acts as our measure for aggregate credit supply. *SPEN* is the growth rate in the quarterly expenditure of the Chinese government (central plus local).

TRADE is the ratio of China's net exports to its GDP, and *STOCK* is the annual percentage growth rate of the S&P 500 in the United States as reported by the Federal Reserve Bank of St. Louis. These are exogenous control variables and are used to proxy the external economic and financial shocks.

2.2 Data

The data we use are quarterly from 2008 to 2014 and cover both firm-level data and nationwide statistics. We halted our analysis after 2014 as there was a major policy regime change beginning in 2015 when the Chinese government carried out a new 10 trillion RMB

[8] *LIQ* is the ratio of current assets to current liabilities, which Chinese banking regulators require to be no less than 25 percent.

[9] The purpose of the factor analysis is to reduce many individual items into a smaller number of dimensions (one dimension in our paper). Specifically, this process extracts and rotates the variables to better fit the data to find the best linear relationship of the variables in a single factor. The use of these variables to proxy for bank health is in line with the CAMELS rating system as well as the Basel II, which use similar measures. Additionally, Bernanke (1983), Diamond and Rajan (2011), and Caballero and Simsek (2013) show liquidity, insolvency, and the prevalence of bank failures matter and can deepen economic crises or slow recovery. Jin et al. (2011) show that nonperforming loans, loan loss provisions help determine the prevalence of bank failures.

stimulus, and many banking system indicators changed extensively. The Chinese data are from Wind (a Chinese data services provider) and the Chinese National Bureau of Statistics. We examine the 1,535 publicly listed firms in the Chinese A-share stock market (Shanghai and Shenzheng Stock Exchanges) for which data for each quarter are available, thus maintaining a balanced panel. We employ the firm's gross revenue as the value of the firm's output (*OUTPUT*) the firm's number of employees as firm employment (*EMP*), and the firm's net capital expenditure to reflect its investment (*INVEST*).[10]

In expansions of the model whereby we test whether firm-level heterogeneity has differential effects on our variables, we consider the firm's assets, its asset-liability ratio, its return on equity (profitability), and the nature of its ownership. Thus, the descriptive statistics, reported in Table 1, are broken into four panels, based upon these specific firm-level characteristics. Firms with larger size, high liability, and high profitability have much larger output, employment, and investment than the other types of firms with medium and small features, especially for investment. It is also noteworthy that Panel D shows that output, employment, and investment are much higher in state-owned firms than in privately-owned firms. State-owned firms have around 7 times more output, 1.6 times more employment, and 10 times more investment than privately-owned firms.[11]

[Table 1]

[10] We use net capital expenditure (cash payments for fixed assets, intangible assets, and other long-term assets less cash receipts from selling these assets and depreciation) to proxy for firm investment. Since some values of net capital expenditure are negative, we use the linear transformation to make all the values positive. To be specific, we add the absolute number of smallest net capital expenditure of each panel to get the new net capital expenditure.

[11] The state-owned firms include both central state-owned firms and local state-owned firms.

The firms in our data set come from 13 industry sectors as specified by the Industry Classification Guideline made by the China Securities Regulatory Commission. These sectors include agriculture, manufacturing, utilities, mining, construction, transportation and warehousing, information technology, wholesale and retail trade, financial and insurance, real estate, social services, communication and culture, and conglomerates. So that our empirical investigation is robust to outliers, we apply the Hodrick–Prescott filter (λ=1600) to delete time trend and seasonality and, as is standard in firm-level panel studies, we winsorize the highest 2.5% and the lowest 2.5% of the firm-level observations in output, employment and investment. This is particularly relevant since some Chinese firms manage earnings in the different quarters, especially in the fourth quarter in one year.[12]

Many of the key variables move sharply across the quarters in our sample. The growth rate in firm-level employment dropped from 2.5 percent in the first quarter of 2008 to 1 percent in the third quarter of 2009. At the same time, however, the annualized growth rate in investment rose from 25.9 percent at the beginning of 2008 to 30.5 percent in the last quarter of 2009. The increase in firm-level investment—quite the opposite of what was experienced in the United States where investment fell sharply in late 2008 and early 2009—is clearly influenced by the nature of China's fiscal stimulus. Specifically, China's government encouraged firms, particularly state-owned ones, to respond to the subsidies

[12] Earnings management is the use of accounting techniques and accounting rules to produce financial reports that present an overly positive view of a company's business activities and financial position, such as earnings, revenue, or total assets.

and tax cuts by engaging in capital investment so as to better stimulate future economic growth (see Chen, et al., 2011; Liu, et al., 2018; Wen and Wu, 2019). In terms of GDP, China's annualized growth rate fell from around 11 percent in 2008 to around 8 percent in 2009. The growth rate rebounded a bit, rising back into double digits in 2010 and 2011 before falling steadily and reaching only 7 percent by the end of our sample in 2014. This suggests that the effects of China's 2008 and 2009 stimulus had only temporary effects on GDP growth.[13] These movements are shown in Figure 2.

[Figure 2]

With respect to how Chinese economic activity relates to the health of the banking system, the movements illustrated in Figure 2 suggest that the rebound in GDP growth rates, starting in the 3rd quarter of 2009, coincides with the increase in credit supply, capital adequacy ratio, profitability, and with the reduction in the bad loan ratio. Thus, improvement of the Chinese economic activity coincides strongly with the improvement in the nation's bank health. While the results are not reported in the interest of space, we examined correlation coefficients pertaining to our banking and credit variables. Liquidity, capital adequacy ratio, profitability, and bad loan ratio all have strong correlations (in the expected directions) with credit supply. This suggests that a healthy banking system is positively correlated with credit supply as is consistent with Bernanke (1983).

[13] The employment and fixed asset investment are measured for the Chinese urban regions and eliminate the outliers.

3. Empirical results

The first subsection below reports the results of our benchmark case, which considers the broad relationship between the banking indicators and firm-level output, employment, and investment. The second subsection considers possible nonlinearities in this relationship based on heterogeneous firm-level characteristics such as firm size and ownership.[14]

3.1 Dynamic panel regression results

The results of our benchmark model are reported in Table 2. We only report the coefficients on the first lags to save space.[15] Since, as mentioned above, liquidity, capital adequate ratio, profitability and bad loan ratio have strong correlations with each other, we employ a factor analysis to construct one index titled banking health ratio (*HEA*) in the regression model.[16] Table 2 shows that firm-level output, employment, and investment do indeed have significant interactions with one another. Specifically, firm investment positively influences firm output and employment. Employment positively influences output, but negatively influences investment. Finally, output positively influences both employment and investment.

Regarding the exogenous roles of the banking system, we find that our bank health

[14] We also test the stability condition and Granger causality among the variables in the equation. We find that the panel VAR satisfies the stable condition and the variables in the RHS are Granger-causing variables. The results can be found in Tables A2 and Table A3 of the Appendix.

[15] As is expected, the coefficients on the first lags are generally much larger and have larger p-values than those on the second and third lags.

[16] In the factor analysis, the estimated weights on liquidity, capital adequacy ratio, profitability ratio and bad loan ratio are 0.835, 0.952, -0.112 and -0.866, respectively.

proxy is positively associated with output, employment, and investment. This result is statistically significant at the 1 percent confidence level. Government expenditures also have positive and significant effects on the output. The results also suggest that credit supply (*LOAN*) positively impacts firm-level output, employment, and investment. The same is true for government spending. In terms of the external economic and financial shocks, net exports (*TRADE*) had a significant and positive relationship with Chinese firm-level employment but was negatively associated with firm-level investment, while US stock market performance was positively associated with Chinese firm-level employment but negatively associated with firm-level investment.[17]

As a whole, the results reported in Table 2 strongly suggest that both bank credit and a healthy banking system are important factors in influencing firm-level economic outcomes. Furthermore, the results suggest that the Chinese government's 2008 fiscal stimulus plan, as well as the government's expansionary monetary policy which strongly increased bank credit had positive influences on the economic outcomes for Chinese firms, consistent with Liu et al. (2018). The results are also in line with studies such as by Bernanke (1983), Hasan et al. (2009) and Koetter and Wedow (2010) who show the importance of banking health conditions on the economic recovery.[18]

[17] In a robustness check, we employed the bad loan ratio (*BAD*) alone as our proxy for banking health. The results suggest that firm-level output, employment, and investment have significant interactions with one another. Largely consistent with what we find in the benchmark model, bad loans have the negative effects on the firm output, employment, and investment, however the negative effects on the firm employment and investment are not statistically significant. Banking health, credit supply, government spending and net exports keep their significant and positive effects on the firm output, employment, and investment. These results are shown in Table A4 in Appendix.

[18] In order to stimulate the economy and adjust industry structure, the Chinese government

[Table 2]

3.2 Accounting for Firm Heterogeneity

Although the results above depict the general relationship between banking indicators and firm-level output, employment and investment, as we highlighted in the introduction, these relationships may vary if firms with different characteristics, such as firm size, liability, profitability and ownership, face different financial constraints.[19] In order to test the significant difference of the subsamples, we use the pairwise comparison normal

promulgated the "top ten industry revitalization plan" in the early 2009, which covers manufacturing industries (automobile, equipment, shipbuilding manufacturing industry, non-ferrous metal industry, steel industry, textile industry, petrochemical industry), electronic information industries and logistics industries. The detailed measures include providing credit support, increasing tax rebates and government purchase on the products of the firms, such as agricultural products, refined oil and non-ferrous metal. Since industries are supported differently due to government policies, we replicate our investigation based on the 13 industries and find that manufacturing industry, construction industry, transportation and warehousing industry, real estate industry, utility industry, mining industry and construction industry are larger positively affected by banking health ratio and credit supply. In terms of fiscal policy, we find that agriculture and relevant industry, manufacturing industry and real estate industry, utility industry, mining industry, construction industry and transportation and warehousing industry are positively and significantly affected. In summary, among these industries, it is evident that the industries in need of financial support in the revitalization plan really obtain banking credit and government fiscal support, including manufacturing industry, utility industry and transportation and warehousing industry. This finding supports Kletzer and Bardhan (1987), Rajan and Zingales (1998) and Wurgler (2000), which show that financial development helps meet the funding requirements and promotes development via corporate innovation, new technology application, and upgrades in technology. In general, well-developed financial markets improve capital allocation and optimize the industrial structure. However, besides these industries, some problematic industries due to their potential impacts on boosting housing prices, especially construction industry and real estate industry, have also received banking credit. Due to space limitations, we do not report the regression results.

