Global Research Unit
Working Paper #2019-005

Credit and Fiscal Multipliers in China

Sophia Chen, IMF
Lev Ratnovski, ECB & IMF
Pi-Han Tsai, Zhejiang University

Credit and Fiscal Multipliers in China

Sophia Chen, Lev Ratnovski, Pi-Han Tsai[1]

Abstract

We estimate credit and fiscal multipliers in China, using subnational political cycles as a source of exogenous variation. The tenure of the provincial party secretary, interacted with the credit and fiscal expenditure used in other provinces, instruments for provincial credit and government expenditure growth. We find a fiscal multiplier of 0.75 in 2001-2008, which increased to 1.2 in 2010-2015, consistent with higher multipliers in a slower economy. At the same time, a credit multiplier of 0.2 in 2001-2008 declined to close to zero in 2010-2015, consistent with credit saturation and credit misallocation. Our results suggest that credit expansion cannot further support economic growth in China. The flip side is that lower credit growth is also unlikely to disrupt output growth. Fiscal policy is powerful, and can cushion the macroeconomic adjustment to lower credit intensity.

JEL Classification Numbers: E63, G21, H20, R12
Keywords: Credit Growth, Fiscal Stimulus, Macroprudential Policy, Multipliers, China

[1] Chen is with the International Monetary Fund; Ratnovski is with the European Central Bank and International Monetary Fund; Tsai is with Zhejiang University in China. We thank James Daniel, Giovanni Dell'Ariccia, Divya Kirti, Gian-Maria Milesi-Ferretti, Maury Obstfeld, and Maria Soledad Martinez Peria for useful comments, and Hala Moussawi and Huy Nguyen for excellent research assistance. Contact: ychen2@imf.org, lev.ratnovski@ecb.int, pihant@zju.edu.cn.

I. INTRODUCTION

The Chinese economy has been growing at 13.5 percent on average since 2001. The growth has slowed after the Global Financial Crisis (GFC). In response, China adopted accommodative macroeconomic policies, including a major credit expansion. Credit to private non-financial sector has more than doubled since 2001, exceeding 210 percent of GDP in 2016 (BIS, 2018). The BIS-defined credit-to-GDP gap—a measure of financial vulnerability based on the deviation of the credit-to-GDP ratio from its long-term trend—is the second highest among 44 economies covered by BIS, after Hong Kong SAR.

The credit boom raises two concerns. The first is the risk of a financial bust leading to an economic slowdown. Such a reversal of a credit boom is a known macroprudential risk (Dell'Ariccia et al., 2016). In China, this risk may be amplified by the fact that rapid credit growth induced the expansion of a less-regulated shadow banking sector (Acharya et al., 2016; Chen et al., 2017B). The second concern is declining credit efficiency, associated with credit saturation and credit misallocation. Credit misallocation in China has been well documented. Deng et al. (2015) give evidence of credit directed to real estate and land purchases, with little macroeconomic effect beyond higher real estate prices. Song et al. (2011), Bai et al. (2016), and Cong et al. (2017) show that credit is often directed to state-owned enterprises (SOEs), which are less productive than private firms. Huang et al. (2017) and Ru (2018) show that SOE loans crowd out the investment of private firms. Yet from a policy perspective, declining credit efficiency is not only a challenge but also an opportunity. When credit efficiency is already low, policies that aim to reduce credit growth can be implemented with a small impact on output. To further reduce this impact, other policy means—such as a fiscal stimulus—may be used to cushion the adjustment.

The exceptionally high credit-to-GDP ratio and credit-to-GDP gap imply that China may be at a critical point in managing its credit boom. Consistent with this, the Chinese authorities have recently invigorated their efforts to stem credit growth. The increase in the domestic credit-to-GDP ratio has declined from about 14 percentage points per year in 2009-2016 to about 5 percentage points in 2017 (BIS, 2018). This helped reduce the credit gap. Yet to correct a still high credit-to-GDP ratio, China needs a further slowdown in credit growth.

Assessing the real implications of China's transition to lower credit growth hinges on answering several critical questions. How much did credit contribute to China's output growth historically? Has new credit become less effective as the economy became saturated with credit? What would be the output drag from lower credit growth in China? Can the real impact of China's transition to lower credit growth be cushioned by fiscal policy? This paper aims to address these questions by estimating the causal effects of credit and of government expenditure on output growth in China in 2001-2015. The causal effect of government expenditure on output is the fiscal multiplier whereas the causal effect of credit on output relates to credit effectiveness; in this paper we call it "the credit multiplier".

It seems essential in the Chinese context to estimate credit and fiscal multipliers jointly. China uses credit growth as a policy tool, setting policy-driven targets for aggregate credit and its allocation (Tao, 2006; Li et al., 2008; Wong, 2011). Theory suggests that credit growth supports real activity through wealth effects and a financial accelerator mechanism (Bernanke and Gertler, 1989; Kiyotaki and Moore, 1997; Gilchrist and Zakrajsek, 2012). Cross-country empirical studies confirm a positive relationship between credit growth and GDP growth, operating through private consumption and private investment (e.g. Dell'Ariccia et al., 2016). To the extent that credit and fiscal stimuli can complement or substitute each other to achieve desired economic outcomes, it is important to understand their joint effects on output both for policy purposes and for correct empirical identification.

However, the estimation of multipliers is empirically challenging, because macroeconomic policies are rarely exogenous to macroeconomic conditions. Fiscal expenditure may increase during economic upturns because of looser budget constraints, or during the downturns under a countercyclical fiscal policy. Credit is endogenous because credit demand and possibly credit supply are procyclical (Bernanke and Gertler, 1995; Adrian and Shin, 2010). An empirical identification of the multipliers therefore requires policy shocks that are exogenous to macroeconomic conditions. Following Nakamura and Steinsson (2014), we study the effect of a *relative* credit or expenditure shock in one region—compared to other regions—on its *relative* output. We use provincial credit and expenditure shocks stemming from subnational political cycles, as we will describe below, as a source of such exogenous variation. We use fixed effects to control for aggregate macroeconomic conditions and centralized fiscal, monetary, and exchange rate policies. [2] In addition, our estimate of the fiscal multiplier captures expenditure shocks that are independent of tax adjustments because variations in provincial expenditure has little or no effects in local residents' tax burden due to characteristics of fiscal federalism in China in our sample period.

We achieve identification in three steps. In the first step, we note that the tenure of provincial party secretaries is a source of exogenous variation in credit and fiscal expenditure in Chinese provinces.[3] This is based on two formally-tested observations. The timings of the appointments (and reappointments) of provincial party secretaries are largely predetermined

[2] For example, the literature of fiscal multipliers often uses shocks to military spending; see Spilimbergo et al., 2009, for a review. Some literature on fiscal multipliers has addressed the endogeneity problems with structural vector autoregressions (VAR). However, the validity of VAR results hinge on the model's structural assumptions. In the context of China, Wang and Wen (2013) estimates a fiscal multiplier of 2.83 in the short-run and 6.51 in the long-run. There are also some literatures applying instrumental approach to estimate the fiscal multipliers in China. In a framework similar to Nakamura and Steinsson (2014), Guo et al. (2016) use central-local earmarked transfers interacted with a dummy variable for National Poor Counties status as an instrument for local public spending. Their estimate of the county-level fiscal multiplier is about 0.6.

[3] The provincial party secretary is the *de facto* person in charge of the province while the provincial governor takes the second political ranking in the province (Li and Zhou, 2005). In alternative specifications (not reported), we substituted province secretary's tenure with province governor's tenure. Our main conclusions are not affected although the effects are in general smaller.

by the tenure of the previous secretary and the national political cycle. Consequently, they are unrelated to local economic conditions. Moreover, provincial party secretaries have incentives to use stimulus policies at strategically important times during their tenure to improve the prospect of their retention or promotion. The use of subnational political cycles in China as the identification strategy for causal inference was pioneered by Guo (2009) and subsequently applied to examine the changes in corporate behavior during leadership transitions (An et al., 2016; Feng and Johansson, 2017).[4] In the second step, we disentangle a single tenure-based instrument for provincial stimulus into two instruments: for credit growth and for public expenditure growth. We do that by interacting the tenure of the provincial party secretary with credit and expenditure growth in all other provinces. We verify that, all else equal, provincial stimulus is more likely to be provided through fiscal (credit) means when other provinces have higher expenditure (credit) growth.[5] In the third step, we verify that the exclusion restriction is satisfied. We show that neither the tenure of the provincial party secretary nor the type of stimulus in other provinces affect the relative output growth in the province other than through their effect on the province's stimulus mix.

For the whole 2001-2015 period of our analysis, the instrumental variables (IV) estimation yields a fiscal multiplier of 0.8 and a credit multiplier of 0.2. The fiscal and credit multipliers estimated jointly are lower than those estimated separately, suggesting that provinces use fiscal and credit stimuli as complements. The IV estimation gives higher point estimates for the multipliers than the Ordinary Least Squares (OLS) estimation, consistent with countercyclical macroeconomic policy (i.e. more credit and expenditure growth in response to slower output growth). Overall, the results are highly robust to alternative estimation techniques.

