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I.   Introduction:

The financial crisis of 2007-2008, which originated in the United States, was considered by many economists to be the worst financial crisis since the Great Depression of the 1930s. It not only dragged down many financial institutions in the U.S., but it also triggered the most severe economic contraction in many foreign countries. Even though China, an export-led growth country, has enjoyed double digit growth for the past ten years, China's economy was also threatened by economic contraction in the West. Fortunately, China's economic growth soon reclaimed lost ground thanks to a 4 trillion Yuan (USD 586 billion) fiscal stimulus package aimed to upgrade infrastructure and transportation and modernize different industries (Yerxa, 2011). Although the stimulus package received lot applause for boosting growth and reviving the economic contraction, it raised the leverage ratio for China's government. Most importantly, the credit loosening due to the stimulus plan has increased debt burdens for local Chinese governments. As a matter of fact, the collapse of many private lending facilities in Wen Zhou, an eastern city in Zhejiang Province, which was well known for its exporting business, and other major cities in other provinces drew a lot of public

attention to the health of China's public debt especially at provincial level (Caixin Magazine online, December, 2011).

Even though the worries that some local governments were not able to pay back their debts after series of default events in many local cities in 2010 were intensified, it is still not clear whether China's local government debts has a significant impact on China's economic growth. Most of current studies on China's local government debts rely on news analysis and observation. For instance, the debt problem in Wen Zhou in 2010 drew a lot of attention from domestic and foreign news media. Bloomberg, one of the most influencing financial media, released a news report saying that, "China's first audit of local government debt found liabilities of 10.7 trillion yuan ($1.7 trillion) at the end of last year and warned of repayment risks, including a reliance on land sales" (Bloomberg news, 2011). Professional economists and fiscal pundits such as Nouriel Roubini, an economics professor at New York University's School of Business, start publishing paper to question the health of local government's fiscal policy. Some of studies may have a convincing inside story to conclude that the current borrowing level carried by local government has detrimental effect on China's fiscal sustainability. However, whether or not the growing amount of debts held by local governments has negative effect on China's economic growth is still unclear at this stage.

Recently, there have been a lot researches focusing on the relationship between government debt and economic growth. Also, many literatures identify the determinants of China's economic growth. Among all the literatures focusing on the impact of government debt on economic growth, Kumar and Woo (2010) did a distinguished job by providing an empirical analysis on the impact of high public debt on long-run economic growth based on a panel of advanced and emerging economies over four decades. Besides focusing on government debts, they also include a broad range of determinants of growth. Their empirical results suggest

an inverse relationship between government debt level and economic growth, controlling for other determinants of growth. Besides the international evidence of impact of government debts on economic growth, Lin (2003) identifies the components of China's government debt, which comprises domestic and foreign debt. He concludes that risk of foreign debt is very low for China since China's foreign exchange reserves are much higher than total foreign debt outstanding. For China's domestic government debt, it is more complicated because domestic debt consists of explicit fiscal deficits, local government debt, state banks' non-performing loans, and fiscal subsidies made to social security funds (Lin, 2003). Lin (2003) attributes the local government debt to the tax system adopted in 1994. Since local government cannot get enough revenue from tax due to the shared tax collecting with central government, they have been running deficits since 1994. Lin (2003) concludes that if current tax system remains unchanged, local government debts accumulated from fiscal deficits will cause a serious trouble.

However, what the two literatures above and other literatures focusing on government debt and economic growth in China have not identified is the impact of China's local government debt. Most importantly, what Lin (2003) did not emphasize is that the true cause of local government debt after the 1994 tax reform comes from local financing platform, which this paper will delve into later. As a result, this paper intends to fill up the research gap by answering the main question of the paper: does local government debt in China have significant impact on China's economic growth? In order to answer the question, this paper will contribute to the empirical literature on the relationship between china's local government debt and economic growth by first providing a comprehensive historical analysis on local fiscal policy and implementation plan in China and then constructing a panel regression model by using cross provincial dataset. This regression model will include provincial GDP per capita growth from 1994 to

2011 as dependent variable and local debts and other determinants of economic growth from 1994 to 2011 as independent variables. And finally, this paper will run regressions to test whether local government debt has significant impact on China's economic growth.

The results, based on a range of econometric techniques such as ordinary least squares (OLS), fixed effect (FE) and random effect (RE), suggest an inverse relationship between local government debt and economic growth, controlling for other determinants of growth: on average, a 10 percentage point increase in the debt-to-GDP ratio is associated with a slowdown in annual real per capita GDP growth of around 0.27 percentage points per year.