[19] In order to know the correlations of firm ownership with other firm characteristics, including firm size and firm profitability, we first calculate the distribution of large and small firms among public and private firms. With respect to public firms, we find that 36.13% are large firms while 19.34% are small firms (with the remainder medium sized). With respect to private firms, large firms are 32.49%, while small firms are 25.55%. Furthermore, we calculate the correlation of a dummy variable for the large firms and a dummy variable for pubic firms. The results show that the correlation is 0.216, which confirms that the higher proportion of large firms is public than private firms. By calculating the profitability of private and public firms, respectively, we find that the profitability of private firms is 4.172% and the profitability of public firms is 3.140%. However, the difference is not statistically significant. Therefore, we find that firm ownership cannot explain firm profitability. Thus, it is necessary to divide the whole sample by using different firm characteristics to account for firm heterogeneity.

We also directly calculate the correlations of the firm characteristics, including state-owned firms, firm size, firm liability and firm profitability. The results confirm that characteristics of firms have the low correlation coefficients between each other. This result further supports the importance of investigating the effects of firm heterogeneity in our paper. The specific results are shown in Table A5 in Appendix.

test.[20] We investigate this possibility in the following subsections.[21]

3.2.1 Firm size

Studies by Beck et al. (2006a,b) and Drakos and Giannakopoulos (2011) and Shen et al. (2015) suggest that smaller firms generally have less access to external financing and are more constrained in their internal financing. In order to connect our results to such studies, we split the firms in our sample into three subgroups—large, medium, and small.[22] We run the Panel VAR model for each of these subgroups and report the results in Panel A of Table 3. In terms of the dynamic interactions between output, employment, and investment, there are some interesting differences between the three subsamples. For example, firm-level lagged output is positively and significantly correlated with employment and investment only in the large firm sample. Furthermore, lagged

[20] The statistic of the pairwise comparison normal test is built as $\frac{(\hat{\beta}_{1j} - \hat{\beta}_{2j})}{\sqrt{se^2(\hat{\beta}_{1j}) + se^2(\hat{\beta}_{2j})}} \sim N(0,1)$

where $\hat{\beta}_{1j}$ and $\hat{\beta}_{2j}$ are the regression estimators for group 1 and group 2 while j means the j-th variable in the regressions. $se^2(\hat{\beta}_{1j})$ and $se^2(\hat{\beta}_{2j})$ are the square of standard error of $\hat{\beta}_{1j}$ and $\hat{\beta}_{2j}$. This statistic follows the normal distribution (0,1) in the large sample, whose sample size is larger than 30.

[21] In order to directly investigate the effects of different types of firms on the firm output, employment, and investment, we use the dummy variables to distinguish the firms with different types. To be specific, we restrict our sample to only the highest and lowest 30 percent of firms with respect to size, liability, and profitability. We then create a dummy variable equal to 1 for the highest 30% of firms for each of these categories. In a separate analysis, we employ the full sample and create a dummy variable equal to 1 for the state-owned firms. The results show that firm output, employment and investment of the firms with highest 30% size, liability, and profitability are higher than the firms with the lowest 30% of size, liability, and profitability. Additionally, firms with state ownership have the higher output, employment, and investment, than privately owned firms. The detailed results are in Table A6 of the Appendix.

[22] We divide all the firms into the highest 30%, the middle 40% and the lowest 30% and define the highest 30% as the firms with large size, high liability, high profitability, the middle 40% as the firms with medium size, medium liability and medium profitability and the lowest 30% as the firms with small size, low liability and low profitability, respectively.

investment is no longer correlated with output when the sample is broken up by firm size, but it is positively correlated with employment regardless of firm size.

We are most interested in how firm-level heterogeneity affects the relationships between our exogenous variables. With respect to the health of the banking system and the availably of credit, our results suggest that these financial variables have positive and significant effects on all types of firms. However, the magnitude of this effect is generally highest in the large firm subsample, especially for investment and employment, although with respect to bank health's impact on output, the effects are slightly larger for smaller firms than otherwise, but the difference with larger firms' output affected by credit supply is not significant in the pairwise comparison normal test. It is interesting to note that while government spending positively influenced output in all three of the subsamples, the magnitude of the effect was largest on small firms and smallest on large firms; nevertheless, this difference is not significant for output. With respect to investment, however, the effect was reversed with government spending having the largest positive effect on large firms. Finally, regarding the control variables, it is notable that movements in the US stock market had the largest impact on the output of large Chinese firms and had no significant impact on the output of small firms.

3.2.2 Firm liability

In the related literature, Stiglitz and Weiss (1981) and Jensen (1986) argue that firms with high liability ratios may have many good investments yielding returns higher than

the prevailing interest rate, which may be the factor that drove banks to provide so much access to credit. On the other hand, Lang et al. (1996) and Aivazian et al. (2005) argue that this high level of leverage may constrain a firm's ability to attain future credit. The relationship between a firm's economic performance and the health of the banking system may then depend upon the firm's liability ratio, that is, a firm's total liabilities divided by its total assets. Furthermore, there is some disagreement about whether a high liability ratio reflects positively upon the health of the firm or alternatively acts as a constraint upon the firm's ability to attain future credit. Thus, following the splitting procedure we employed in the analysis above, we divided the firms in our sample into three groups based upon their liability ratio and rerun the panel VAR model. The results are reported in Panel B of Table 3.

First, with respect to the interaction of firm-level output, employment, and investment, the dynamic interactions are not systematically much different for any of the three subsamples as compared to the results reported in Table 2. But again, we are most interested in whether the exogenous variables, particularly bank health and the supply of credit, have differential effects based on the size of a firm's liability ratio. Bank health is positively associated with output for all three types of firms, however the coefficient is 50 percent larger for high-liability ratio firms. The magnitude of the positive impact of bank health on firm-level investment is also highest for high-liability firms. This difference is significant in the pairwise comparison normal test. There is, however, no strong difference in magnitude of the positive impact that bank health has on firm-level

employment. Interestingly, the same general pattern plays out with respect to credit supply—high liability firms benefit the most with respect investment from an increase in the supply of credit. These results also offer support for Stiglitz and Weiss (1981) and Jensen (1986) as they suggest that firms with high liability have generally made good investments with supra-normal returns.

Regarding government expenditures, the largest positive impact is again on high-liability firms. These results are in line with studies such as by Huynh and Petrunia (2010) who find a positive and nonlinear relationship between leverage and firm's growth by using listed and unlisted Canadian manufacturing firms. Finally, the results suggest that the performance of the US financial system positively effects high-liability firms but has little or no impact on medium- or low-liability firms.

3.2.3 Profitability of Firms

It is generally believed that firms with higher profitability are less likely to be credit constrained (see Cull and Xu, 2003; Whited and Wu, 2006; Firth et al., 2009; Drakos and Giannakopoulos, 2011). Thus, we may suspect that credit supply would have less of an effect on high profitability firms than otherwise. To investigate such linkages, we again followed the splitting procedure used above and broke the firms into three groups in line with their earnings and profitability, that is, high profitable firms, medium profitable firms and low profitable firms. Profitability is measured by the firm's return on equity (ROE). The results are reported in Panel C of Table 3.

Indeed, while bank health positively affects output in all three subsamples, the magnitude of the effect is largest in the low profitability firm subsample. However, with respect to employment and investment, bank health has the largest positive impact on high profitability firms—in fact the impact of bank health on employment is negative for low profitability firms. The effects of credit supply are significantly positive on the output of all three types of firms. The size of the coefficients is not very different across the three subsamples with the exception of those dealing with investment, whereby credit supply has twice as large of an impact on high profitability firms than it does low profitability ones. Generally, these results support the notion that the Chinese banking system tends to favor firms with high earnings growth and profitability and that firms with low profitability face financing constraints.

On the other hand, the coefficients on government spending suggest that expansionary fiscal policies have the highest impact on low profitability firms as the coefficient is two and a half times larger in the low profitability subsample than it is in the high profitability subsample. Still with respect to the impact of government spending on firm-investment, the effect is highest in the sample of firms that have high ROE. Finally, it is notable that the effect of US financial performance has very different output effects on Chinese firms with high versus low profitability. Specifically, better performance of the S&P 500 in the US brings faster output growth in low profitability Chinese firms but brings slower output growth for more profitable Chinese firms.

3.2.4 Firm ownership

Faccio et al. (2006), Claessens et al. (2008), Faccio (2010) and Shen et al., (2015) show that politically-connected firms are more likely to be assisted via bank loans when they face financial difficulties compared to similar non-politically connected firms. The Chinese banking system is heavily influenced by government and banks' lending decisions often reflect government-dictated policies rather than market-based decisions. For example, banks are often pressured to finance state-owned enterprises (SOE) which make heavily losses (Cull and Xu, 2003; Allen et al., 2005; Barboza, 2008; Firth et al., 2009; Chen et al., 2013; Liu et al., 2018). Accordingly, we split the sample into two—one with firms that are state owned and the other with privately owned firms. The results of these two subsamples are reported in Panel D of Table 3. Note that 60 percent of the firms in our sample are state-owned.