We further consider the evolution of the fiscal and credit multipliers, contrasting periods before and after the GFC. In China, the GFC marked the transition to lower output growth and higher credit growth. We find that the fiscal multiplier has increased from 0.75 in 2001-2008 to 1.2 in 2010-2015.[6] This increase is consistent with the findings that fiscal multipliers are generally higher in a slower economy (Auerbach and Gorodnichenko, 2012; Baum et al., 2012; Blanchard and Leigh, 2013). We further find that the credit multiplier has declined from 0.2 in 2001-2008 to close to zero in 2010-2015.[7] A decline in the credit multiplier is consistent with credit saturation and credit misallocation, identified in the earlier reviewed literature.

[4] The causal inference based on political outcomes that are unrelated to local conditions resembles that achieved by studying the outcomes of marginal elections in U.S. and other countries (as in Lee, 2008, and the later literature; see Lee and Lemeieux, 2010, for a review).
[5] In practice, local governments may stimulate the economy through the credit market ("credit stimulus") by directing banks to lend more or directing SOEs to borrow more.
[6] The pre-GFC fiscal multiplier estimate is consistent with the 0.84-1.1 range estimate in He et al. (2009).
[7] We exclude year 2009 from the split-sample estimations to focus on the "normal times" multipliers.

The findings on the evolution of credit and fiscal multipliers for China have important policy implications. First, they suggest that credit expansion has contributed to output growth in China before the GFC. However, following China's transition to higher credit growth after the GFC, the effect of additional credit on output have become negligible. Overall, our results suggest that, at present, a reduction in credit growth is unlikely to disrupt output growth, if the least effective types of credit—such as those to SOEs—are cut first. This conjecture is consistent with anecdotal evidence in 2017 when sharply lower credit growth led to only a negligible reduction in output growth.[8] Further, the high fiscal multipliers suggest that should lower credit growth begin to impact output, a fiscal stimulus may be used to cushion the adjustment.

We also explore the cross-province heterogeneity of credit and fiscal multipliers. We find that the fiscal multiplier is substantially lower in provinces with a less profitable SOE sector, consistent with less-effective SOEs being a drag on the fiscal resources. We find no evidence that the multipliers are different in provinces with high or low house price growth (a proxy for the household credit boom) or real GDP per capita (a proxy for the level of development).

Finally, we study the effects of fiscal and credit stimuli on industry composition. We find that both credit and fiscal expansion boost construction and manufacturing. The result that credit matters for construction and manufacturing is unsurprising, because these sectors tend to be credit dependent. The result that fiscal stimulus has a similar industrial bias is less evident. Yet it is consistent with the observation that fiscal stimulus historically has been targeted at infrastructure and related industries (Wong, 2011).[9] In contrast, both credit and fiscal stimuli have a low or, post GFC, negative impact on the services sector, consistent with the crowding out effect.

The rest of the paper proceeds as follows. Section II discusses our data and identification strategy. Section III presents the results. Section IV discusses robustness and measurement issues. Section V concludes.

II. DATA AND METHOD

We collect macroeconomic and political data for 31 provincial units of China: 4 centrally administrated cities (Beijing, Shanghai, Tianjing, and Chongqing), 22 provinces, and 5

[8] One caveat is that an abrupt reversal in credit growth may affect financial stability. This type of nonlinear response is not captured by our analysis.

[9] For example, in the 2008-2009 fiscal stimulus in China, transportation and power infrastructure accounted for the highest share of expenditure (37.5 percent) and health and education for the lowest (3.8 percent), according to the National Development and Reform Commission. Prior literature suggests that local policymakers prefer to spend on infrastructure because that leads to more easily quantifiable outputs (O'Brien and Li, 1999; Jin et al., 2005; Luo et al., 2010).

autonomous regions (Guangxi, Inner Mongolia, Ningxia, Tibet, and Xinjiang). The key macroeconomic variables of interest are provincial GDP, provincial fiscal stance, measured as total expenditure, and provincial credit, measured as the sum of bank loans in domestic and foreign currencies granted in the province. The macroeconomic data is from CEIC China Premium Database and is deflated to 2010 RMB using national CPI. The political variable of interest—the tenure of the provincial party secretary—is hand-collected from the Zheng Tan Wang website.[10] The sample runs 2001-2015: it starts during the acceleration of market reforms in China in the early 2000s and ends before China's transition to lower credit growth in 2016. Table 1 shows data summary statistics.

Our empirical specification follows Nakamura and Steinsson (2014) in the context of U.S. states. We extend their empirical model to include both government expenditure and credit. Specifically, we estimate the equation:

$$\frac{Y_{it}-Y_{it-2}}{Y_{it-2}} = \alpha_i + \gamma_t + \beta_G \frac{G_{it}-G_{it-2}}{Y_{it-2}} + \beta_{CR} \frac{CR_{it}-CR_{it-2}}{Y_{it-2}} + \varepsilon_{it}, \quad (1)$$

where Y_{it} is GDP, G_{it} is government expenditure, CR_{it} is credit, all in province i in year t. We include province and year fixed effects α_i and γ_t. Province fixed effects capture time-invariant differences in output growth and other heterogeneity across provinces. Year fixed effects control for the aggregate macroeconomic conditions and centralized fiscal, monetary, and exchange rate policies. As Nakamura and Steinsson (2014), we use two-year changes to capture the dynamics of multipliers. Hence, our model allows for a sluggish response of output to expenditure and credit.[11] To account for the overlapping nature of observations, we cluster standard errors ε_{it} at the province level.[12] Shocks to government expenditure and credit are normalized by the initial provincial GDP, so the stimulus is expressed in as percentage points of initial GDP. The coefficients β_G and β_{CR} capture the fiscal and credit multipliers respectively.

One data advantage specific to our model relates to characteristics of fiscal federalism in China. Whereas provincial has most of the power in discretionary fiscal spending (as we will describe in Section IV.C), the taxation power is very centralized. The 1994 Tax Sharing Reform gave the central government most of the power in setting the tax rates and defining tax bases. Local governments only have very restrictive power in setting minor tax rates

[10] Source: www.zt360.cn.
[11] An alternative specification based on one-year changes in the variables, but with contemporaneous and one-year lagged regressors (not reported), produces similar results.
[12] In alternative results not reported,

within a limited range (Ahmad 2008). Thus, variations in provincial expenditure had little or no effects on variations of local tax burdens in our sample period. We are able to interpreted the fiscal multiplier estimate β_G as a fiscal spending multiplier independent of the implied adjustment in taxes.

The main challenge in identifying the effect of government expenditure and credit on GDP is that the explanatory variables are likely endogenous. For this reason, we estimate equation (1) using an instrumental variables approach. We base the instrumentation on the literature on sub-national political cycles in China, using the tenure of provincial party secretaries as a source of exogenous variation in credit and fiscal expenditure. This instrumentation strategy based on two observations. First, prior literature suggests that the timings of appointments (or reappointments) of provincial party secretaries are exogenous to provincial economic conditions. We confirm this in our data. Figure 1 plots the average two-year GDP growth in provinces with newly appointed party secretaries around the year of appointment relative to the growth in other provinces. It shows that there is no statistical difference in provincial growth rates in the three years prior to the appointments of a new party secretary compared to other provinces. Table 2 shows additional evidence that provincial GDP growth in the years preceding the appointments are not systemically above or below the national average. Figure 2 panels A and B show that the appointments largely occur either at the end of the previous secretary's pre-determined 5-year tenure or following the national party congress (Li and Zhou, 2005; Tsai, 2016). Second, party secretaries have incentives to use macroeconomic stimulus at strategically important times during their tenure to improve the prospect of their retention or promotion. Figure 3 shows that provincial credit and expenditure growth peak towards the end of the first five-year term of the secretary, and then peak again in the middle of the second five-year term.[13] Overall, provincial economic stimulus is positively associated with the tenure of the provincial party secretary.[14]

Moreover, when choosing the modality of the stimulus, a province is more likely to use fiscal (credit) stimulus when other provinces have higher expenditure (credit) growth. Figure 4 panel A shows that provincial credit growth is associated with credit growth in other provinces, but not with expenditure growth in other provinces (all controlling for province and year fixed effects). Figure 4 panel B shows a similar pattern for the sensitivity of expenditure growth.

[13] This is consistent with Guo (2009) who finds that county expenditure peaks in the third and fourth year of a county leader's tenure.

[14] Note that the decrease in credit and expenditure growth in Figure 3 and 4 in years 8-9 of the tenure has little statistical importance, because the frequency of tenure over 7 years is very low: only 3 percent in our sample. According to the Party and State constitution, the term-limit of local officials is five years and they can stay at the same position at the maximum two terms. However, in practice, local officials face frequent political turnovers and few local officials can stay more than five years. Frequent political turnovers of provincial leaders are to avoid the rise of localism (Tsai, 2016).

Our identification uses these political cycle patterns as a source of exogenous variation in provincial stimulus policies. The "first stage" of our two-stage least squares (2SLS) regresses provincial credit and government expenditure growth on those in other provinces, interacted with the tenure of the provincial party secretary, after controlling for year and province fixed effects. This yields the fitted values of credit and expenditure growth for each province, which we use in the second stage regression. We report the results for the weak instrument test for all our IV specifications. The Cragg-Donald Wald F-test for excluded instruments comfortably exceeds the critical values tabulated by Stock and Yogo (2005).