The rest of this paper is organized as follows: Section 2 has four main parts. Part one provides an economic theory of government debt. Part two reviews the empirical evidence of government debt. Part three reviews China's fiscal history and fiscal structure at local government. Part four highlights the debates from economists and reiterates this paper's key contributions. Section 3 introduces the modeling and data. Section 4 discusses and interprets the regression results. Section 5 concludes with further research suggestions.

II.   Literature Review

A. Economic theory of government debt

Before going too deep into China's local government debt problems, two critical questions are raised: why do high debt levels affect future growth, and how does high debt level affect future growth? From a conventional view, the government's debt policy affects the economy both in the short run and in the long run. Government debt and deficit is interrelated because a country with a large debt have difficulty to finance annual deficits through more borrowing and, consequently, will be more likely to raise tax to collect more revenue. Therefore,

we begin analyzing the effect of debt on economic growth by discussing the short-run effects of budget deficits.

In the short run, if the government creates a budget deficit by holding spending constant and reducing tax revenue, this policy will raise households' current disposable income. Based on the Keynesian view, the increases in income and wealth boost household spending on consumption goods and thereby, raise the aggregate demand for goods and services. In the long run, suppose that the government holds spending constant and reduces tax revenue, this policy creates a budget deficit and decreases public saving assumed the economy follows this identity:

$$S + (T - G) = I + NFI$$

Where S is private saving, T is taxes, G is government purchases of goods and services, I is domestic investment, and NFI is net foreign investment. The left side of this equation is national saving, which is the sum of private and public saving while the right side indicates save funds for investment at home and abroad. This identity is also a description of the market for loanable funds (Elmendorf and Mankiw, 1998).

If we adopt the conventional view that private saving rises by less than public saving falls, then national saving declines. After national saving declines, total domestic investment may decline as well because the sum of private and public saving equals to the sum of investment and net export. Reduced domestic investment will cause domestic capital stock to shrink, which implies lower output and income. The marginal product of capital will be higher after total capital becomes less and less. The rising marginal product of capital causes the interest rate to rise. Meanwhile, labor productivity would decrease, thereby reducing the average the average real wage and total labor income. (Elmendorf and Mankiw, 1998) As a result, the lack of domestic investment and the reduction

in productivity will drag down the total output in the economy, and thereby slowdown the economic growth.

Despite the short term and long term effect of government's debt policy, debt financing is the center of financial system nowadays. Countries cannot flourish without borrowing. When individuals have the ability to borrow to expand their consumption level, the overall demand in the economy becomes stronger. When business owners have the ability to borrow to expand their firms, they are expanding the capacity of the economy to generate more jobs and demands. However, past experiences teach us that we cannot borrow forever because high leverage ratios create instability. As debt level increases, borrowers' ability to repay becomes more sensitive to drop in asset prices and increase in interest rate because once the prices of their collaterals drop, they are no longer considered as creditworthy. After a series of default happens, lenders start to lose faith in the market and to scale back their lending. Once the entire credit line breaks, consumption and investment fall. Afterward, high unemployment rate and insufficient aggregate demand will drag the real economy down. The real economy will experience an even worse economic downturn if the level of debt before crisis is enormous (Cecchetti et al, 2009).

B. Empirical Evidence of Government Debt

In order to see whether government debt problem poses a significant effect on China's economic growth, we have to find an accurate model that can capture the effect of debt on economic growth. Rogoff and Reinhart (2010) develop a model using data from 105 countries consisting of both advanced and emerging economies from the past twenty years to analyze the relationship between the public leverage ratio (debt-to-GDP ratio) and average GDP growth. Based on their calculation, they come up with a threshold for debt-to-GDP ratio. When the debt-to-GDP ratio rises above 90 percent, median growth rates fall by

one percent, and average growth falls considerably more. Also, they find that the thresholds for both advanced and emerging economies are similar even though emerging economies will more likely face a worse economic downturn when debt-to-GDP ratio exceeds 90 percent. Moreover, emerging markets face a lower threshold for external debt, which is usually denominated in a foreign currency. When external debt in emerging economy exceeds 60 percent of GDP, annual growth declines by about two percent (Reinhart and Rogoff, 2010). In addition, high debt level not only limits country's long run economic growth, but it also limits the effectiveness of fiscal policy.