Regarding the dynamic interaction between firm-level output, employment, and investment, the results suggest that the interactions found in the full sample generally hold up in both subsamples. The major exception is with respect to employment. Lagged output significantly influences output in a positive direction for privately-owned firms, however the coefficient is small and insignificant for the sample of state-owned firms. In terms of magnitude, changes in lagged output do bring over three times more investment to state-owned firms than to private ones. In other words, state-owned firms tend to invest their increases in revenues into capital investment while private firms tend to expand their workforce.

With respect to the exogenous variables, bank health has a positive impact on output, employment, and investment, and the magnitudes are not much different for the private or state-owned subsamples. An increase in credit supply, however, has over twice as large of a positive impact on the output of privately-owned firms as it does state-owned ones. This strongly suggests that credit constraints are more binding for privately-owned firms. These results are in line with studies such as by Poncet et al. (2010) and Chan et al. (2012) and Cong et al. (2018) which contend that private firms face the higher degrees of financial constraint than state-owned firms in China.[23] Ho, et al. (2017) demonstrate that under the Chinese stimulus plan of 2008 and 2009, new bank credit was funneled disproportionately to state-owned firms rather than private ones. Jefferson (2016) further explains that the private Chinese firms are more profitable and efficient compared to state-owned ones because the state-owned firms have the problems in corrupt practices, weak supervision and undefined property rights.

Still, in terms of capital investment, the impact of credit supply is around 50 percent higher for state-owned firms than private ones. This suggests that the under the monetary stimulus that followed the Great Recession, new bank credit heavily funded capital investment by state-owned firms as suggested by Ho, et al. (2017) and Cong, et al. (2018). With respect to the impact of China's fiscal stimulus, the coefficients on *SPEND* suggest that the largest impact on output and employment was felt by private firms while

[23] Additionally, the literature suggests that politically-connected firms are more likely to be bailed out when they face financial difficulties compared to similar but non-politically connected firms (Cull and Xu, 2003; Firth et al., 2009; Chen et al., 2013; Liu et al., 2018).

state-owned firms saw slightly higher increases in investment as a result of the stimulus.

[Table 3]

3.3 Comparison with Great Recession and recovery periods

The potential impact of financial and fiscal policies may differ between the Great Recession itself (2008-2009) and the subsequent recovery period (2010-2014) (see Corsetti et al., 2012; Ouyang and Peng, 2015). To examine this, we duplicate our analysis, this time by including an interaction dummy for quarters during the Great Recession[24]. The regression models are now as follows:

$$OUTPUT_{it} = \sum_{j-1}^{k} \alpha_j^{o,1} OUTPUT_{it-j} + \sum_{j-1}^{k} \alpha_j^{o,2} EMP_{it-j} + \sum_{j-1}^{k} \alpha_j^{o,3} INVEST_{it-j} + b_1^o HEA_{t-1} + b_2^o LOAN_{t-1}$$
$$+ b_3^o SPEN_{t-1} + b_4^o TRADE_{t-1} + b_5^o STOCK_{t-1} + b_6^o GRREC_t \times HEA_{t-1} + b_7^o GRREC_t \times LOAN_{t-1}$$
$$+ b_8^o GRREC_t \times SPEN_{t-1} + \alpha_i^o + \varepsilon_{it}^o \quad (4)$$

$$EMP_{it} = \sum_{j-1}^{k} \alpha_j^{e,1} OUTPUT_{it-j} + \sum_{j-1}^{k} \alpha_j^{e,2} EMP_{it-j} + \sum_{j-1}^{k} \alpha_j^{e,3} INVEST_{it-j} + b_1^e HEA_{t-1} + b_2^e LOAN_{t-1}$$
$$+ b_3^e SPEN_{t-1} + b_4^e TRADE_{t-1} + b_5^e STOCK_{t-1} + b_6^e GRREC_t \times HEA_{t-1} + b_7^e GRREC_t \times LOAN_{t-1}$$
$$+ b_8^e GRREC_t \times SPEN_{t-1} + \alpha_i^e + \varepsilon_{it}^e \quad (5)$$

$$INVEST_{it} = \sum_{j-1}^{k} \alpha_j^{i,1} OUTPUT_{it-j} + \sum_{j-1}^{k} \alpha_j^{i,2} EMP_{it-j} + \sum_{j-1}^{k} \alpha_j^{i,3} INVEST_{it-j} + b_1^i HEA_{t-1} + b_2^i LOAN_{t-1}$$
$$+ b_3^i SPEN_{t-1} + b_4^i TRADE_{t-1} + b_5^i STOCK_{t-1} + b_6^i GRREC_t \times HEA_{t-1} + b_7^i GRREC_t \times LOAN_{t-1}$$
$$+ b_8^i GRREC_t \times SPEN_{t-1} + \alpha_i^i + \varepsilon_{it}^i \quad (6)$$

[24] In addition to using an interaction dummy for quarters to explore the differences between the Great Recession (2008-2009) and the subsequent recovery period (2010-2014), we also divided the sample into the Great Recession period and subsequent recovery period and reran the regressions as a robustness check. The results demonstrate that the interactions of firm output, employment and investment found in the full sample generally hold up in both subsamples. In terms of the exogenous variables, banking health has a smaller effect on the firm output, employment and investment in the Great Recession period while credit supply has a larger effect on the firm output, employment and investment in the Great Recession period. In terms of government expenditures, it is evident that its effect is not very significant in the Great Recession period but its effect is significant and positive in the subsequent recovery period. The insignificance of government expenditure's effect might be caused by too short period as we have only 8 quarterly observations in the Great Recession period. Overall, these findings are very similar with the results in Table 4. The results are not reported in the interest of space.

where $GRREC_t$ is a dummy variable ($GRREC = 1$) for the Great Recession, covering the five quarters from the fourth quarter of 2008 through the fourth quarter of 2009.

The results are reported in Table 4. We are most interested in the coefficients on the interaction terms. For example, in specification (1) the coefficient on the interaction of our banking health variable and the Great Recession dummy is -0.073 while the coefficient on bank health without the interaction is 0.107. This suggests that during the five Great Recession quarters, a 1 percent increase in the bank health variable would cause output to increase by 0.034 (0.107 minus 0.073) whereas during the recovery period the same shock would increase output by 0.107 percent. In all three cases, the positive coefficients on the non-interaction terms were larger (in absolute value) than the negative coefficients on the interaction terms. This suggests that while bank health had a positive effect on firm performance during the Great Recession, this effect was larger during the subsequent recovery period between 2010 and 2014 (as well as the first three quarters of 2008).

Specification (2), however, offers a very different finding. The coefficients suggest that the positive effects that increased credit supply played on all three outcomes were significantly higher during the Great Recession period than the rest of the sample. Thus, during the recession itself, expanding credit supply may be a superior remedy to focusing on measures that promote the overall health of the banking system. However, during the period of recovery from a financial crisis, measures promoting bank health appear to be of great importance to firms, consistent with Bernanke's (1983) findings from the Great Depression-era United States.

Finally, specification (3) suggests that increases in government spending play a much larger role on promoting firm-level output during the Great Recession period than otherwise. A one percent increase in government spending would boost firm level output by 0.899 percent (0.324 plus 0.575) during the recession period compared to only 0.324 percent otherwise. These results are consistent with Ouyang and Peng (2015), which notes that the effect of 2008 economic stimulus plan had a large effect during the Great Recession period, but little or no long run effect. It is also consistent with the finding of Corsetti et al. (2012) that output multipliers of government expenditures are especially larger in times of financial crisis. However, the coefficient on the interaction term between spending and firm-level investment is negative, and its size almost directly offsets the positive coefficient on investment without the interaction. Thus, government spending did not promote firm-investment during the Great Recession, but it did during the rest of the sample. The interaction term on government spending and the Great Recession is insignificant with respect to employment, suggesting that the positive effect government spending had on employment was not significantly different between Great Recession months or otherwise.

The results reported in Table 4 broadly suggest that policies boosting credit supply and government expenditures had a disproportionately strong positive impact upon firm-level decisions during Great Recession quarters. Thus, the Chinese government's 4-trillion RMB stimulus plan and its 14.6 trillion RMB increase in bank credit during the Great Recession appear to have helped mitigate the negative effects of the global downturn for

Chinese firms.

[Table 4]

3.4 Dynamic analysis on the effects of financial and fiscal policies

In order to expound upon the dynamic nature of our empirical model, this section discusses the impulse response functions and variance decompositions from the panel VAR model. In particular, we investigate the dynamic effects that shock in one variable has on the others.

With respect to impulse response functions, the results are shown in Appendix Figure A1.[25] Of most interest to us are the impulse response functions between shocks to our bank health proxy, credit supply, and government expenditure and firm-level output, employment, and investment. This analysis shows that a one standard deviation shock in the bank health variable increases firm-level output, employment, and investment by 0.31, 0.006, and 0.033 respectively, with the maximum affect occurring around the third period after the shock. These effects converge to zero by around the fifth period. With respect to credit supply, a one standard deviation shock causes firm investment to increase by 0.9 in the highest point in the second period before converging to zero in by the sixth period. A one standard deviation shock in credit supply also affects output and employment by 0.05 and 0.06 respectively, with these effects peaking around periods 2

[25] Firm-level output, employment and investment positively respond to their own lags, but the effect to output and investment, in particular, diminishes very quickly. Furthermore, firm output responds positively to employment and investment. Firm employment responds positively to output but responds negatively to investment. Firm investment positively responds to output and employment. For example, a one standard deviation shock to lagged output, employment, and investment would cause firm output to rise by 0.6, 0.06 and 0.024 respectively, and then the effect diminishes in subsequent periods.

and 3. The effect of credit on employment persists and is still statistically significant in the 10th quarter after the shock. A one standard deviation shock in government expenditure causes output and investment to increase by 0.015 and 0.28 respectively, with in the effect peaking around the 3rd period but the response of employment is very small. These results suggest that positive shocks in bank health indicators and government expenditures have relatively large effects on firm-level output and investment, but their effects are only significant for around a year—by the 5th quarter after the shock, the effect has generally dissipated.