III. RESULTS

A. Credit and fiscal multipliers

Our results on credit and fiscal multipliers in China over the entire 2001-2015 period are shown in Table 3. We report the credit multiplier estimated separately (columns 1-2), the fiscal multiplier estimated separately (columns 3-4), and credit and fiscal multipliers estimated jointly (columns 5-6). In each case, we report OLS estimates first, followed by IV estimates. The multipliers capture the percentage change in GDP in response to the change in credit or in government expenditure by one percentage point of initial GDP. Column 6 of Table 3 shows our headline result—a credit multiplier of 0.2, and a fiscal multiplier of 0.8—jointly estimated in an IV specification.

It is useful to compare the results obtained in various specifications of Table 3. The point estimates of credit and fiscal multipliers estimated separately (columns 1-4) are higher than those estimated jointly (columns 5-6). This suggests a positive correlation with credit and fiscal expenditure, consistent with the simultaneous use of credit and fiscal stimuli. Consequently, a separate estimation of credit or fiscal multipliers has an upwards bias, as it omits the effect of other contemporaneous stimulus policies. The point estimates of credit and fiscal multipliers in the OLS estimation (columns 1, 3, and 5) are somewhat lower than those in the IV estimation (columns 2, 4, and 6). This is consistent with countercyclical macroeconomic policy: expenditure and credit growth are high when GDP growth is low, leading to a downward bias in the OLS estimates compared to the IV estimates that correct for this endogeneity. Interestingly, the wedge in OLS and IV estimates is higher for the credit multiplier than for the fiscal multiplier, possibly because budget constraints limit the amount of fiscal expenditure in recessions, but there are no similarly binding constraints on credit.

To achieve identification, our instruments should satisfy the exclusion restriction: They should affect the dependent variable (provincial growth) only through the explanatory variables (credit and fiscal expenditure), and not directly. There are three channels through which the exclusion restriction may be violated in our setup. First, it is possible that stimulus in other provinces is associated with aggregate macroeconomic conditions. In our

specification, this channel is absorbed by year fixed effects. Second, stimulus in other provinces may affect a province's growth due to the spillovers from the neighboring provinces to the province in question.[15] To address this concern, we control for macroeconomic policy stance in neighboring provinces in second-stage regressions. We verify that this does not affect our results. Third, the tenure of the provincial party secretary might affect the provincial growth through channels other than its effects on the province's credit or fiscal expenditure. We verify that controlling for the tenure in second-stage regressions also does not affect our results, and the party secretary's tenure by itself has no statistically or economically significant effects on provincial GDP growth. We report these robustness tests in Table 4 columns 1 and 2. When credit and expenditure in neighboring provinces and the tenure of provincial party secretary are added as controls, the estimated credit and fiscal multipliers are very similar to the baseline results reported in Table 3. The coefficients on the credit and expenditure in neighboring provinces are insignificant, suggesting that the spillovers of credit and fiscal policies across provinces are negligible. The coefficient on party secretary's tenure is also insignificant, suggesting that the tenure by itself has no direct effect on provincial GDP growth.

We report two more robustness results in Table 4. In columns 3 and 4, we report the baseline specification estimated with weighted provincial GDP. The weighted estimation gives results that more accurately capture the country-wide macroeconomic effects of credit and expenditure growth. The magnitudes of the coefficients are very close to those reported in Table 3. Finally, in columns 5 and 6, we report the baseline specification where dependent and explanatory variables are detrended. This is a very demanding specification that controls not only for time-invariant differences in growth rates across provinces, but also for time-invariant differences in the changes in growth rates in provinces over our sample period. Again, the resulting coefficients are very close to those reported in Table 3.

B. The evolution of the multipliers

A central question in the policy debate on the effects of credit growth in China is whether the credit multiplier might have declined as the economy became more saturated with credit. Table 5 aims to shed light on this debate. We estimate the credit and fiscal multipliers separately over two periods: 2001-2008 and 2010-2015. We interpret these as "normal times" multipliers because they exclude the GFC period.[16]

[15] Such spillover-related biases would be present in any "open economy multiplier" models.

[16] Since the subsample estimates omit the GFC period (the observations based on 2007-09, 2008-10, and 2009-11 growth rates), the subsample estimates need not average up to the estimates for the full sample. During the GFC period, the credit multiplier appeared high, while the credit multiplier appeared low. Formal estimations during the GFC period are imprecise because of the short sample.

We find that the credit multiplier in China has substantially declined in recent years and is now close to zero. The credit multiplier was 0.2 in 2001-2008 (column 2) but is statistically insignificant in 2010-2015 (column 4). The decline in the credit multiplier is consistent with previous findings that credit boom leads to credit misallocations and inefficiency. In contrast, the fiscal multiplier has increased from 0.75 in 2001-2008 to 1.2 in 2010-2015. The finding that the fiscal multiplier has increased as output growth slowed is consistent with the literature on the relationship between fiscal multipliers and the state of the economy.[17]

C. Provincial heterogeneity

We next examine the heterogeneity of fiscal and credit multipliers across provinces. Heterogeneity may arise for several reasons. First, since credit and fiscal stimuli are often channeled through SOEs (Song et al., 2011; Bai et al., 2016; Cong et al., 2017; Huang et al., 2017; Ru, 2018), provinces with a more productive SOE sector may have larger multipliers. Second, since household credit can crowd out investment from productive businesses (Deng et al., 2015), provinces with larger housing booms may have smaller multipliers. Third, less developed provinces may have more "shovel-ready" projects, leading to larger multipliers.

To test the three different channels, we add to our baseline regressions the interactions of credit and expenditure growth variables with dummies indicating whether a province is above or below the median for SOE productivity (measured by average profit per SOE), house price growth, as well as provincial real GDP per capita. We define the median for SOE productivity and house price growth annually, but for GDP per capita over the whole period because the ranking of provinces by GDP per capita is very persistent in our sample period.

Table 6 presents the results. We find the strongest heterogeneity in the fiscal multipliers across provinces based on SOE profitability (columns 1-2): the fiscal multiplier is higher in provinces with higher SOE profitability. This result implies that an inefficient SOE sector is a drag on the effectiveness of fiscal stimulus. Controlling for the fiscal multiplier, SOE profitability does not affect the credit multiplier.[18] Furthermore, we find no evidence that fiscal or credit multipliers differ depending on provincial per capita income or house price growth (columns 3-6).

D. Industry effects

There is a broadly held opinion that the Chinese economy can achieve a more sustainable growth path through a rebalancing from the manufacturing and construction sectors towards services. To shed light on how credit and fiscal policies may be used to achieve such

[17] The one-sided Z-scores for the difference between early and late sample IV estimates are 1.458 for credit and 1.682 for expenditure, which are significant at the 10 percent and 5 percent respectively.
[18] We interpret these results as suggestive evidence because the instruments are somewhat weak.

rebalancing, we examine the effects of credit and fiscal expenditure on industry composition. We estimate the following regression:

$$\frac{Ind_{ijt} - Ind_{ijt-2}}{Y_{it-2}} = \alpha_i + \gamma_t + \beta_G \frac{G_{it} - G_{it-2}}{Y_{it-2}} + \beta_{CR} \frac{CR_{it} - CR_{it-2}}{Y_{it-2}} + \varepsilon_{it}, \qquad (2)$$

where Ind_{ijt} is the output of industry j in province i in year t. The coefficients β_G and β_{CR} capture the increase in industry output (in percentage points of GDP) in response to an increase in credit or in government expenditure by one percentage point of GDP. This specification thus disaggregates the output multiplier by sectors. Because sectoral outputs sum up to aggregate output, the sectoral multipliers β_G and β_{CR} for all sectors also sum up to the aggregate credit or expenditure multiplier.

The results for sectoral multipliers are shown in Table 7. Panel A reports the results for the full sample. Panel B reports the results for the 2010-2015 period. We report the results for construction (columns 1-2), manufacturing (columns 3-4), and services excluding financials (columns 5-6). As before, we report the OLS estimates first, followed by IV estimates. The effect of fiscal and credit stimulus on industry growth can be inferred by dividing β_G and β_{CR} by the share of the sector in GDP. This calculation is shown in Panel C. The results show that credit and fiscal expenditure have the largest effect on manufacturing and, somewhat less so, on construction. This is consistent with the observation that fiscal stimulus often targets manufacturing. The stimuli have the smallest effect on the services sector. Moreover, over 2010-2015, credit stimulus might have constrained the growth of the services sector (column 6).[19] This might be related to a reallocation of resources from services to manufacturing (Borio et al., 2016). Overall, the results suggest that, in order to contribute to the rebalancing of the economy towards services, future fiscal stimulus needs to target services expenditure more than the historical fiscal stimulus did.