However, the model developed by Rogoff and Reinhart does not take reverse causality into account. High debt can potentially lower the future economic growth, but low economic growth also can cause debt to grow in the long run. As a result, analyzing government debt requires a more comprehensive model because economic growth is determined by many factors ranging from political structures to cultural aspect. If a model cannot fully cover all the determinants of economic growth, the impact of debt on economic growth is biased. In a paper written by Robert Barro, Determinants of Economic Growth in a Panel of Countries (1997), he provided a framework to analyze the factors that determine the economic growth rate in different countries. He derives his model from the hypothesis from the neoclassical growth model that poorer countries typically grow faster per capita at initial level and thereby catch up with the richer countries. The convergence hypothesis of neoclassical growth model implies that the growth rate of real per capita GDP during a time period would tend to be inversely related to the level of real per capita GDP in the initial year. In this model,

$$g = g(y, y^*)$$

Where g is the growth rate of per capita output, y is the current level of per capita output, and is the steady-state level of per capita output. If the current level of

per capita output, y, is high, the growth rate of per capita output, g, will diminish for a given steady-state level of per capita output,. If holding the current level of per capita output constant, the growth rate of per capita output will increase with a rise in the steady-state level of per capita output, because the improvements in external conditions such as government regulations, law, and market openness, are beneficial to the long-run growth of the economy. The steady-state level of per capita output is determined by a number of factors comprising social, economic, cultural and demographic. In addition, the steady-state level of per capita output is also determined by political factors such as the degree of political freedom, the extent of market efficiency, and size of government expenditure (Barro, 1996).

Barro's model provides a frame work to analyze the determinants of economic growth even though he does not take government debt into account. To test whether government debt has significant effect on economic growth empirically, debt has to be added as a new variable into the model. Recently, the empirical literature on debt and economic growth has grown. But many of those growth regressions used in the literature have many shortcomings. Instead of focusing on a few socioeconomic variables that are statistically significant, they tend to include as many variables as possible to mitigate omitted variable bias. Even though they may correct omitted variable bias, they commit multicollinearity errors where two or more predictor variables in a multiple regression model are highly correlated. As a result, it is better to focus on a core set of explanatory variables that have shown a strong and consistent relationship with economic growth. If there are some extra variables that are important to explain economic growth, we can include them in the model while keeping the same core variables.

Specifically, the findings of Kumar and Woo (2010) select the core sets of growth determinants, which are consistent with Barro's model. Besides selecting the core sets of growth determinants, Kumar and Woo utilizes a variety

of estimation methodologies, such as pooled OLS, robust regression, between estimator, fixed effects panel regression, and system GMM (SGMM) dynamic regression to capture the effect of government debt on economic growth. Since there are many sources of bias that can result in inconsistent estimates of the coefficients in panel regressions ranging from omitted-variables bias to endogeneity, using different estimation methodologies will mitigate them. The econometric results from Kumar and Woo (2010) suggest an inverse relationship between initial debt and subsequent growth after controlling for other determinants of growth: a 10 percentage point increase initial debt-to-GDP ratio is associated with a slowdown in annual real per capita GDP growth of around 0.2 percentage points per year. On average, a 10 percentage point increase in initial debt is associated with a decline of investment by about 0.4 percentage points of GDP. Cecchetti et al (2009) use similar methodology analyzing data from OECD to conclude that high debt is bad for growth. When public debt is above 85 percent of GDP, further increases in debt may begin to have a negative impact on growth. More specifically, a 1 percentage point increase in corporate debt is associated with an approximately 2 basis point reduction in per capita GDP growth. A 1 percentage point rise in household debt-to-GDP is associated with a 2.5 basis point reduction in growth.

While the cross-country empirical results from Kumar and Woo (2010) and Cecchetti et al (2008) conclude the negative effect of government on economic growth despite of the size of economy, they have not emphasized the importance of local government debts especially in China. Even though a lot of previous literature helps explain and identify the determinants of China's economic growth, only a few of them start to emphasize the importance of China local government debt on China economic growth in recent years. However, finding the variables that best explain China's economic growth is still very challenging due to the uniqueness of China's economic structure. Most importantly, just like what

Lin(2003) mentions in his paper, "No one knows exactly how large is the local government debt. It is believed that township government debt is widespread and severe." Because of this, finding the correct variable to represent China's local government debt is a very challenging task for this paper. Therefore, the first step before constructing a model that explains the effect of China local government debt on China's economic growth is to review the history of China's fiscal policy at provincial level.

C. China's fiscal history and local government's fiscal structure

China's debt problems are much more complicated than developed countries because China's unique political system yields a different fiscal policy implementation plan. Before going to empirical analysis of China's local government debt, we have to review the history of fiscal policy and the fiscal structure of China's local government.