With respect to the responses of firm-level output, employment and investment to shocks in net exports and US financial market performance, we find that these effects are generally smaller than they were for the financial variables. Furthermore, the effect of a positive shock to US market performance is negative (though small) with respect to output and investment.

We also apply variance decompositions to assess the percentage of the variation in one variable that is explained by a shock to another variable, as accumulated over time. The results are reported in Table 5. For example, by the 10^{th} period forecast horizon, the change of firm-level output that can be explained by lagged output is 90.66 percent, by lagged employment is 7.78 percent, and by lagged investment is 1.56 percent. As is expected, for earlier periods, the percent of output that can be explained by lagged output is much higher—it is over 99 percent in the 2^{nd} period forecast horizon.

In specifications (2) through (6), we explore the percentage of the variation in output,

employment, and investment that can be explained by a one standard deviation shock to bank health, credit supply, government expenditures, net exports and US stock market performance over a 10 period forecast horizon.[26] The results suggest that a shock to bank health has a fairly strong effect in explaining the variation in investment, but a much smaller effect on output and employment. A shock to credit supply has substantial effects on the variation in both investment and output, but relatively smaller effects on the variation of employment. Shocks to government expenditures affect of all three firm-level variables, accounting for between 3.5 and 7 percent of the variation in them. Shocks to net exports and US financial markets explain very little—always less than 1 percent—of the variation in output, employment, and investment.[27]

[Table 5]

4. Conclusions

In response to the worldwide Great Recession, the Chinese government instituted a 4 trillion RMB government stimulus fiscal policy as well as a highly expansionary monetary

[26] We do not report the variance decompositions on output, employment, and investment in specifications 2 through 6 to save space. They are generally similar to those reported in specification (1), particularly given how little of the variation is typically explained by each of the five exogenous variables.

[27] The Chinese stimulus package encourages state-owned to invest more and there exists a large difference in size, liability ratio and profitability for the state-owned firms and private firms, we divide the whole sample by ownership and apply impulse reaction functions and variance decompositions to investigate state-owned and private firms, respectively. In the results of the impulse reaction functions, we find that the effect of interaction of firm-level variables is strong and significant for both state-owned firms and private firms. Besides, the shocks of the banking health ratio, credit supply, government expenditure and external economic factors on the firm-level investment are larger in the private firms than the state-owned firms but these shocks on the firm-level output are smaller in the state-owned firms than the private firms. However, the shocks of the banking indicators and government expenditure are significant in a very short period. In the results of variance decompositions, we find that the changes in the banking health ratio, credit supply, government expenditure and external economic factors would explain the changes more in firm-level output, employment and investment in the state-owned firms than private firms.

policy whereby it grew bank credit by 14.6 trillion RMB between 2008 and 2009. This paper explores the interaction of Chinese firm-level output, employment, and investment and the potential impact that these Chinese government policies had on firm-level decisions between 2008 and 2014. We employ quarterly data in a panel VAR analysis. We find that both the supply of credit and a healthy banking system contribute strongly to the growth of firm-level output, employment and investment. The same was true for increases in government spending and increases in net exports.

Since Chinese firms may be differentially affected by fiscal and monetary stimulus policies based on their size, liability, profitability and ownership, we also investigate how the effects of the banking/financial indicators, as well as government expenditures, trade, and the US financial system, change along with firm characteristics. Our results suggest that both credit and bank health have larger positive impacts on large firms than they do on smaller ones, particularly with respect to employment and investment. With respect to firm-liability, we find that bank health and credit generally have their strongest effect—particularly on output and investment—on high-liability firms rather than those with low liabilities. In terms of firm profitability, there are no systematically strong differences in how bank health or availability of credit affects firms; however, we find that the impact of shocks to government spending, net exports, and the US financial system tend to have their strongest impact on the output of low-profitability firms. Additionally, when we break our sample into private firms and those owned by the state, we find that expansions of credit have larger impacts on private Chinese firms, suggesting that indeed

these firms are generally more credit constrained than state-owned ones. Increases in government spending also tend to have larger impacts on the output and employment of private firms than they do state owned ones.

We also consider whether the relationships between firm level indicators and bank hearth, credit, and government spending changed between the Great Recession period and the subsequent recovery period. Our results suggest that expansions of credit were particularly helpful during the recession itself, while that the health of the banking system was very important in helping firms during the recovery period following the downturn.

Although our results suggest that Chinese financial and fiscal policies helped mitigate the impact of Great Recession, we must acknowledge that there are corresponding costs from soaring banking credit growth and higher government expenditures. In particular, Chinese commercial banks today have a large quantity of outstanding loans with high insolvency risks, because many industries have serious problems of overcapacity, low production efficiency, and limited development potential. Moreover, the Chinese government has a major financial burden due to the financing of its policies through government debt. Such macroeconomic issues deserve further research.

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Figure 1 Transmission channels of money, credit and banking system in the economy

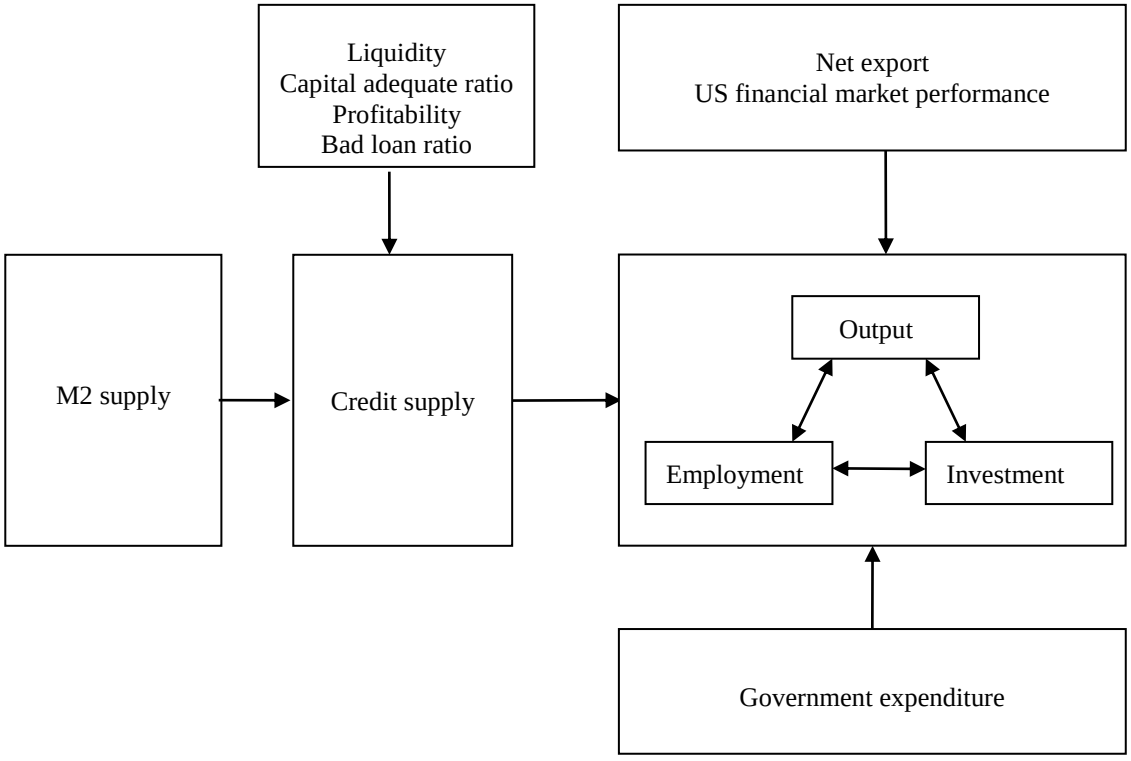
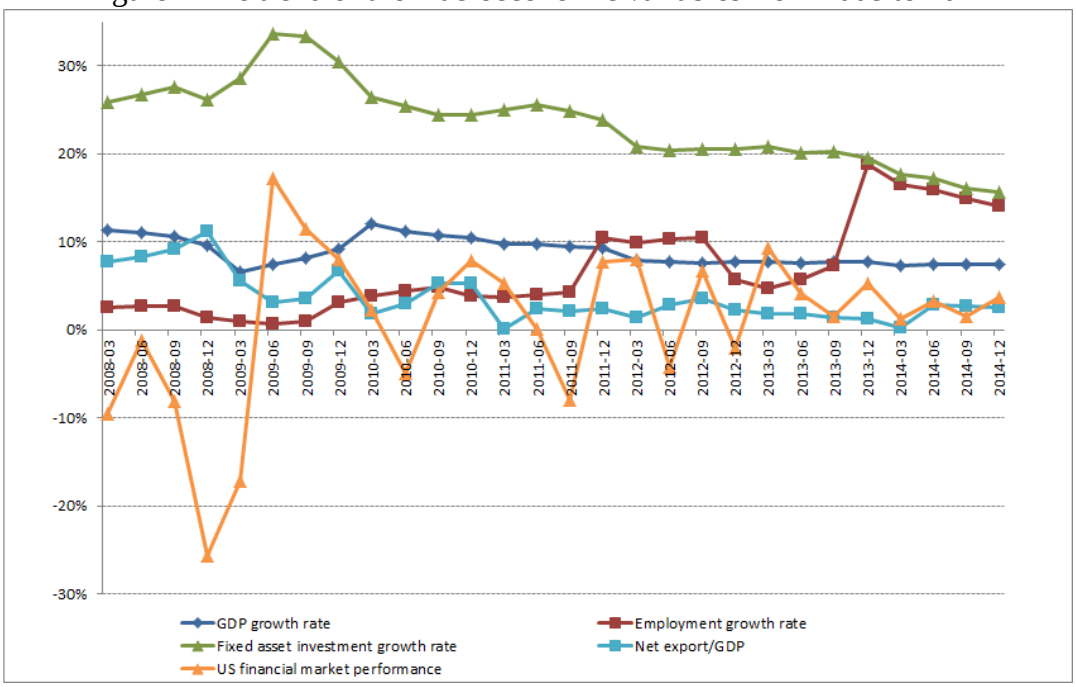


Figure 1 demonstrates the interaction with firm output, employment and investment with each other. Healthy banking system, credit supply, government expenditure and external economic factors are expected to influence these three firm-level variables.