IV. DISCUSSION

A. Measurement issues

Credit

The use of bank loans as a measure of credit in China deserves some discussion. Bank loans reflect only a subset of overall credit, which also includes bonds, credit from non-banks (e.g. wealth management products), and other instruments. At the aggregate level, overall credit in China is measured by "total social financing" (TSF). However, data on province-level TSF is

[19] The instruments are somewhat weak for the service sector in the post-crisis period (Cragg-Donald Wald F statistic is 11.99, compared to the Stock and Yogo (2005) 5 percent IV relative size value of 13.97), suggesting that the IV estimate may be somewhat biased towards OLS estimates (Bound et al., 1995).

limited. In the aggregate, bank loan growth and TSF growth (as a share of GDP) have a high correlation of 0.93 (Figure 5), suggesting that bank loan growth is a good proxy for the overall credit growth.[20]

Off-budget expenditure

We use provincial on-budget expenditure in our baseline estimation. Part of sub-national expenditure in China is off-budget, and thus is not fully captured in our data (IMF, 2017). Historically, much of off-budget expenditure took the form of "Extrabudgetary Funds" (EBF). EBF was typically planned and earmarked for subsidies for rural business and construction, and for the maintenance of urban public goods. EBFs declined since 2000 due to central government regulations and were required to be included in provincial budgets from 2011. To assess the impact of EBF on the multipliers, we collect data on EBF from Provincial Statistical Yearbooks. We re-estimate the multiplier for total expenditure defined as the sum of on- and off-budget expenditure. Table 8 shows the multiplier for total fiscal expenditure of 0.72 (column 4), which is slightly smaller than the baseline of 0.79 (Table 3). But because EBF expenditure is a small fraction of total expenditure (13 percent on average), our result implies that the off-budget expenditure multiplier is substantially smaller than that for on-budget expenditure.[21]

Another source of off-budget expenditure is related to local government funding vehicles (LGFV). Because local governments are legally prohibited from borrowing, they use LGVFs as government-sponsored corporate platforms to fund infrastructure and public welfare projects. The aggregate size of LGFVs was trivial before the mid-2000s, but expanded massively after the GFC due to the prominent role of LGFVs in funding the RMB 4 trillion fiscal stimulus of 2008-2010 (Shih, 2010; Bai et all, 2016).[22] Despite its rapid growth, off-budget expenditure remains modest compared to on-budget expenditure.[23] Estimating the off-budget expenditure multiplier associated with LGFVs involves two challenges. First, there is no comprehensive data on government spending associated with LGFVs.[24] Second, LGFVs are partially financed with bank loans and give loans alongside financing expenditure, so LGFV operations are an opaque mix of credit and fiscal stimulus components. To the extent that off-budget expenditure is partially funded by credit, and the overall credit multiplier is

[20] The correlation between bank loan growth and TSF growth is 0.84 if the 2009 outlier year is excluded.
[21] A back-of-envelope calculation using our results in Table 3 and Table 8 suggests that the off-budget expenditure multiplier is 0.25.
[22] The LGFVs were effectively a reincarnation of the trust and investment companies of the 1990s, which local governments used to raise funds from domestic and international investors. Those companies were forced to close by the central government in the late 1990s due to the overborrowing concerns (Shih, 2010).
[23] Bai et al. (2016) estimate that about 2.8 trillion of the planned stimuli were local government off-budget spending, which is about 15 percent of all provincial on-budget expenditure during the 2008-2010 period.
[24] Some papers use LGFV bond data from WIND database (Chen et al., 2017B; Gao et al., 2017). Yet this database covers only LGFVs with traded bonds (an uncertain share of the LGFV universe), has likely double counting problem related to complex parent-subsidiary structures in many LGFVs, and, importantly for our analysis, does not identify which provincial or local government sponsors a given LGFV.

smaller than the fiscal multiplier (Table 4), one can conjecture that the off-budget LGFV expenditure multiplier is lower than the on-budget expenditure multiplier—consistent with our previous results on the EBF multiplier.

Provincial data

Our analysis is at the province level instead of a more geographically granular county or municipality levels. This is based on several considerations. First, Chinese provinces have more control over local macroeconomic policies than counties and municipalities do (Wedeman, 1999). Especially after 1994 Tax-Sharing Reform, the central government recentralized the revenue upward and devolved the expenditure downward, increasing the fiscal and political dependence of local governments on their provincial governments (Shen et al., 2012; Tsai, 2016). Thus, the economic policies of sub-provincial governments may not reflect their own preferences, but rather those of provincial governments. Second, the credit multiplier estimation relies on the assumption that credit granted in a province is spent there. This assumption would be problematic on a geographically granular level.

B. Non-random political appointments

Our baseline analysis treated all provincial party secretaries as facing similar incentives and tenure prospects. One concern is that these may in fact be correlated with party secretaries' personal characteristics, leading to an omitted variable bias. For example, a party secretary more connected to the central committee may have better promotion perspectives, also before the five-year appointment period ends. To alleviate this concern, we undertake a robustness test by adding to the first-stage regression the controls for party secretaries' personal characteristics including age, gender, education, central connection (i.e. membership or alternate membership of the party central committee), and localness (i.e. whether the secretary was born or promoted in the same province as the current position).[25] In results not reported, we find that most of these personal characteristics are not statistically significant. The only significant indicator is membership of the party central committee but including this indicator does not change our second-stage results, indicating the robustness of our baseline regression of Table 3. We therefore opt for a more parsimonious specification.

A related concern is that a tenure longer than 5 years reflects a reappointment after the first five-year term. To the extent that the reappointment has been made conditional on previous performance, the fact of the reappointment may be correlated with local economic conditions. To address this concern, we restrict the estimation to a sample with party secretaries' tenure of 5 years or less. The results (Table 9) are very similar to the baseline.

[25] Our data source is the Chinese politics and vitae websites http://ldzl.people.com.cn (Ren Min Wang) and http://news.xinhuanet.com (Xin Hua Wang).

C. "Open economy multipliers"

We estimate credit and fiscal multipliers with provincial data using an "open economy multiplier" approach that captures the effect of a relative change in the macroeconomic stance in one region on its relative output, while controlling for aggregate macroeconomic shocks (Nakamura and Steinsson, 2014). To what extent are these estimates representative of aggregate multipliers?

First, provincial and central governments may have different expenditure structure, which may affect the magnitude of the multipliers. In China, the central government is responsible for national defense, foreign affairs, geological prospecting, and national debt; whereas the sub-national governments are responsible for urban maintenance and construction, environment, water supply, and community services. In principle, all other responsibilities—including education, health care, social welfare, public safety, and local economic development—are shared by the central and sub-national governments. But in practice, most of spending in the shared categories is done by sub-national governments (Shen et al., 2012). Based on this central-provincial distribution of responsibilities, it appears that most of the traditional targets of discretionary stimulus policies (e.g. infrastructure, urban development, and social spending) are effectively at the provincial responsibility level. Therefore, we expect our province-level fiscal multiplier to be well representative of the aggregate multiplier for discretionary fiscal policies.[26]

Second, the provincial relative multipliers do not account for the endogenous macroeconomic response to aggregate stimulus (such response is absorbed in year fixed effects). For example, aggregate credit or fiscal stimulus may induce a monetary policy reaction: a monetary contraction in response to a positive stimulus or a monetary accommodation in response to a negative stimulus. Such endogenous responses are not accounted for in any "open economy multiplier" setting, and if present would imply that the aggregate multipliers may be smaller than our estimates.

V. CONCLUSION

We use a novel instrumentation strategy based on subnational political cycles to jointly estimate credit and fiscal multipliers in China. We verify that the appointments of provincial party secretaries are unrelated to local macroeconomic conditions, and the provincial secretaries have incentives to use stimulus policies at strategic points during their tenure. Further, the type of the stimulus—fiscal or credit—is related to the type of stimulus adopted in other provinces. Therefore, the tenure of the provincial party secretary and the peer

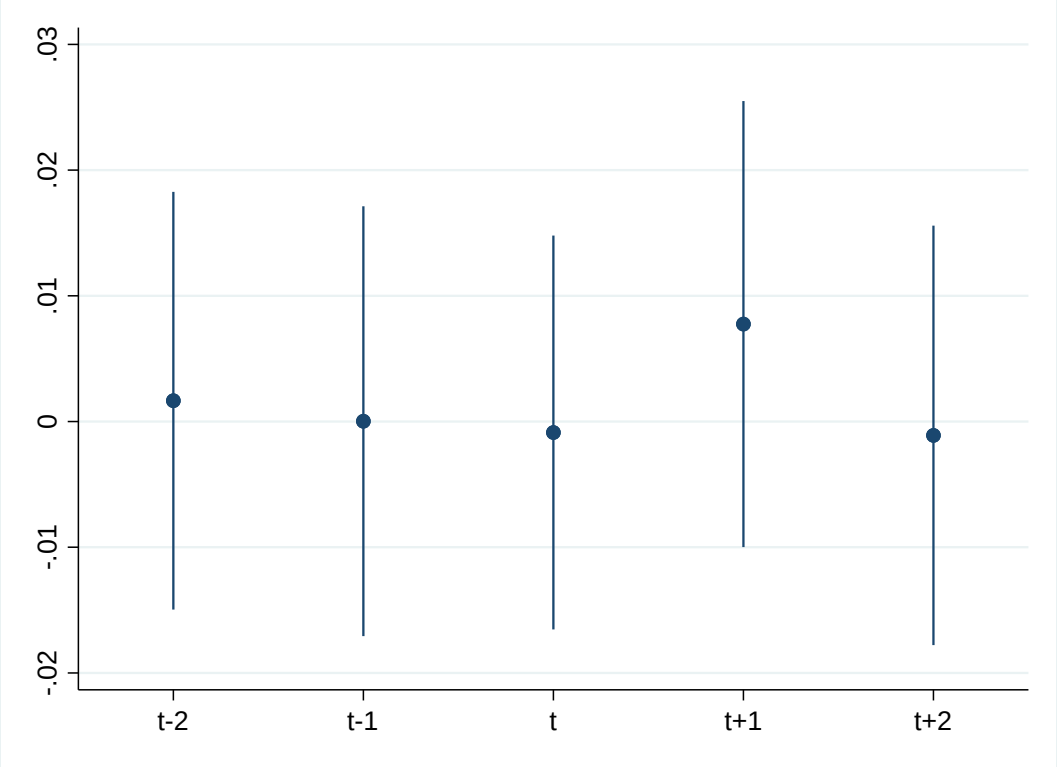
[26] At the sub-national level, the higher-level government has discretion on the expenditure responsibilities of the government in a level immediately below it. In other words, the provincial government has influence on all sub provincial-level expenditure (including cities, prefectures, counties, townships) (Shen et al, 2012).

provinces policy mix offer a source of exogenous variation in provincial expenditure and credit growth, which we use to estimate the multipliers.