After Deng Xiaoping introduced the market economy to China in 1980, China's economy started to take off. Between 1980 and 1999, the average growth rate of China's GDP was around 9.5 percent. However, the robust growth of China's economy did not increase the central government's revenue because the tax system implemented in 1980 was not efficient enough to generate revenue for central government. The budgetary revenue-to-GDP ratio decreased from 28.4% in 1979 to 12.6% 1993. Most importantly, the central government revenue-to-total revenue ratio decreased from 46.8% in 1979 to 31.6% in 1993 (Zhu, 2007). The insufficient revenue in central government diminished its authority in the implementation of fiscal policy. The central government was sometimes forced to borrow money from other local governments between 1980 and 1990 (Zhu, 2007).

One of the main reason that central government could not collect enough revenue to support its expenditure was China's centralized fiscal system, which relied on local government agencies to collect revenues for transfer to

the national treasury. Each local government had an assigned duty to collect a certain amount of tax by the end of each year. In return, the central government assigned re-transferring revenues to local governments' budgets. Because such a policy was basically a part of socialist planned economy, where everyone eats from the same pot, local governments had no incentives to promote the local economy. In addition, in order to address the insufficient revenue, China's central bank, People's Bank of China, had to print more money to ensure that there was enough money circulating around the economy. Such an aggressive money printing policy eventually resulted in the risk of high inflation. Many economists and policymakers in China during that time started to worry about the central government's fiscal authority, and called reform in the tax system. However, because of different political interests, the tax reform did not take place until 1994 after a series of fiscal crises in central government (Zhu, 2007).

To address problem of inefficient fiscal policy, China's Prime Minister, Zhu Rongji, who was an economist himself and a devout follower of Milton Friedman, decentralized China's tax system in 1994 by introducing a new tax system called the Tax Sharing System although he was under a lot political pressure from different interest groups. Before 1994 reform, there were three categories of taxes levied in China: the industrial and commercial tax, tariff, and the agriculture tax (Zhu, 2007). The three main taxes were controlled by central government. The new tax sharing system introduced in 1994 basically separated the tax revenue collected by central and local governments. The tax revenue (not tax legislation), according to the new sharing system, is divided in a way that some taxes are exclusively assigned to the central level, some are assigned exclusively to the local level, and some taxes are shared between both levels based on a fixed ratio. For central government, the tax revenue comes from taxes such as consumption tax, tariffs, vehicle acquisition tax, and business tax. For local government, the

tax revenue comes from taxes such as urban maintenance and construction tax, vehicle and vessel usage license tax, and orientation adjustment tax on investment in fixed asset. Since VAT (Value-added Tax) and income tax are the two largest tax revenues, they are divided between the central and local level. For VAT, the central level takes 75% while the local level takes 25%. For both individual and Enterprise Income Tax, the central level takes 60% and local level takes 40%. The new tax sharing system basically left local government no choice but to generate as much tax revenue as it could to support its annual expenditure level. As a result, the new tax sharing system provides incentives for local governments to generate more tax revenues by promoting their local economies (Zhu, 2007).

However, although the new tax system was designed to generate more revenue for the central government, it also limits the range of tax revenues collected by local government. From 1960 to 1985, local governments had budget surpluses. From 1986 to 1993, even though local government started experiencing deficits in some years due to the fixed asset investments, they soon recovered the "lost ground" in following years. But the tax reform in 1994 changed everything. Local government budgets jumped from a surplus of 6.1 billion yuan in average in 1993 to a deficit of 172.7 billion yuan in average in 1994 (Lin, 2003). Basically, starting in 1994, almost every local government from 31 provinces had a budget deficit each year. In addition, since China is currently undergoing massive infrastructure spending in different provinces after 1994, the local governments have to find another way to come up with more funds besides tax revenue to fund their building projects.

However, no matter how fast a local economy can develop, its economic capacity cannot expand without enough budget revenue to support. Since even the richest provincial government such as Guangdong province, one of the first provinces to experience market reform in 1980 had a hard time to collect enough

revenue to finance their annual budget deficit. Moreover, because the tax and budget reforms enacted in 1994 prohibit local governments from issuing bonds, the local governments could not simply issue debt to finance their projects. After the 1997 Asian Financial Crisis, the local governments came up with a new way to generate more funds. The law forbids the local governments to issue debts directly, but it doesn't prohibit them to generate funds indirectly by setting up an entity called the Local Financing Platform (LFP) (Walter and Howie, 2011).