Figure 2 The trend of the macroeconomic variables from 2008 to 2014



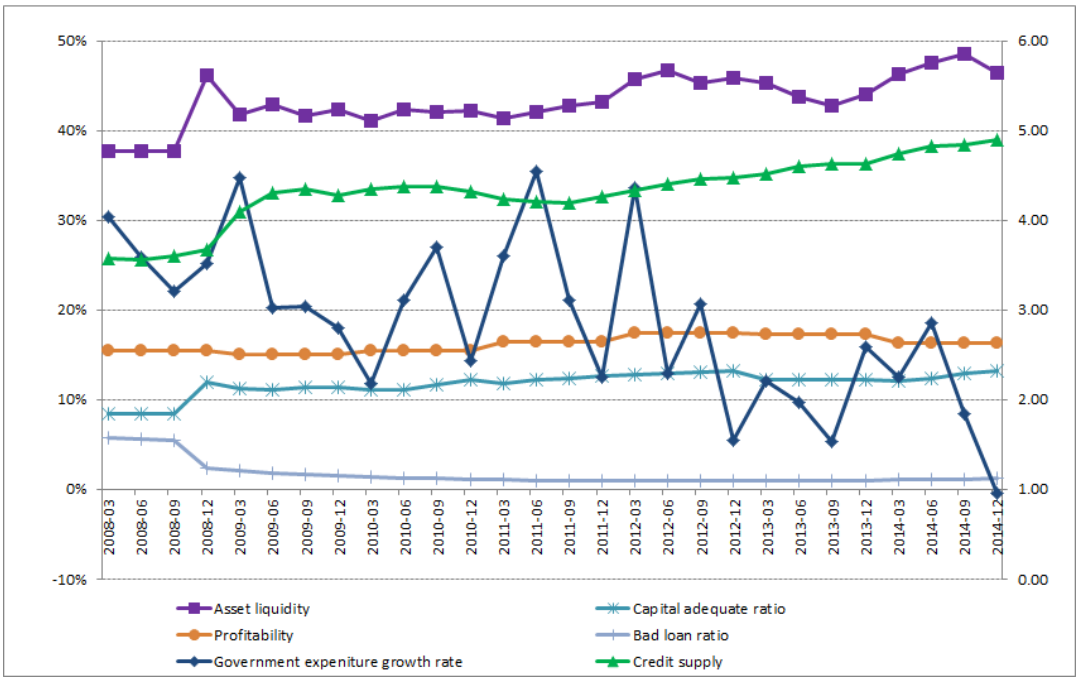


Figure 2 shows the trend of the macroeconomic variables from 2008 to 2014. It is evident that GDP annual growth rate and employment growth drops in the end of 2008, which is followed by the rise of the fixed asset investment growth rate and the growth rate of government expenditure. The recovery in the Chinese GDP growth coincides with the increase in credit supply, capital adequacy ratio, profitability and with the reduction in bad loan ratio.

Table 1 Descriptive statistics of firms' characteristics

		Output		Employment		Investment	
	Obs	Mean	Std	Mean	Std	Mean	Std
Panel A							
Firms with large size	12908	878.995	3782.916	8809.797	22579.399	35.989	213.675
Firms with medium size	17164	62.393	70.917	3539.382	5551.074	1.135	2.400
Firms with small size	12908	19.019	24.595	2405.060	5464.748	0.296	0.995
Panel B							
Firms with high liability	12908	474.525	1514.489	5036.659	9984.215	25.350	191.819
Firms with medium liability	18424	254.521	2425.298	5328.708	18476.349	5.159	41.367
Firms with low liability	12908	168.013	2154.318	3389.661	6593.586	5.737	84.038
Panel C							
Firms with high profitability	12908	648.978	3730.787	6061.206	19446.631	28.880	211.153
Firms with medium profitability	18424	170.954	676.493	4466.523	11286.744	5.192	32.346
Firms with low profitability	12908	104.681	312.461	3920.815	7383.580	2.010	10.565
Panel D							
State-owned firms	23016	452.089	2843.990	5588.563	16749.820	13.456	128.131
Private firms	15288	64.885	156.100	3391.504	6977.723	1.301	5.596

This table reports the descriptive statistics for firm output, employment and investment in our sample. The sample covers all the 13 industries and the sample period is from 2008 to 2014. The unit of output is 10 million RMB and the unit of investment is 100 million RMB.

Table 2 Results on firm-level variables: Benchmark model

	Output		Employment		Investment	
	(1)	(2)	(3)	(4)	(5)	(6)
OUTPUT(-1)	0.182***	0.178***	0.016***	0.016***	0.021***	0.020***
	(0.044)	(0.044)	(0.005)	(0.005)	(0.003)	(0.003)
EMP(-1)	0.116***	0.120***	0.833***	0.835***	-0.139***	-0.132***
	(0.044)	(0.044)	(0.025)	(0.025)	(0.015)	(0.015)
INVEST (-1)	0.019*	0.017	0.019***	0.018***	0.384***	0.385***
	(0.011)	(0.011)	(0.003)	(0.003)	(0.010)	(0.010)
HEA(-1)		0.048***		0.006***		0.051***
		(0.004)		(0.001)		(0.002)
LOAN(-1)	0.108***	0.106***	-0.0001	0.017***	0.266***	0.322***
	(0.017)	(0.021)	(0.003)	(0.004)	(0.007)	(0.008)
SPEN(-1)	0.210***	0.356***	0.037***	0.041***	0.395***	0.469***
	(0.050)	(0.053)	(0.013)	(0.014)	(0.029)	(0.030)
TRADE(-1)		0.638**		0.827***		2.417***
		(0.315)		(0.101)		(0.179)
STOCK(-1)		0.031		0.029**		-0.130***
		(0.044)		(0.013)		(0.029)
Observation	36840	36840	36840	36840	36840	36840
N	1535	1535	1535	1535	1535	1535

The panel VAR model is estimated in first differences with third lagged instruments. The sample covers all the 13 industries and the sample period is from 2008 to 2014. All the variables are removed by trend and seasonality. We do not report the influences of second and third lagged output, employment and investment because of the space limitations. The standard error is estimated by white robust covariance. ***, ** and * show the significance at the level of 1%, 5 % and 10%, respectively.

Table 3 Results on firm-level variables in line with different firm characteristics

Panel A: Firm size

	Output				Employment				Investment			
	Large	Medium	Small	Diff. for (1) vs (3)	Large	Medium	Small	Diff. for (4) vs (5)	Large	Medium	Small	Diff. for (7) vs (9)
	(1)	(2)	(3)	Test	(4)	(5)	(6)	Test	(7)	(8)	(9)	Test
OUTPUT(-1)	0.048	0.171***	0.245***	-0.197**	0.042***	0.010	0.005	0.037***	0.031***	-0.007	0.001	0.030***
	(0.063)	(0.050)	(0.064)	(0.014)	(0.012)	(0.009)	(0.005)	(0.000)	(0.011)	(0.006)	(0.002)	(0.004)
EMP(-1)	0.012	0.133***	0.225*	-0.213**	0.769***	0.839***	0.910***	-0.141***	-0.163***	-0.178***	-0.083***	-0.080***
	(0.051)	(0.047)	(0.117)	(0.048)	(0.052)	(0.026)	(0.034)	(0.000)	(0.030)	(0.025)	(0.014)	(0.008)
INVEST (-1)	0.007	0.013	-0.010	0.017	0.011***	0.020***	0.023**	-0.012**	0.320***	0.423***	0.506***	-0.186***
	(0.015)	(0.011)	(0.037)	(0.335)	(0.004)	(0.005)	(0.010)	(0.057)	(0.014)	(0.013)	(0.018)	(0.000)
HEA(-1)	0.053***	0.055***	0.068***	-0.015*	0.016***	0.005***	0.00002	0.016***	0.144***	0.066***	0.025***	0.119***
	(0.007)	(0.004)	(0.009)	(0.094)	(0.002)	(0.001)	(0.002)	(0.000)	(0.006)	(0.003)	(0.002)	(0.000)
LOAN(-1)	0.216***	0.264***	0.258***	-0.042	0.042**	0.029***	0.018*	0.024**	1.187***	0.497***	0.213***	0.974***
	(0.060)	(0.046)	(0.088)	(0.347)	(0.017)	(0.010)	(0.010)	(0.017)	(0.052)	(0.025)	(0.017)	(0.000)
SPEN(-1)	0.270***	0.356***	0.466***	-0.196	0.043	0.064***	0.019	0.024***	1.130***	0.477***	0.223***	0.907***
	(0.094)	(0.053)	(0.129)	(0.110)	(0.031)	(0.019)	(0.026)	(0.000)	(0.078)	(0.041)	(0.029)	(0.000)
TRADE(-1)	-0.173	-0.116	0.231	-0.404	0.947***	0.893***	0.289*	0.658**	-0.197	0.690***	0.282*	-0.479
	(0.514)	(0.311)	(0.583)	(0.302)	(0.197)	(0.123)	(0.150)	(0.051)	(0.428)	(0.209)	(0.145)	(0.145)
STOCK(-1)	0.181**	0.099*	0.035	0.146	0.036	0.059***	0.015	0.021***	0.111	0.009	0.005	0.106*
	(0.075)	(0.054)	(0.098)	(0.118)	(0.032)	(0.018)	(0.023)	(0.000)	(0.076)	(0.037)	(0.026)	(0.093)
Observation	11064	14712	11064		11064	14712	11064		11064	14712	11064	
N	461	613	461		461	613	461		461	613	461	