Our results shed light on the policy debates on the real implications of credit growth and on growth rebalancing in China. We estimate a fiscal multiplier of 0.8 and a credit multiplier of 0.2 over 2001-2015. Furthermore, we find that the credit multiplier in China has recently been close to zero, consistent with credit saturation and credit misallocation. This implies that, at present, slower credit growth in China is unlikely to disrupt output growth. Indeed, the spillovers of sharply lower credit growth in 2016-2017 on output growth seemed limited, in line with this prediction of our analysis.

We find that, in contrast to the credit multiplier, the fiscal multiplier in China has recently increased to 1.2. High fiscal multipliers imply that fiscal policy may be effective in supporting macroeconomic adjustment. Yet we also find evidence that the effectiveness of fiscal policy is lower for off-budget expenditure and in provinces with unproductive SOEs. Further, the fiscal stimulus in China primarily boosts construction and manufacturing at the expense of services. Consequently, future fiscal stimulus would need to be on-budget and rebalanced towards services-related expenditure to contribute to the rebalancing of the Chinese economy towards services.

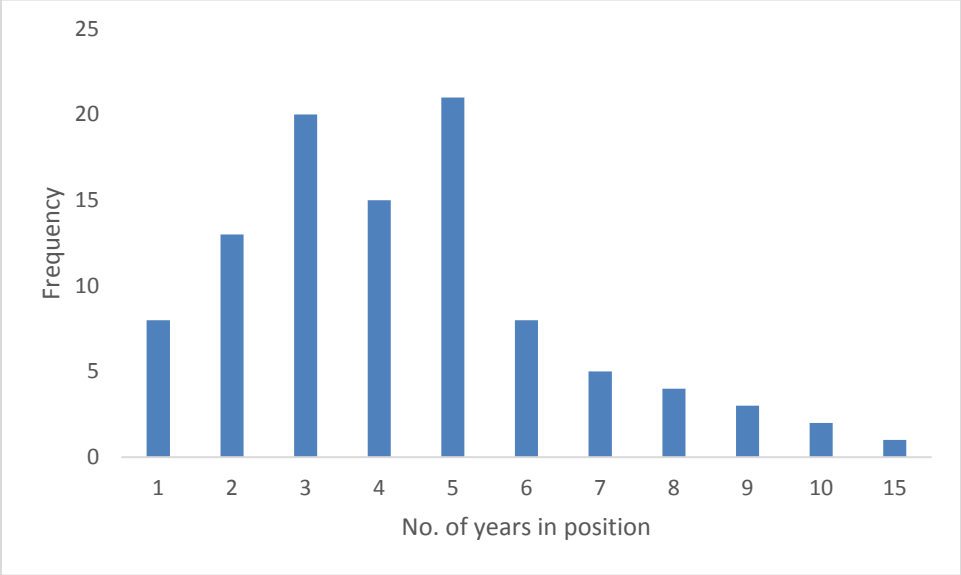
Figure 1. Appointment timing and provincial macroeconomic conditions



Note: This figure plots the average two-year GDP growth in provinces with newly appointed party secretaries in a five-year window around the year of appointment relative to the growth in other provinces. Plotted GDP growths are predicted values after removing year fixe effects. The bar shows 95 percent confidence intervals.

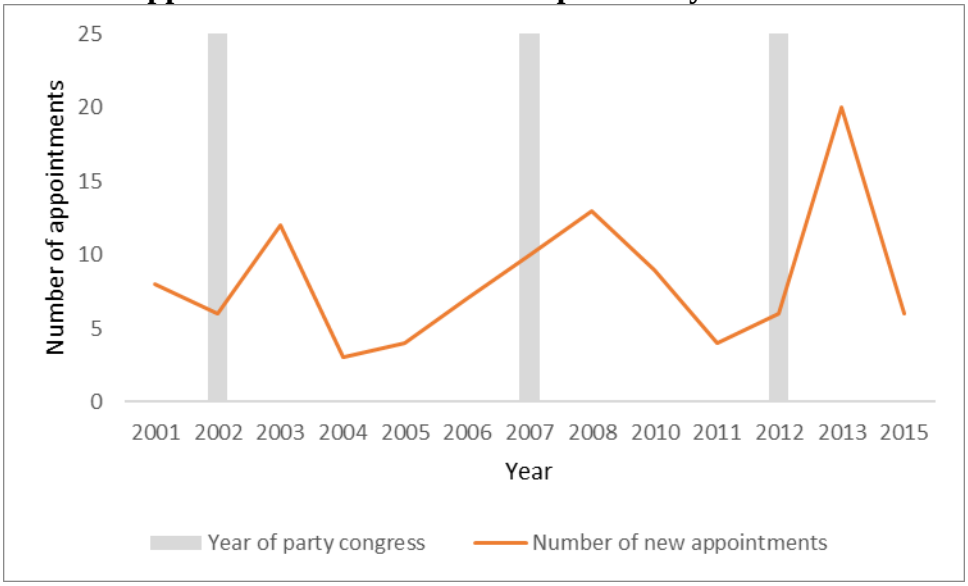
Figure 2 – Provincial party secretary appointment cycles

Panel A. Appointments and pre-determined tenure



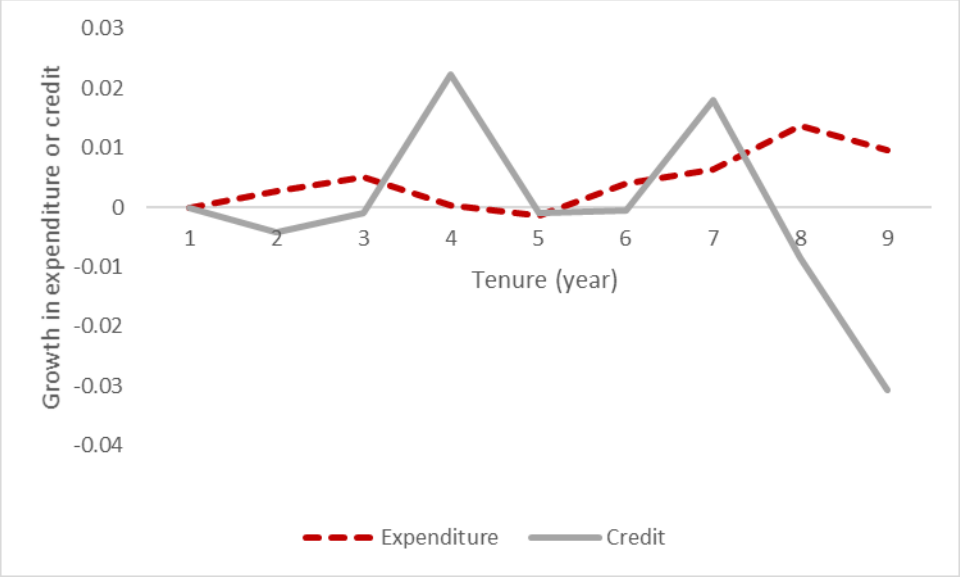
Note: The figure plots the number of years in position for the previous party secretary when a new secretary is appointed.

Panel B. Appointments and the national political cycle



Note: The figure plots the number of newly appointed provincial party secretaries by year. Grey bars are the years of the national party congress.