These LFPs provide non-tax revenue to local governments to fund their operating budgets. Their sources of fund come from bank loans. But the question is how those LFPs can secure bank loans that local governments cannot obtain directly. In order to circumvent restrictions on local government borrowing from bank, local governments create corporations that act as the borrowers to obtain loans from banks. These corporations consist of State-Owned Enterprises (SOE) and local incorporated investment companies. Sometimes they combine together to form a financial entity such as a private equity or a fund management company. The mechanism of the local government funding process through Local Financing Platform is not hard to comprehend. Basically, local governments contribute lands to local financing platforms and provide tax subsidies for them. The LFPs have lands as collaterals to borrow money from banks. Meanwhile, the LFPs use the lands they obtained from local governments to develop infrastructure projects such as high ways, railways, and airports. One the one hand, these infrastructure projects is beneficial to those LFPs because they solely control the profits from these projects. For example, China Railway Company was one of the biggest LFPs in northern China before the head of this company was arrested in 2010 because of corruption. They controlled 99% of railways in northern China. More than half of the profits made from ticket selling and cargo shipping goes to this company. They not only used the profits to develop more railways, but they also started

developing real estate projects in Beijing, Tianjing, and other major metropolitans in China to expand their financial influence. On the other hand, these projects developed by LFPs are beneficial to local economy. When a new railway or real estate project starts, they need more workers to work and more raw materials such as cement and steel to build bridges and airports, and thereby increase total industrial outputs at local level. That is why some provinces such as Guangdong, the biggest provinces in southern China, and Zhejiang, the biggest provinces in eastern China, experienced accelerating economic growth in recent years.

While the LFPs start developing projects, they secure more loans for local governments to finance their deficits. Since local governments need to pay wages to their employees, to provide funding for public schools, and to pay for healthcare payments to local government staff, the amount of revenue they get annually cannot cover their expenditure level due to the 1994 tax reform. After LFPs get loans from banks that are owned by the state by providing lands as collateral, local governments no longer experienced insufficient funds. Also, local governments can invest in those LFPs, which issue primary shares, to become one of the largest shareholders who can get dividend payment every year. Meanwhile, the LFP can issue municipal bonds backed by local government and sell them to bank and municipal bond investors. Then the cash obtained from bonds sell goes to local government to finance their budget deficits and other expenditures. Thus, the local financing platform serves as an agent to pass the loans from bank to local government (Walter and Howie, 2011). On the surface, this funding process between local governments and LFPs are mutually beneficial. Local governments do not have to beg money from central government in Beijing to finance their budget deficits and infrastructure projects. LFPs can get the lands for their projects at an artificially low price. Also, they can pay fewer taxes than other corporations especially private corporations.

Theoretically, the whole funding process should work perfectly well under a high economic growth because the platform's capacity for borrowing money from banks depends on the value of the collateral, which is mostly land. Because LFPs use the lands to develop real estate projects such as office buildings, resident houses, and shopping malls and other infrastructure projects, the price of the land might triple due to the increase in demands for housing or rental business. The repercussion of the increase in price of this land will spread to lands nearby. If the economic growth does not slow down in the near future, the price of lands will increase for a long period. The more valuable the land, the more money the LFPs can borrow from banks. Most importantly, those loans backed by the lands will not turn sour if the price of land is still very attractive for investment.

However, once the economic growth starts to slow down, it will be unclear whether the loans obtained by LFP to fund local government budget deficits and expenditures become a Chinese style of "subprime mortgage crisis". Recently, because of global economic slowdown, China cannot immune from the global repercussion. China's GDP growth went down from 14.2% in 2007 to 9.6% in 2008 due to the global financial crisis. Even though the 9.6% growth is still faster than a lot of countries, the 4.6% drop of GDP growth still had a lot impact on China's economy especially at housing sector (World Bank Data). Based on the data from Global Property Guide, house prices in China rose rapidly from 2000 to 2008, primarily driven by low interest rate and cheap credit (Global Property Guide). The skyrocketing house prices were partly caused by speculator who wished to make a huge fortune from selling their homes at higher price. Since it was cheap and easy to obtain a home loan, anyone can become a speculator. Most importantly, China was still lack of regulation in homeowner loan market. Many people who did not have a good credit history could easily take out a loan to buy house. As the economy started showing sign of weakness, the speculators pulled

out from the housing market. The lack of demand for houses caused the house prices to drop at the beginning of 2009.

But economic slowdown was not the primary reason causing home price to drop in China. In order to ease public complaint over the skyrocketing house prices in Beijing, Shanghai, and other major metropolitan areas due to the speculative activities before 2009, the government adopted some housing market-cooling measures in April 2010. For instance, the down payment for first-time buyers' mortgages was increased to 30% from 20%, while for second homes down payment rose to 60% from 50%. New property taxes were introduced in Shanghai and Chongqing between 0.4% and 0.6% in Shanghai (Global Property Guide). These government measures caused house prices to drop substantially in the last quarter of 2011. After house prices dropped, the price of land also decreased. Since those loans obtained by LFPs from banks are backed by lands as collaterals, the sudden drop in house prices will cause those loans to sour.