Panel B: Firm liability

	Output				Employment				Investment			
	High	Medium	Low	Diff. for (1) vs (3)	High	Medium	Low	Diff. for (4) vs (5)	High	Medium	Low	Diff. for (7) vs (9)
	(1)	(2)	(3)	Test	(4)	(5)	(6)	Test	(7)	(8)	(9)	Test
OUTPUT(-1)	0.264***	0.135*	0.062	0.202**	0.002	0.039***	0.012**	-0.010	0.008**	0.015*	0.006	0.002
	(0.072)	(0.076)	(0.057)	(0.014)	(0.007)	(0.010)	(0.006)	(0.139)	(0.004)	(0.008)	(0.006)	(0.391)
EMP(-1)	0.123*	0.059	0.181*	-0.058	0.808***	0.842***	0.844***	-0.036	-0.170***	-0.153***	-0.128***	-0.042

	(0.077)	(0.054)	(0.093)	(0.315)	(0.057)	(0.028)	(0.039)	(0.301)	(0.024)	(0.027)	(0.026)	(0.118)
INVEST (-1)	0.006	0.004	0.009	-0.003	0.012**	0.024***	0.009*	0.003	0.341***	0.355***	0.334***	0.007
	(0.012)	(0.022)	(0.019)	(0.447)	(0.005)	(0.005)	(0.005)	(0.336)	(0.017)	(0.015)	(0.019)	(0.392)
HEA(-1)	0.075***	0.050***	0.050***	0.025**	0.007***	0.008***	0.005***	0.002	0.091***	0.081***	0.056***	0.035***
	(0.009)	(0.005)	(0.007)	(0.014)	(0.002)	(0.002)	(0.002)	(0.240)	(0.005)	(0.004)	(0.004)	(0.000)
LOAN(-1)	0.358***	0.225***	0.112**	0.246***	0.019	0.044***	0.020*	-0.001	0.758***	0.589***	0.455***	0.303***
	(0.089)	(0.052)	(0.054)	(0.009)	(0.013)	(0.011)	(0.011)	(0.279)	(0.040)	(0.030)	(0.029)	(0.000)
SPEN(-1)	0.507***	0.366***	0.277***	0.230*	0.033	0.062***	0.043	-0.010	0.636***	0.680***	0.397***	0.239***
	(0.106)	(0.070)	(0.101)	(0.058)	(0.026)	(0.021)	(0.026)	(0.393)	(0.062)	(0.047)	(0.047)	(0.001)
TRADE(-1)	0.476	-0.507	0.331	0.145	0.769***	0.661***	0.706***	0.063	0.001	0.267	1.022***	-1.021***
	(0.571)	(0.411)	(0.423)	(0.419)	(0.172)	(0.138)	(0.146)	(0.390)	(0.323)	(0.250)	(0.239)	(0.006)
STOCK(-1)	0.175*	0.068	0.054	0.121	0.056**	0.016	0.045*	0.011	0.044	0.034	0.033	0.011
	(0.092)	(0.060)	(0.075)	(0.154)	(0.024)	(0.022)	(0.025)	(0.463)	(0.060)	(0.045)	(0.044)	(0.441)
Observation	11064	14712	11064		11064	14712	11064		11064	14712	11064	
N	461	613	461		461	613	461		461	613	461	

Panel C: Firm profitability

	Output				Employment				Investment			
	High	Medium	Low	Diff. for (1) vs (3)	High	Medium	Low	Diff. for (4) vs (5)	High	Medium	Low	Diff. for (7) vs (9)
	(1)	(2)	(3)	Test	(4)	(5)	(6)	Test	(7)	(8)	(9)	Test
OUTPUT(-1)	0.175**	0.163***	0.176***	-0.001	0.019**	0.022***	0.010	0.009	0.003	0.024***	0.007*	-0.004
	(0.082)	(0.026)	(0.065)	(0.504)	(0.008)	(0.007)	(0.007)	(0.199)	(0.006)	(0.008)	(0.004)	(0.290)
EMP(-1)	0.102*	0.030	0.222*	-0.120	0.774***	0.832***	0.912***	-0.138**	-0.175***	-0.158***	-0.099***	-0.076**
	(0.060)	(0.029)	(0.126)	(0.195)	(0.055)	(0.030)	(0.029)	(0.013)	(0.028)	(0.026)	(0.023)	(0.018)
INVEST (-1)	-0.001	-0.002	0.032	-0.033	0.012***	0.017***	0.016**	-0.004	0.331***	0.340***	0.379***	-0.048**
	(0.014)	(0.009)	(0.037)	(0.202)	(0.004)	(0.004)	(0.008)	(0.327)	(0.015)	(0.016)	(0.020)	(0.027)
HEA(-1)	0.047***	0.061***	0.065***	-0.018*	0.016***	0.009***	-0.005**	0.021***	0.103***	0.080***	0.045***	0.058***
	(0.008)	(0.004)	(0.008)	(0.056)	(0.002)	(0.001)	(0.002)	(0.000)	(0.005)	(0.004)	(0.003)	(0.000)
LOAN(-1)	0.216***	0.264***	0.215***	0.001	0.027*	0.032***	0.022**	0.005	0.785***	0.609***	0.399***	0.386***
	(0.069)	(0.035)	(0.075)	(0.496)	(0.015)	(0.009)	(0.011)	(0.394)	(0.041)	(0.030)	(0.028)	(0.000)
SPEN(-1)	0.213**	0.388***	0.520***	-0.307**	0.046	0.064***	0.020	0.026	0.710***	0.579***	0.448***	0.262***
	(0.106)	(0.050)	(0.122)	(0.029)	(0.031)	(0.019)	(0.025)	(0.257)	(0.062)	(0.048)	(0.044)	(0.000)

TRADE(-1)	-0.830	-0.076	1.063*	-1.893**	0.888***	0.862***	0.411***	0.477**	0.812**	0.472*	-0.0003	0.812**
	(0.591)	(0.269)	(0.576)	(0.011)	(0.183)	(0.132)	(0.156)	(0.024)	(0.332)	(0.250)	(0.229)	(0.022)
Observation	11064	14712	11064		11064	14712	11064		11064	14712	11064	
N	461	613	461		461	613	461		461	613	461	

Panel D: Firm ownership

	Output			Employment			Investment		
	State-owned	Private	Diff. for (1) vs (2)	State-owned	Private	Diff. for (1) vs (2)	State-owned	Private	Diff. for (1) vs (2)
	(1)	(2)	Test	(3)	(4)	Test	(5)	(6)	Test
OUTPUT(-1)	0.123***	0.185***	-0.062	0.005	0.025***	-0.020**	0.036***	0.010***	0.026***
	(0.046)	(0.068)	(0.225)	(0.006)	(0.007)	(0.015)	(0.009)	(0.003)	(0.003)
EMP(-1)	0.064*	0.174*	-0.110	0.810***	0.850***	-0.040	-0.153***	-0.111***	-0.042*
	(0.038)	(0.092)	(0.135)	(0.043)	(0.030)	(0.223)	(0.024)	(0.020)	(0.089)
INVEST (-1)	0.001	0.061*	-0.060**	0.016***	0.030***	-0.014**	0.348***	0.489***	-0.141***
	(0.010)	(0.034)	(0.045)	(0.004)	(0.007)	(0.041)	(0.013)	(0.016)	(0.000)
HEA(-1)	0.046***	0.052***	-0.006	0.006***	0.006***	0.000	0.058***	0.039***	0.019***
	(0.005)	(0.006)	(0.221)	(0.001)	(0.002)	(0.500)	(0.003)	(0.003)	(0.000)
LOAN(-1)	0.072***	0.166***	-0.094**	0.016***	0.017***	-0.001	0.380***	0.256***	0.124***
	(0.024)	(0.037)	(0.017)	(0.005)	(0.006)	(0.449)	(0.012)	(0.011)	(0.000)
SPEN(-1)	0.267***	0.422***	-0.155	0.020	0.070***	-0.050*	0.525***	0.394***	0.131**
	(0.056)	(0.113)	(0.110)	(0.018)	(0.027)	(0.062)	(0.044)	(0.041)	(0.015)
TRADE(-1)	0.200	1.621	-1.421**	0.965***	0.538***	0.427**	2.605***	2.047***	0.558
	(0.345)	(0.651)	(0.027)	(0.129)	(0.178)	(0.026)	(0.265)	(0.246)	(0.939)
	0.083	0.040	0.043	0.045***	0.003	0.042*	-0.168***	-0.101***	-0.067
Observation	(0.051)	(0.086)	(0.334)	(0.016)	(0.025)	(0.079)	(0.043)	(0.038)	(0.121)
N	19728	13104		19728	13104		19728	13104	

Notes: See notes to Table 2. The P-values of the pairwise comparison normal test for the coefficient difference are reported in the parentheses in the test column. We divide all the firms with the highest 30%, the middle 40% and the lowest 30% and define the highest 30% as the firms with large size, high liability, high profitability, the middle 40% as the firms with medium size, medium liability, medium profitability the lowest 30% as the firms with small size, low liability, low profitability, respectively.