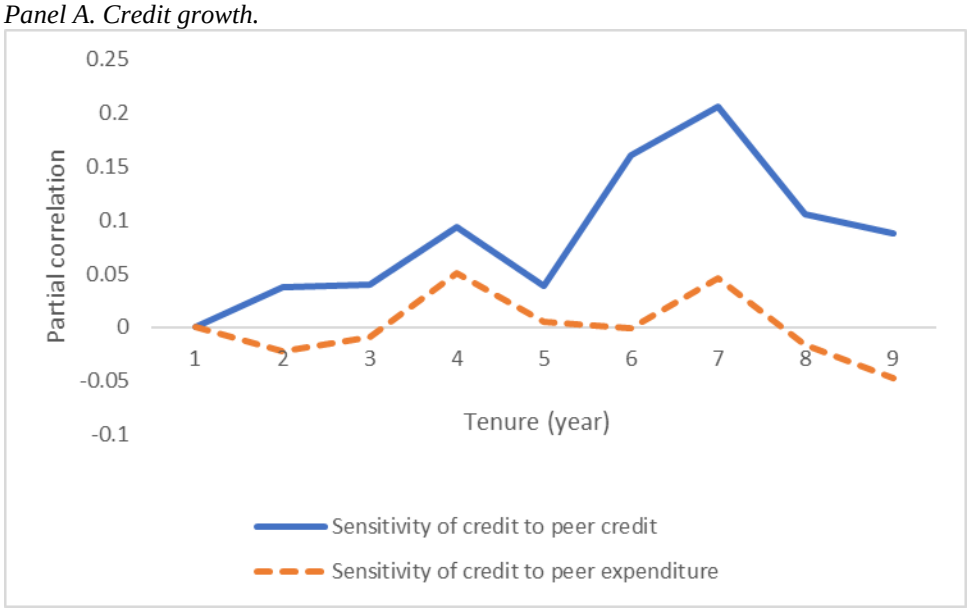
Figure 3. Credit and expenditure growth over the tenure of provincial party secretaries



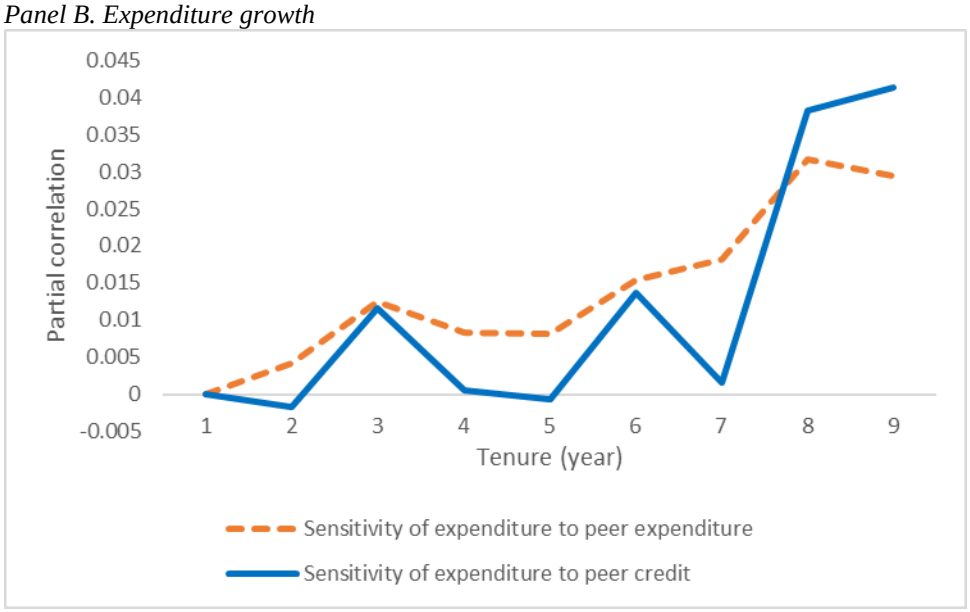
Notes: The figure plots credit (or expenditure) growth over the tenure of the provincial secretary, after controlling for province and year fixed effects. Credit (or expenditure) growth is measured by two-year change in real credit (expenditure) relative to two-year lagged GDP. Year 1 is normalized to zero.

Figure 4. Sensitivity to other provinces' stimulus policies over the tenure of provincial secretaries

Panel A. Credit growth.

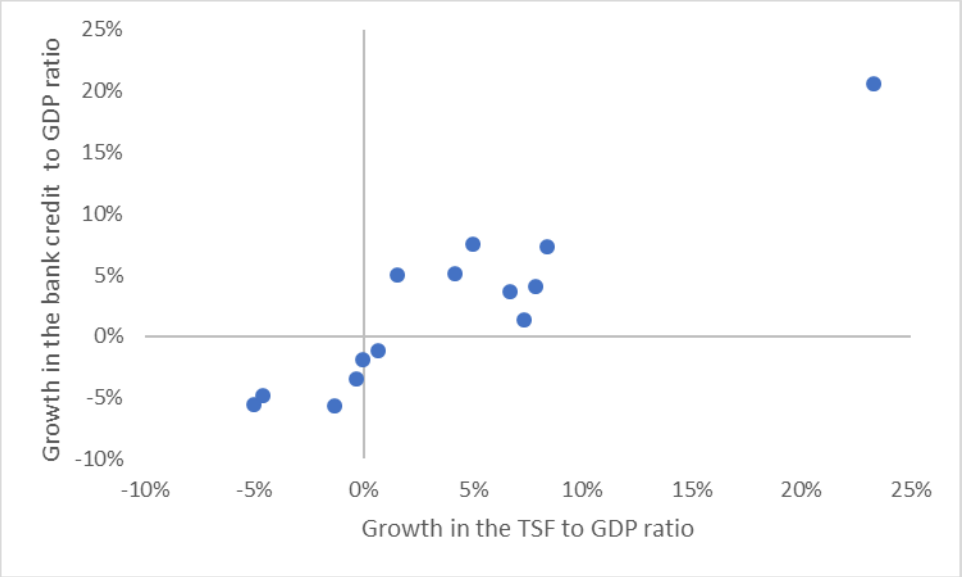


Panel B. Expenditure growth



Notes: Panel A plots the correlation between a province's credit growth and credit (or expenditure) growth in other provinces over the tenure of the provincial party secretary, after controlling for province and year fixed effects. Panel B plots the correlation between a province's expenditure growth and expenditure (or credit) growth in other provinces over the tenure of the provincial party secretary. Credit (or expenditure) growth is measured by two-year change in real credit (expenditure) relative to two-year lagged GDP. Year 1 is normalized to zero.

Figure 5. The correlation of bank loans and TSF growth.



Note: This figure plots annual growth of aggreaget total social finacing (TSF) and bank credit as a share of GDP.
Source: CEIC and authors' calculation.

Table 1. Summary statistics

	N	Mean	St. Dev.	Min	Max
Nominal GDP (Bn RMB)	465	1187.95	1252.82	13.92	7281.26
Real growth (2-year difference relative to 2-year lag GDP)					
GDP	386	0.27	0.09	0.06	0.45
Credit	387	0.32	0.16	0.05	0.85
Expenditure (on-budget)	386	0.07	0.05	0.02	0.34
Expenditure (on- and off-budget)	239	0.07	0.05	0.02	0.30
Construction	387	0.02	0.01	0.00	0.08
Manufacturing	387	0.11	0.07	-0.04	0.26
Services excluding financial	385	0.10	0.03	0.05	0.19
Secretary's tenure (years)	465	3.28	2.24	1.00	15.00

Table 2. Provincial growth prior to party secretary's appointments

	Above median (%)	Below median (%)	Switching (%)
t-1 and t-2	34	36	30
t-1 and t-2 and t-3	28	25	46

Notes: We compare the two-year GDP growth rate to the national median prior to the appointment of a party secretary. t is the year of appointment. This table shows the proportion of provinces for which the growth rates were always above, always below, or fluctuated around the national median.

Table 3. Full sample results

	Real GDP					
	1	2	3	4	5	6
	OLS	IV	OLS	IV	OLS	IV
Real Credit	0.223***	0.283***			0.191***	0.202***
	[0.035]	[0.039]			[0.033]	[0.040]
Real Expenditure			1.009***	1.083***	0.795***	0.793***
			[0.186]	[0.290]	[0.175]	[0.292]
Observations	370	370	372	372	359	359
R-squared	0.770		0.760		0.803	
Year and province FE	Yes	Yes	Yes	Yes	Yes	Yes
Cragg-Donald Wald F		104.2		112.2		51.65
Kleibergen-Paap rk Wald F		27.10		23.36		14.75

Notes: This table shows results of OLS and IV regressions on credit and fiscal multipliers. The independent variable is two-year growth in real GDP, and the dependent variables are two-year growth in real credit and expenditure relative to two-year lagged GDP. All specifications include province and year fixed effects. All variables are winsorized at the 2 and 98 percent. All standard errors are clustered at the province level and reported in brackets. ***, **, and * represent statistical significance at the 1 percent, 5 percent, and 10 percent, respectively.

Table 4. Identification tests and alternative estimations

	Real GDP					
	With first-stage controls		Weighted results		Detrended results	
	1	2	3	4	5	6
	OLS	IV	OLS	IV	OLS	IV
Real Credit	0.190***	0.197***	0.185***	0.180***	0.190***	0.209***
	[0.034]	[0.038]	[0.033]	[0.036]	[0.033]	[0.040]
Real Expenditure	0.767***	0.765***	1.050***	0.760**	0.758***	0.780***
	[0.177]	[0.291]	[0.269]	[0.301]	[0.158]	[0.284]
Real Credit in Neighboring Provinces	-0.005	-0.007				
	[0.063]	[0.060]				
Real Expenditure in Neighboring Provinces	0.150	0.150				
	[0.199]	[0.204]				
Secretary's Tenure	-0.001	-0.001				
	[0.002]	[0.001]				
Observations	358	358	359	359	359	359
R-squared	0.804		0.866	31	0.503	
Year and province FE	Yes	Yes	Yes	Yes	Yes	Yes
Cragg-Donald Wald F		51.68		97.22		31
Kleibergen-Paap rk Wald F		13.90		24.92		47.84

Notes: This table shows results of OLS and IV regressions on credit and fiscal multipliers. The independent variable is two-year growth in real GDP, and the dependent variables are two-year growth in real credit and expenditure relative to two-year lagged GDP. All specifications include province and year fixed effects. All variables are winsorized at the 2 and 98 percent. All standard errors are clustered at the province level and reported in brackets. ***, **, and * represent statistical significance at the 1 percent, 5 percent, and 10 percent, respectively.