Theoretically, under the contract between borrower and banks, if the price of land drops, the borrower has to use other methods such as liquidation to pay back what it owes to the banks and bond investors. However, that was not the case in China. According to an article from Bloomberg News, written by Henry Sanderson and Michael Forsythe, "China Cities Value Land at Winnetka Prices with Bonds Seen Toxic", many local governments tried to overstate the land value by three to four times the actual value in order to secure more loans from banks. In one case, local officials were not even able to the specify the exact location of the specific property securing loan, reportedly stating, "it's somewhere north of town, I don't exactly known where. It's like the land outside the city, you know, with the big piles salt" (Bloomberg News, July 13, 2011). This investigation done by Bloomberg News clearly indicates that the attitude by local government officials towards repayment of the loan was disturbingly noncommittal and dismissive.

Recent data from China's statistical yearbook indicates that the growth of loans in each province has already reached an unprecedented level. Also, most of loans shown in China's statistical yearbook are one-year loans. Also, since only state-owned banks have authority to issue loans in China, the close relationship between state-owned banks and LFPs, which are mainly the cover identities of state-owned enterprises in each province, gives local governments a back channel to take out more loans no matter how turbulent the overall economy around the world is. Therefore, given by the evidence provided by Bloomberg try to pay back the loans they ask LFPs to borrow in previous years.

As a matter of fact, not many people before 2008 paid too much attention to the transaction between local governments and LFPs and most importantly, the amount of debt existed under local government's balance sheet, because China was still on an accelerating growth before 2008. But after the growth correction in 2009, local government's unique funding process drew both applause and criticism from different economists after China experienced economic slowdown at the beginning of 2010. One the one hand, one group of economists thinks financing through LFP is less transparent and less manageable than direct government borrowing. The opaque business agreement between LFP and local government leads many economists to question the accuracy of the official reported number of total loan that local governments borrow each year. Also, they worry that the enormous amount of loan accumulated each will have a negative impact on China's economy. On the other hand, some economists think that borrowing from LFP to finance infrastructure projects is beneficial to the economy because these projects will ultimately contribute to long-term economic growth. If the local government has ability to generate enough revenue to pay off its loans from previous years, LFP borrowing will not hurt the whole economy.

The pro sides of local government borrowing think because China

is still a developing country, the space for future growth is enormous. A well-known economist, Justin Lin who is a Chinese economist and former Chief Economist and Vice President of the World Bank recently said in his speech, *Beyond Keynesianism and The New "New Normal"*, that China is not going to collapse because of global recession since China's potential economic growth is still strong enough to compensate short run economic shock. Unlike the U.S. and other western advanced economies, China is still undergoing a transition from a poor country to a developed country. The large gap between rural area and urban area provides China a valuable opportunity to continue its infrastructure projects to reach urbanization. According to Lin, China's fiscal expansionary policy during the past ten years has raised government's debt-to-GDP ratio, but if adding central government debt and LFP loans together, the total debt-to-GDP ratio is around 40 percent. Comparing this number to other countries such as Japan and Greece, China's current debt-to-GDP ratio is still relatively healthy. In addition, not only does China have a fine fiscal condition, China's high household saving rate and 3 trillion U.S. treasury holding will provide adequate fund to expand its economy (Lin, 2011).

Also, according to a report written by a group of economists from Credit Suisse, most of loans borrowed by local government financing platform is largely used in infrastructure projects. As shown in the graph, urban infrastructure and transport projects accounted 62% of the loans and land purchases accounted 10.6%. Infrastructure and transport projects used more than 70% of the total loans borrowed by LFPs. Even though it seems that the amount of loans is enormous, local government's assets are increasing from these investments. Unlike the public debt used to pay for social pension fund and other benefits in Southern Europe, local government's debts in China are utilized to accumulate a large amount of fixed assets to increase the total output. Thus, if China's economic growth is

steady over the next ten years, according to Credit Suisse, the debt problems at local level should not be problematic.

However, even though Lin's and Credit Suisse's arguments that China's robust future growth mitigates government's debt burden seems to be reasonable, many independent research departments and economists cast doubts on his argument. In a special report done by Bloomberg, China's banks didn't fully report the total loans they lent to local government financing platform. For instance, Industrial and Commercial Bank of China (ICBC), second largest state-owned banks in China, reported in 2011 that they include the total loans borrowed by 10,000 LFPs across the entire country in bank's public report. However, Bloomberg sent its own investigation team and found that ICBC only includes 113 LFPs, or about 2% of those reported by the banks. The hidden loans, according to Bloomberg, sometimes contained toxic assets, which came from failed real estate and infrastructure projects from 2008 to 2011. Also, with prices dropping dramatically in China's real estate market in 2011, many local governments were struggling to sell lands to raise more cash. Meanwhile, the decrease in land price causes the price of collaterals held by LFPs to drop. As a result, they were not able to obtain enough loans from banks for local governments (Bloomberg news, 2011).