Table 4 Results on the regression models with the output, employment and investment with interaction effects

	Output			Employment			Investment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
OUTPUT(-1)	0.177***	0.178***	0.178***	0.016***	0.016***	0.016***	0.019***	0.020***	0.021***
	(0.044)	(0.044)	(0.044)	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)
EMP(-1)	0.119***	0.118***	0.119***	0.835***	0.834***	0.835***	-0.134***	-0.135***	-0.131***
	(0.044)	(0.044)	(0.044)	(0.025)	(0.025)	(0.025)	(0.015)	(0.015)	(0.015)
INVEST (-1)	0.014	0.015	0.018*	0.018***	0.018***	0.018***	0.381***	0.382***	0.384***
	(0.011)	(0.011)	(0.011)	(0.003)	(0.003)	(0.003)	(0.010)	(0.010)	(0.010)
HEA(-1)	0.107***	0.054***	0.051***	0.011***	0.007***	0.006***	0.146***	0.061***	0.049***
	(0.010)	(0.004)	(0.004)	(0.003)	(0.001)	(0.001)	(0.006)	(0.002)	(0.002)
LOAN(-1)	0.086***	0.070***	0.091***	0.015***	0.009**	0.016***	0.289***	0.266***	0.335***
	(0.021)	(0.022)	(0.022)	(0.004)	(0.004)	(0.004)	(0.009)	(0.009)	(0.009)
SPEN(-1)	0.441***	0.335***	0.324***	0.049***	0.036***	0.040***	0.607***	0.437***	0.495***
	(0.055)	(0.053)	(0.054)	(0.016)	(0.014)	(0.014)	(0.030)	(0.029)	(0.030)
TRADE(-1)	1.057***	0.968***	0.605*	0.864***	0.902***	0.825***	3.092***	2.927***	2.444***
	(0.319)	(0.317)	(0.317)	(0.101)	(0.102)	(0.101)	(0.179)	(0.175)	(0.180)
STOCK(-1)	0.159***	-0.066	0.129**	0.041***	0.007	0.034**	0.076***	-0.279***	-0.213***
	(0.048)	(0.044)	(0.056)	(0.014)	(0.014)	(0.016)	(0.029)	(0.029)	(0.039)
HEA(-1)×GRREC(-1)	-0.073***			-0.006**			-0.117***		
	(0.011)			(0.003)			(0.006)		
LOAN(-1)×GRREC(-1)		0.182***			0.041***			0.281***	
		(0.023)			(0.005)			(0.015)	
SPEN(-1)×GRREC(-1)			0.575***			0.026			-0.479***
			(0.185)			(0.037)			(0.133)
Observation	36840	36840	36840	36840	36840	36840	36840	36840	36840
N	1535	1535	1535	1535	1535	1535	1535	1535	1535

Notes: See notes to Table 2. *GRREC* stands for the five quarters Q4 2008 through Q4 2009 when the worldwide Great Recession was at its worst.

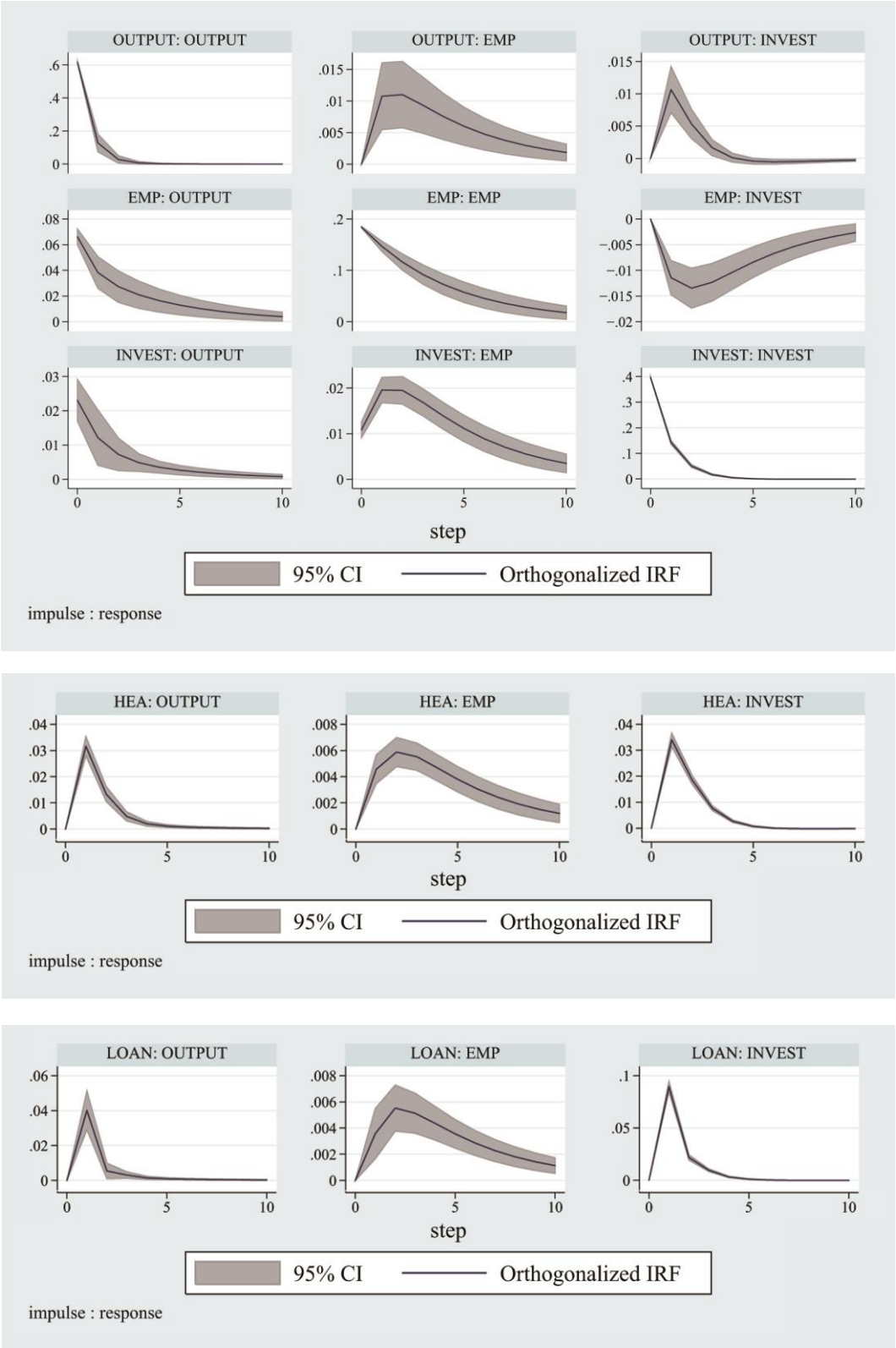
Table 5 Results on the variance decompositions

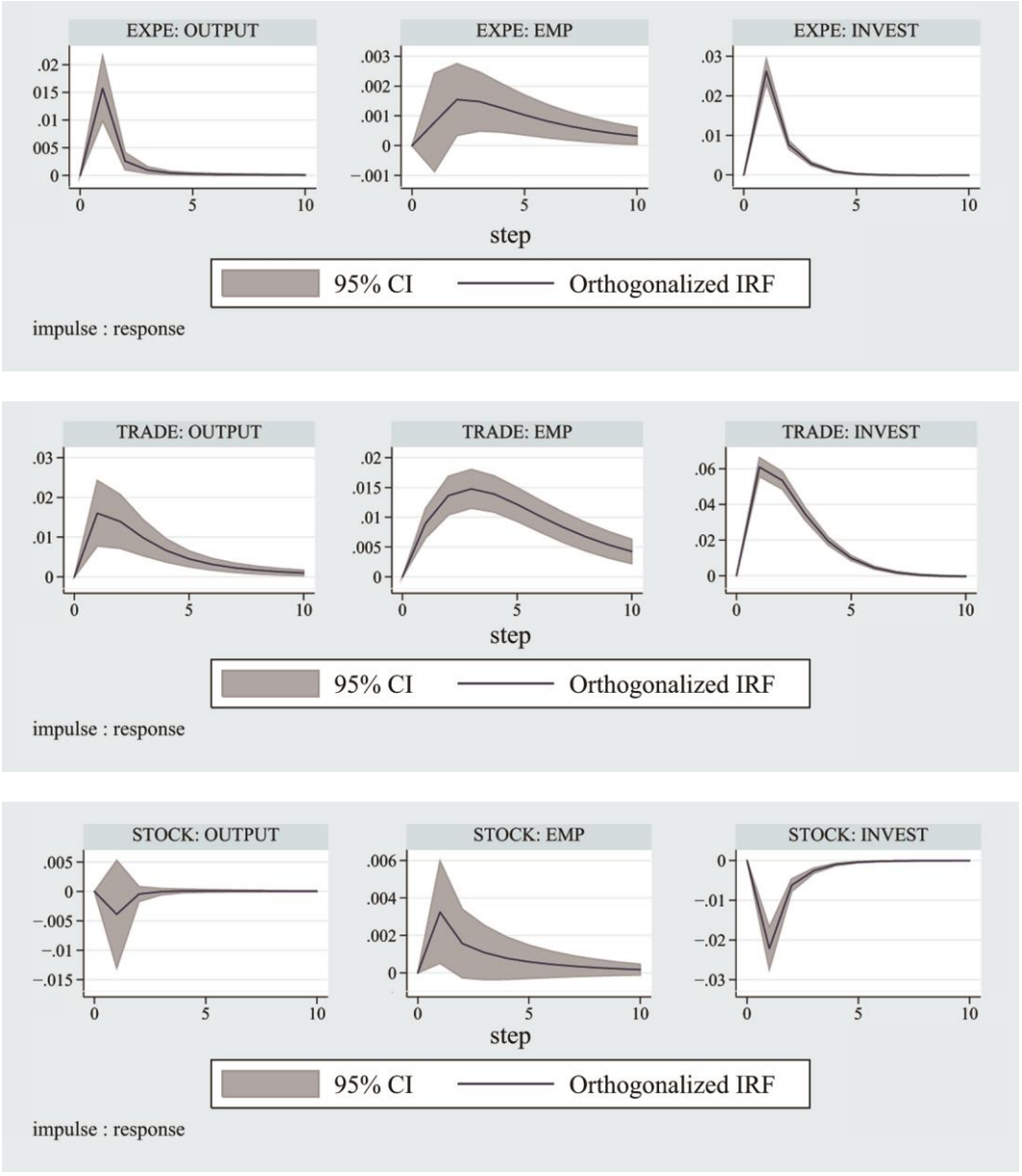
Response variable	Forecast horizon	Impulse variable							
			(1)		(2)	(3)	(4)	(5)	(6)
		OUTPUT	EMP	INVEST	HEA	LOAN	EXPE	TRADE	STOCK
OUTPUT	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	2	99.35%	0.16%	0.49%	0.39%	0.38%	0.01%	0.05%	0.03%
	4	97.96%	1.00%	1.04%	0.58%	2.12%	1.83%	0.11%	0.04%
	6	95.98%	2.64%	1.39%	0.52%	2.86%	3.14%	0.12%	0.07%
	8	93.52%	4.95%	1.52%	0.51%	3.05%	3.92%	0.13%	0.10%
	10	90.66%	7.78%	1.56%	0.51%	3.13%	4.26%	0.13%	0.12%
EMP	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	2	0.83%	99.17%	0.00%	0.00%	0.01%	0.12%	0.01%	0.26%
	4	1.90%	98.00%	0.10%	0.08%	0.10%	1.45%	0.01%	0.29%
	6	2.81%	97.09%	0.10%	0.10%	0.07%	2.78%	0.01%	0.41%
	8	3.61%	96.28%	0.10%	0.14%	0.05%	3.31%	0.01%	0.43%
	10	4.31%	95.58%	0.11%	0.16%	0.04%	3.51%	0.01%	0.44%
INVEST	0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	2	1.19%	0.12%	98.69%	7.08%	2.85%	0.13%	0.31%	0.04%
	4	2.13%	0.20%	97.68%	14.13%	8.16%	6.47%	0.83%	0.23%
	6	2.79%	0.28%	96.92%	14.62%	8.20%	7.29%	0.91%	0.28%
	8	3.18%	0.41%	96.41%	15.08%	8.20%	7.07%	0.97%	0.28%
	10	3.41%	0.59%	96.00%	14.94%	8.21%	6.99%	0.97%	0.29%