Table 5. Early and late subsamples results

	Real GDP			
	2001-2008		2010-2015	
	1	2	3	4
	OLS	IV	OLS	IV
Real Credit	0.219***	0.215**	0.197*	0.107
	[0.063]	[0.089]	[0.109]	[0.083]
Real Expenditure	0.656***	0.747**	0.766***	1.184***
	[0.176]	[0.311]	[0.253]	[0.256]
Observations	166	165	108	108
R-squared	0.681		0.902	
Year and province FE	Yes	Yes	Yes	Yes
Cragg-Donald Wald F		18.07		14.04
Kleibergen-Paap rk Wald F		11.96		7.626

Notes: This table shows results of OLS and IV regressions on credit and fiscal multipliers. The independent variable is two-year growth in real GDP, and the dependent variables are two-year growth in real credit and expenditure relative to two-year lagged GDP. All specifications include province and year fixed effects. All variables are winsorized at the 2 and 98 percent. All standard errors are clustered at the province level and reported in brackets. ***, **, and * represent statistical significance at the 1 percent, 5 percent, and 10 percent, respectively.

Table 6. Provincial heterogeneity

	Real GDP					
	1	2	3	4	5	6
	OLS	IV	OLS	IV	OLS	IV
Real Credit	0.171***	0.189***	0.185***	0.124**	0.197***	0.140*
	[0.027]	[0.036]	[0.045]	[0.053]	[0.067]	[0.079]
Real Expenditure	0.530***	0.377	0.695***	0.777***	0.129	0.578
	[0.188]	[0.266]	[0.211]	[0.293]	[0.351]	[0.633]
Real Credit * High SOE profit	0.005	-0.099				
	[0.036]	[0.081]				
Real Expenditure * High SOE profit	0.382***	0.802**				
	[0.127]	[0.345]				
Real Credit * High House price growth			0.001	0.052		
			[0.029]	[0.047]		
Real Expenditure * High House price growth			0.089	-0.114		
			[0.148]	[0.194]		
Real Credit * High Real GDP per capita					-0.000	0.000
					[0.000]	[0.000]
Real Expenditure * High Real GDP per capita					0.003**	0.001
					[0.002]	[0.003]
Observations	331	331	315	315	359	359
R-squared	0.830		0.815		0.810	
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cragg-Donald Wald F		5.175		9.795		14.67
Kleibergen-Paap rk Wald F		3.208		11.18		6.804

Notes: This table shows results of OLS and IV regressions on credit and fiscal multipliers. The independent variable is two-year growth in real GDP, and the dependent variables are two-year growth in real credit and expenditure relative to two-year lagged GDP, and interactions with dummy variables of high SOE profit as a share of GDP, high house price growth, and high real GDP per capita. High SOE profit and high house price growth is defined as above the median in a given year. High real GDP per capita is based on the average in the sample period. All specifications include province and year fixed effects. All variables are winsorized at the 2 and 98 percent. All standard errors are clustered at the province level and reported in brackets. ***, **, and * represent statistical significance at the 1 percent, 5 percent, and 10 percent, respectively.

Table 7. Sectoral multipliers

Panel A: Sectoral contributions, entire sample: 2001-2015

	Construction		Manufacturing		Services ex. financial	
	1	2	3	4	5	6
	OLS	IV	OLS	IV	OLS	IV
Real Credit	0.021***	0.015**	0.083**	0.109**	0.062***	0.046**
	[0.006]	[0.007]	[0.033]	[0.044]	[0.018]	[0.022]
Real Expenditure	0.084**	0.055*	0.438***	0.606***	0.212*	0.138
	[0.039]	[0.033]	[0.135]	[0.220]	[0.109]	[0.099]
Observations	364	364	360	360	358	358
R-squared	0.689		0.767		0.517	
Year and province FE	Yes	Yes	Yes	Yes	Yes	Yes
Cragg-Donal Wald F		42.29		42.48		42.68
Kleibergen-Paap rk Wald F		14.67		13.88		12.69

Panel B. Sectoral contributions, the post-crisis period, 2010-2015

	Construction		Manufacturing		Services ex. financial	
	1	2	3	4	5	6
	OLS	IV	OLS	IV	OLS	IV
Real Credit	0.009	0.003	0.079	0.070	-0.067	-0.098**
	[0.011]	[0.011]	[0.127]	[0.094]	[0.050]	[0.041]
Real Expenditure	0.032	0.073**	0.361	0.678***	0.133	0.219**
	[0.032]	[0.028]	[0.259]	[0.238]	[0.139]	[0.090]
Observations	364	364	360	360	358	358
R-squared	0.689		0.767		0.517	
Year and province FE	Yes	Yes	Yes	Yes	Yes	Yes
Cragg-Donald Wald F		13.45		13.08		11.99
Kleibergen-Paap rk Wald F		14.67		13.88		12.69

Table 7. Sectoral multipliers (cont')

Panel C. Sectoral multipliers

	2001-2015			2010-2015		
	Cons-truction	Manu-facturing	Services ex. financial	Cons-truction	Manu-facturing	Services ex. financial
	1	2	3	4	5	6
Real Credit						
Sectoral multiplier (i.e. contribution to overall output multiplier)	0.015	0.11	0.046	0.003	0.07	-0.098
divided by sectoral share in GDP	0.075	0.39	0.37	0.078	0.39	0.37
obtains effect on industry growth	0.20	0.28	0.12	0.04	0.18	-0.27
Real Expenditure						
Sectoral multiplier (i.e. contribution to overall output multiplier)	0.055	0.606	0.138	0.073	0.678	0.219
divided by sectoral share in GDP	0.075	0.39	0.37	0.078	0.39	0.37
obtains effect on industry growth	0.73	1.57	0.37	0.94	1.73	0.59

Notes: Panel A and B show results of OLS and IV regressions on sectoral multipliers. The independent variable is two-year growth in real sectoral output relative to GDP, and the dependent variables are two-year growth in real credit and expenditure relative to two-year lagged GDP. All specifications include province and year fixed effects. All variables are winsorized at the2 and 98 percent. Panel C infers the effects of credit and expenditure from on sectoral growth from sectoral multipliers. All standard errors are clustered at the province level and reported in brackets. *, **, and *** represent statistical significance at the 1 percent, 5 percent, and 10 percent, respectively.

Table 8. Including off-budget expenditure

	Real GDP					
	1	2	3	4	5	6
	OLS	IV	OLS	IV	OLS	IV
Real Credit	0.285***	0.401***			0.247***	0.246***
	[0.056]	[0.093]			[0.053]	[0.095]
Real Total (On- and Off-Budget) Expenditure			0.852***	1.112***	0.586***	0.724**
			[0.198]	[0.245]	[0.189]	[0.281]
Observations	227	227	231	231	220	220
R-squared	0.607		0.571		0.646	
Year and province FE	Yes	Yes	Yes	Yes	Yes	Yes
Cragg-Donald Wald F		58.83		92.47		20.17
Kleibergen-Paap rk Wald F		19.03		37.64		7.578

Notes: this table shows results of OLS and IV regressions on credit and fiscal multipliers. The independent variable is two-year growth in real GDP, and the dependent variables are two-year growth in real credit and expenditure relative to two-year lagged GDP. All specifications include province and year fixed effects. All variables are winsorized at the 2 and 98 percent. All standard errors are clustered at the province level and reported in brackets. ***, **, and * represent statistical significance at the 1 percent, 5 percent, and 10 percent, respectively.

Table 9. Robustness to reappointments

	Real GDP					
	1	2	3	4	5	6
	OLS	IV	OLS	IV	OLS	IV
Real Credit	0.222***	0.265***			0.203***	0.197***
	[0.041]	[0.045]			[0.038]	[0.038]
Real Expenditure			1.015***	1.029***	0.864***	0.812***
			[0.187]	[0.297]	[0.181]	[0.302]
Observations	321	321	320	320	311	311
R-squared	0.783		0.776		0.822	
Year and province FE	Yes	Yes	Yes	Yes	Yes	Yes
Cragg-Donald Wald F		82.62		96.53		41.08
Kleibergen-Paap rk Wald F		41.62		24.69		15.56

Notes: this table shows results of OLS and IV regressions on credit and fiscal multipliers. The estimation is restricted to a sample with party secretaries' tenure of 5 years or less. The independent variable is two-year growth in real GDP, and the dependent variables are two-year growth in real credit and expenditure relative to two-year lagged GDP. All specifications include province and year fixed effects. All variables are winsorized at the 2 and 98 percent. All standard errors are clustered at the province level and reported in brackets. ***, **, and * represent statistical significance at the 1 percent, 5 percent, and 10 percent, respectively.