In more scary news reported by Financial Times, it stated that some local governments are having troubles paying their wages in their public servants because of inadequate cash and loans:

> For example, in the Shandong Province capital Jinan, not a single developer bid for nine of the 11 plots offered by the city in early November. The two plots that sold went for bottom-line prices.
>
> A city with a serious land market crash is Guangzhou, where in November some 32-plots failed to sell. In some cases, auctions were suspended by the city government, which blamed poor market conditions.

These plots were supposed to generate about 18.7 billion yuan for Guangzhou's city government, representing some 29 percent of the planned land sale revenues written into the 2011 fiscal budget. Asking prices averaged 5,584 yuan per square meter of floor space (Financial Times, 2011).

Therefore, the decrease in residential real estate construction diminishes local government's ability to pay back their debts through land sales.

In addition to the scary China's local government debts reported by Financial Times and Bloomberg, Nouriel Roubini, a professor from NYU's Stern School of Business, criticized that the high borrowing by China's local governments eventually would become another "subprime mortgage" (Reuters news, 2011). His reasoning behind the prediction of China's debt problem was based on his field study in 2011. He stated that even though local governments have spent billions of dollars to upgrade city's transportation, housings, and schools, many investments cannot generate enough revenue to pay back those debts local governments borrow. He gave an example of high speed Maglev train between Shanghai and Hangzhou, another major city in eastern China. The governments of Shanghai and Hangzhou spent billions of dollars to develop the high speed train line. The initial investment was estimated around 300 million USD. Although the new high-speed train has already cut the travelling time between the two cities from four hours to less than one hour, the ticket is so expensive that frequent travelers can just take regional jet with much cheaper price. As a result, most of the trains were just half-empty. Roubini stated that the lack of passengers will reduce the profit generated from the high-speed train line and diminish local governments' capacities to pay back their debts (Reuters news, 2011) (Project-Sydicate, 2011).

The high-speed train line between Shanghai and Hangzhou is just a small corner of China's investment story. Many local governments, according

to Roubini, were developing the similar sumptuous projects, which could not generate enough revenue to pay back debts they borrowed. He worried if local governments continue the excessive investment, China's local government debts will become a new debt crisis, which will drag the whole country down.

D. Summary

At this stage, it is still not clear whether China's local government debts pose a significant threat to China's economic growth although the some economists suggests that China is facing a serious debt crisis. On the surface, the debt problem at local level in China seems to be manageable since China is still on the trend of high economic growth regardless of recent financial crisis. However, the data from China's Statistical Yearbooks from 1994 to 2011 and investigations conducted by two authoritative news agents, Bloomberg and Financial Times, indicate that the borrowing levels at local governments are still too high. The question that whether the high level of debts held by local governments through local financing platforms has significant impact on China's economic growth remains unanswered. Thus, the purpose of the rest of this paper is to provide a quantitative analysis to answer the remaining question left from the previous literature.

Before going deep into quantitative analysis, we still need to find the right variable to represent local government. Since it is impossible to find exact numbers representing China's local government debts at this point, we have to find a proxy number to represent China's local government debts. In fact, based on the previous literature, we can identify the correct variable for debt. Since this paper centers around the loans borrowed by local governments through local financing platforms, the amount of loans from all 31 provinces that report on China's statistical yearbook every year can be used as proxy variable to represent local debts. Even though it is possible that many China's local governments are willing

to hide the actual debts they owe to the banks, the amount of annual loans from each province shown in statistical yearbook, conducted by central government's banking regulation agencies and other statistical departments in Beijing, cannot cover the truth because they have to fully analyze the health of state-owned banks, which are public companies that list their shares in both mainland and Hong Kong stock exchanges. Also, given the evidence provided by Credit Suisse's report that more than 70% of the debts borrowed by local financing platforms are short term loans, which are set to mature by end of 2013, we can conclude that most of LFPs are not going to pay back these debts. Moreover, we also have evidence from Bloomberg that most local governments have not even paid attention with the amount of debts they owe for a long time and, most importantly, they do not have plans to pay them back. Thus, we can conclude that the annual short-term loans from each province shown on China's statistical yearbook are the best proxies to represent China's local government debt.

III.   Model Specification

Based on the findings in cross-country growth literature and discussion on China's local fiscal history, we adopt a cross-provincial panel regression model to investigate the impact of local government debt on economic growth across thirty-one provinces in China. The panel spans 17 years from 1994 to 2011.