Notes: This table reports the results of the variance decomposition from model 1 to model 6 by considering the interaction of firm output, employment and investment and the shock one by one. The shock includes banking health ratio, credit supply, government expenditure, net trade and US financial market performance, respectively. The number of Monte Carlo is 1000.

Appendix

Figure A1 Results of the impulse response functions





Notes: This figure shows the impulse response functions with firm output, employment and investment and shocks, including banking health ratio, credit supply, government expenditure, net trade and US financial market performance. Since banking health ratio, credit supply, government expenditure, net trade and US financial market performance have some correlations with each other, we examine their impulse reaction function one by one. Errors are 5% on each side generated by Monte-Carlo with 1000.

Table A1 Results on the selection order criteria

Selection order criteria						
lag	CD	J-Statistics	J p-value	MBIC	MAIC	MQIC
1	0.567	262.628	0.000	-20.110	208.628	135.799
2	0.611	142.875	0.000	-45.617	106.875	58.323
3	0.665	70.483	0.000	-23.763	52.483	28.207

Notes: This table reports the results on the selection order criteria. The results show that the statistics of CD, MBIC, MAIC and MQIC in the third lag are less than the first and second lags. It means that the third lag is the best to select in the panel VAR model.

Table A2 Results on the Eigenvalue stability condition

Eigenvalue		
Real	Imaginary	Modulus
0.530	0.197	0.565
0.530	-0.197	0.565
0.269	-0.433	0.510
0.269	0.433	0.510
-0.507	0.000	0.507
0.341	-0.375	0.506
0.341	0.375	0.506
-0.249	0.000	0.249
-0.124	0.000	0.124

Notes: This table reports the results on the Eigenvalue stability condition. The results show that all the Eigenvalues lie inside the unit circle and confirm that the panel VAR model satisfies the stability condition.

Table A3 Results on the Panel VAR-Granger causality Wald test

Equation \ Excluded		Equation \ Excluded		Equation \ Excluded	
OUTPUT	P-value	EMP	P-value	INVEST	P-value
EMP	0.000	*OUTPUT*	0.001	*OUTPUT*	0.000
INVEST	0.000	*INVEST*	0.000	*EMP*	0.000
HEA	0.000	*HEA*	0.000	*HEA*	0.000
LOAN	0.000	*LOAN*	0.000	*LOAN*	0.000
EXPE	0.000	*EXPE*	0.000	*EXPE*	0.000
TRADE	0.000	*TRADE*	0.000	*TRADE*	0.000
STOCK	0.000	*STOCK*	0.000	*STOCK*	0.000
ALL	0.000	ALL	0.000	ALL	0.000

Notes: This table reports the results on the Panel VAR-Granger causality Wald test. Ho: Excluded variable does not Granger-cause Equation variable; Ha: Excluded variable Granger-causes Equation variable. The results of the panel VAR-Granger causality Wald test show that the health bank and credit indicators, government expenditure and external economic factors are the firm-level Granger causality to output, employment and wage.

Table A4 Results on the regression models on the output, employment and wage by using bad loans

	Output	Employment	Investment
	(1)	(2)	(3)
OUTPUT(-1)	0.180***	0.016***	0.023***
	(0.044)	(0.005)	(0.003)
EMP(-1)	0.116***	0.834***	-0.137***
	(0.044)	(0.025)	(0.015)
INVEST (-1)	0.019*	0.019***	0.386***
	(0.011)	(0.003)	(0.010)
BAD (-1)	-0.022***	-0.001	-0.001
	(0.003)	(0.001)	(0.002)
LOAN(-1)	0.119***	0.018***	0.322***
	(0.020)	(0.003)	(0.008)
SPEN(-1)	0.213***	0.026**	0.339***
	(0.052)	(0.013)	(0.030)
TRADE(-1)	0.823***	0.817***	2.167***
	(0.311)	(0.097)	(0.179)
STOCK(-1)	0.015	0.037**	-0.007
	(0.048)	(0.015)	(0.030)
Observation	36840	36840	36840
N	1535	1535	1535

Notes: See notes to Table 2.

Table A5 The correlations of the firm characteristics

	State owned firm dummy	Firm size	Firm liability	Firm profitability
State owned firm dummy	1			
Firm size	0.258***	1		
Firm liability	-0.010**	-0.049***	1	
Firm profitability	-0.008*	0.039***	-0.062***	1

Notes: We create the dummy=1 for state owned firms and the dummy=0 for private owned firms. ***, ** and * show the significance at the level of 1%, 5 % and 10%, respectively.

Table A6 Results on the different types of the firms

Characteristics	Dummy variable	Obs	Output	Employment	Investment
Size	Dummy=1 for the highest 30%, Dummy=0 for the lowest 30%	22128	0.081*** (0.024)	-0.005 (0.007)	0.118*** (0.020)
Liability	Dummy=1 for the highest 30%, Dummy=0 for the lowest 30%	22128	0.158*** (0.025)	-0.003 (0.007)	0.094*** (0.016)
Profitability	Dummy=1 for the highest 30%, Dummy=0 for the lowest 30%	22128	0.074*** (0.023)	0.003 (0.006)	0.116*** (0.016)
Ownership	Dummy=1 for state ownership, Dummy=0 for privately owned ownership	36840	0.086*** (0.014)	-0.0066 (0.0044)	0.026** (0.011)

Notes: See notes to Table 2. We restrict our sample to only the highest and lowest 30 percent of firms with respect to size, liability, and profitability. We then create a dummy variable equal to 1 for the highest 30% of firms for each of these categories. When we run the regressions, the coefficients of the dummy variable would tell us the significance of differences among the different groups. Since the limited space, we only report the coefficients of the dummy variables rather than report the other independent variables in the regression models. The results show that the effects of other independent variables keep their expected effects on firm output, employment and investment. ***, ** and * show the significance at the level of 1%, 5 % and 10%, respectively. The specific regression models are shown as:

$$OUTPUT_{it} = \sum_{j-1}^{k} \alpha_j^{o,1} OUTPUT_{it-j} + \sum_{j-1}^{k} \alpha_j^{o,2} EMP_{it-j} + \sum_{j-1}^{k} \alpha_j^{o,3} INVEST_{it-j} + b_1^o HEA_{t-1} + b_2^o LOAN_{t-1} + b_3^o SPEN_{t-1} + b_4^o TRADE_{t-1}$$
$$+ b_5^o STOCK_{t-1} + b_6^o DUMMY_{ti} + \alpha_i^o + \varepsilon_{it}^o \quad (1)$$

$$EMP_{it} = \sum_{j-1}^{k} \alpha_j^{o,1} OUTPUT_{it-j} + \sum_{j-1}^{k} \alpha_j^{e,2} EMP_{it-j} + \sum_{j-1}^{k} \alpha_j^{e,3} INVEST_{it-j} + b_1^e HEA_{t-1} + b_2^e LOAN_{t-1} + b_3^e SPEN_{t-1} + b_4^e TRADE_{t-1}$$
$$+ b_5^e STOCK_{t-1} + b_6^e DUMMY_{ti} + \alpha_i^e + \varepsilon_{it}^e \quad (2)$$

$$INVEST_{it} = \sum_{j-1}^{k} \alpha_j^{i,1} OUTPUT_{it-j} + \sum_{j-1}^{k} \alpha_j^{i,2} EMP_{it-j} + \sum_{j-1}^{k} \alpha_j^{i,3} INVEST_{it-j} + b_1^i HEA_{t-1} + b_2^i LOAN_{t-1} + b_3^i SPEN_{t-1} + b_4^i TRADE_{t-1}$$
$$+ b_5^i STOCK_{t-1} + b_6^i DUMMY_{ti} + \alpha_i^i + \varepsilon_{it}^i \quad (3)$$