REFERENCES

Acharya, Viral V., Jun "QJ" Qian, and Zhishu Yang, 2016. "In the Shadow of Banks: Wealth Management Products and Issuing Banks' Risk in China." Working Paper, NYU.

Ahmad, Ehtisham, 2008. "Taxation Reform and the Sequencing of Intergovernmental Reform in China: Preconditions for a Xiaokang Society," in *Public Finance in China: Reform and Growth for a Harmonious Society*. Shuilin Wang and Jiwei Lou eds. Washington, D.C.: The World Bank.

Adrian, Tobias, and Hyun Song Shin, 2010. "Liquidity and Leverage," *Journal of Financial Intermediation*, 19(3): 418-437.

An, Heng, Yanyan Chen, Danglun Luo, and Ting Zhang, 2016. "Political Uncertainty and Corporate Investment: Evidence from China," *Journal of Corporate Finance* 36: 174-189.

Auerbach, Alan J., and Yuriy Gorodnichenko, 2012. "Fiscal multipliers in recession and expansion," in *Fiscal Policy after the Financial crisis*. University of Chicago Press.

Bai, Chong-En, Chang-Tai Hsieh, and Zheng (Michael) Song, 2016. "The Long Shadow of a Fiscal Expansion," *Brookings Papers on Economic Activity* 60, 309–327.

Baum, Anja, Marcos Poplawski-Ribeiro, and Anke Weber, 2012. "Fiscal Multipliers and the State of the Economy," IMF Working Paper 12-286.

Bernanke, Ben S., and Mark Gertler, 1995. "Inside the Black Box: The Credit Channel of Monetary Policy Transmission," *Journal of Economic Perspectives* 9(4): 27-48.

Bernanke, Ben S., and Mark Gertler, 1989. "Agency costs, net worth, and business fluctuations," *American Economic Review* 87(5): 14-31.

Blanchard, Olivier J., and Daniel Leigh, 2013. "Growth forecast errors and fiscal multipliers," *American Economic Review* 103(3): 117-120.

Bank for International Settlements (BIS), 2018. *Statistical Bulletin*, March.

Borio, Claudio, Enisse Kharroubi, Christian Upper, and Fabrizio Zampolli, 2016. "Labour Reallocation and Productivity Dynamics: Financial Causes, Real Consequences," BIS Working Paper 534.

Bound, John, David A. Jaeger, and Regina M. Baker, 1995. "Problems with Instrumental Variables Estimation When the Correlation between the Instruments and the Endogenous Explanatory Variable Is Weak." *Journal of American Statistical Association* 90 (430): 443–50.

Chen, Ye, Hongbin Li, and Li-An Zhou, 2005. "Relative Performance Evaluation and the Turnover of Provincial Leaders in China," *Economics Letters* 88: 421-425.

Chen, Zhuo, Zhiguo He, and Chum Liu, 2017B. "The Financing of Local Government in China: Stimulus Loan Wanes and Shadow Banking Waxes," *NBER Working Paper* No. w23598.

Cong, Lin William, Haoyu Gao, Jacopo Ponticelli, and Xiaoguang Yang, 2017. "Credit Allocation under Economic Stimulus: Evidence from China," *Chicago Booth Research Paper* No. 17-19.

Dell'Ariccia, Giovanni, Deniz Igan, Luc Laeven, and Hui Tong, 2016. "Credit booms and Macrofinancial Stability," *Economic Policy* 31(86): 299-355.

Deng, Yongheng, Randall Morck, Jing Wu, and Bernard Yeung, 2015. "China's Pseudomonetary Policy," *Review of Finance* 19, 55–93.

Dittmer, Lowell, and Yu-Shan Wu, 1995. "The Modernization of Factionalism in Chinese Politics," *World Politics* 47(4): 467-494.

Feng, Xunan, Anders C. Johansson, 2017. "Political Uncertainty and Innovation in China," *Stockholm School of Economics Asia Working Paper* No.44.

Gao, Haoyu, Hing Ru, and Dragon Yongjun Tang, 2017. "Subnational Debt of China: The Politics-Finance Nexus," Working Paper, MIT.

Gilchrist, Simon, and Egon Zakrajšek, 2012. "Credit Spreads and Business Cycle Fluctuations," *American Economic Review* 102(4): 1692-1720.

Guo, Gang, 2009. "China's Local Political Budget Cycles," *American Journal of Political Science* 53(3): 621-632.

Guo, Qingwang, Chang Liu, and Guangrong Ma, 2016. "How Large is the Local Fiscal Multiplier? Evidence from Chinese Countries," *Journal of Comparative Economics* 44(2): 343-352.

Haltenhof, Samuel, Seung Jung Lee, and Viktors Stebunovs, 2014. "The Credit Crunch and Fall in Employment During the Great Recession," *Journal of Economic Dynamics and Control* 43: 31-57.

He, Dong, Zhiwei Zhang, and Wenlang Zhang, 2009. "How Large Will Be the Effect of China's Fiscal Stimulus Package on Output and Employment?" *Pacific Economic Review* 14(5): 730-744.

Huang, Yi, Marco Pagano, and Ugo Panizza, 2017. "Local Crowding Out in China." Working Paper.

IMF (International Monetary Fund), 2017, *Staff Report for the 2017 Article IV Consultation with the People's Republic of China*.

Jin, Hejui, Yingyi Qian, and Barry R. Weingast, 2005. "Regional Decentralization and Fiscal Incentives: Federalism, Chinese Style," *Journal of Public Economics* 89: 1719-1742.

Kiyotaki, Nobuhiro, and John Moore, 1997. "Credit Cycles." *Journal of Political Economy* 105(2): 211-248.

Lee, David S., 2008. "Randomized Experiments from Non-Random Selection in US House Elections," *Journal of Econometrics* 142(2): 675-697.

Lee, David S., and Thomas Lemieux, 2010. "Regression Discontinuity Designs in Economics," *Journal of Economic Literature* 48(2): 281-355.

Li, Cheng, 2004. "Political Localism versus Institutional Restraints: Elite Recruitment in the Jiang Era," in B. J. Naughton & D. L. Yang (Eds), *Holding China Together*. Cambridge University Press.

Li, Hongbin, and Li-An Zhou, 2005. "Political Turnover and Economic Performance: the Incentive Role of Personnel Control in China," *Journal of Public Economics* 89: 1743-1762.

Li, Qing, Xiu Wen and Yuzhe Zhang, 2008. "China Ramps Up Financial Sector Stimuli," *Caijing Magazine, http:// english.caijing.com.cn/2008-12-09/110036510.html*, accessed 15 August 2017.

Li, Yinan, 2011. "China's Political Business Cycles," Working paper. Accessed August 14, 2017, from http://www.chinasummerinstitute.org/wp-content/uploads/Chinas-Political-Business-Cycle.pdf.

Luo, Renfu, Linxiu Zhang, Jikun Huang, and Scott Rozelle, 2010. "Village Elections, Public Goods Investments and Pork Barrel Politics, Chinese-Style," *Journal of Development Studies* 46: 662-684.

O'Brien, Kevin J., and Lianjiang Li, 1999. "Selective Policy Implementation in Rural China," *Comparative Politics* 31(2): 167-186.

Nakamura, Emi, and Jon Steinsson, 2014. "Fiscal Stimulus in a Monetary Union: Evidence from US Regions," *American Economic Review* 104(3): 753-792.

Ru, Hong, 2017. "Government Credit, a Double-Edged Sword: Evidence from the China Development Bank", *Journal of Finance* 73(1): 275-316.

Shen, Chunli, Jing Jin, and Heng-fu Zou, 2012. "Fiscal Decentralization in China: History, Impact, Challenges and Next Steps," *Annals of Economics and Finance* 13(1): 1-51.

Shih, Victor, 2010. “Local Government Debt Big Rock-candy Mountain,” *China Economic Quarterly,* June: 26–32.

Song, Zheng, Kjetil Storesletten, and Fabrizio Zilibotti, 2011. “Growing Like China,” *American Economic Review* 101(1): 196-233.

Spilimbergo, Antonio, Steven Symansky, and Martin Schindler, 2009. *Fiscal multipliers*. IMF Staff Position Note 2009/11.

Stock, James H. and Motohiro Yogo, “Testing for Weak Instruments in Linear IV Regression,” in James H. Stock and Donald W. K. Andrews, eds., *Identification and Inference for Econometric Models: Essays in Honor of Thomas J Rothenberg*, New York: Cambridge University Press, 2005.

Tao, Yi-Feng, 2006. “The Evolution of ‘Political Business Cycle’ in Post-Mao China,” *Issues and Studies* 42(1): 163-194.

Tsai, Pi-Han, 2016. “Fiscal Incentives and Political Budget Cycles in China,” *International Tax and Public Finance* 23: 1030-1073.

Wang, Xin, and Yi Wen. 2013. “Is Government Spending a Free Lunch? Evidence from China,” *Federal Reserve Bank of St. Louis Working Paper* 2013-013A.

Wedeman, Andrew, 1999. “Agency and Fiscal Dependence in Central-Provincial Relations in China,” *Journal of Contemporary China* 8(20): 103-122.

Wong, Christine, 2011. “The Fiscal Stimulus Programme and Public Governance Issues in China,” *OECD Journal of Budgeting* 11/3.