The baseline panel regression specification is as follows:

$$y_{it} = \alpha + \beta_{i,t} x + \gamma z_{i,t} + \varepsilon_{i,t},$$

Where t denotes the end of a period; i denotes province; y is the growth rate of real provincial income per capita; is an unobservable error term; is a vector of economic variables; is local government debt (in percent of GDP).

Since Kumar and Woo (2010) and Barro (1996) uses a similar panel regression model to analyze the impact of government debt on economic growth,

this paper will select a core set of explanatory variables that have been identified in previous literatures. The variables X in the baseline model specification are as follows: human capital, to reflect the notion that provinces with an abundance of knowledge are more likely have a greater chance of surpass other provinces in the domestic competition; social-economic factors such as population growth, inflation rate, provincial government expenditure growth, State-owned enterprise industrial output growth, and personal disposable income growth.

The econometric model introduced above is actually based on the neoclassical model, which identifies the factors of long-run economic growth. In the neoclassical model, labor and capital are the two key components of this model. Later on, technology also plays a key role in determining long-run economic growth. But new technology requires advanced knowledge in order for the technology to become fully applicable. As a matter of fact, knowledge is acquired through a long duration of education. The higher the education, the more efficient a worker will perform in the real world. Recently, more and more empirical and theoretical research illustrate that human capital plays a key role in determining economic growth. Nelson and Phelps (1966) use the experience of United States agriculture to support the evidence that better education leads to higher production level. The better educated farmer is quicker to adopt new technologies through different channels. He understands how the new technologies can help him to increase his output level since his education gives him ability to assess different ideas, and hence less likely to make errors. As a result, he will achieve a higher production level than other farmers.

Mincer (1981) and Barro (1996) identifies that investment in school education is a very essential component of human capital. Employers are willing to pay higher wages to workers who spend a lot of time and money to acquire proper skills and experience that required by the job. In addition, both Mankiw et

al (1992) and Barro (1996) include educational-attainment, which is the amount of students graduating from middle school, in his model to test whether education level has impact on economic growth. The empirical result from Barro (1996) indicates that an increase by 0.3 year of education increase the per-capita GDP growth by 0.2 percentage points per year. Mankiw et al (1992) use the percentage of working-age population that is in secondary school as a proxy to measure human capital. The empirical result from Mankiw et al (1992) also confirms the strong correlation between education attainment and economic growth. Countries with a higher level of education grow faster for a given level of initial per capita GDP. After China reopened universities after ten years of Cultural Revolution, the enrollment in higher institutions started to increase. Wang and Yao (2003) use different level of school enrollment rate as a proxy for human stock. They find that the accumulation of human capita was very quick from 1952 to 1999 and the empirical result confirms that it contributed significantly to grow and welfare. Thus, in this paper, we use the growth of higher education enrollment as an indicator of human capital.

Since this model has to use other economic determinants as control variables, we have to take in account of the other interesting characteristics reflecting on China's economic growth. Even though the theoretical growth studies have no conclusive evidence regarding the relationship between economic growth and trade openness, most empirical studies illustrate that a country with a more open trade policy will likely experience high economic growth. Barro (1991) Yanikkaya (2003) and Rodriguez and Rodrik (2001) use empirical evidence to show that there is a significant correlation between a country's trade growth rate and economic growth. An improvement in trade growth stimulates and expands domestic output. If a country uses its comparative advantage to produce product with lower opportunity cost and trade with another country, it can result in more

efficient use of its scarce resource and reach higher standards of living (Ball and McCulloch, 1996). Most coastal cities in China have achieved high levels of economic growth due to high trade volume since Deng Xiaoping opened China's economy to the world in 1989. Thus, trade growth is definitely an important variable in this model. In this paper, we calculate the growth of trade (sum of import and export) in each province starting in 1994.

Based on economic theory, unexpected inflation has three main costs to the society. First of all, unexpected inflation leads to wealth redistribution. In particular, the wealth of creditors may pass to debtors after unexpected inflation. Second, uncertainty about future price levels is likely to distort consumption, saving, borrowing and investment. In addition, variability of inflation has some significant impact on wages. For instance, variable inflation causes risk-averse workers to increase wage levels incorporated with premium, which serves as insurance to against rising price in order to maintain the current lifestyle. This will push up both nominal and real wages. Increase in nominal wage adds up the production cost of producers, and thereby causes the overall price level in the society to increase because producers are demanding higher price levels to compensate their costs (Briault, 1995) (Sidrauski, 1967). However, unexpected rising price in consumer goods may cause people to scale back their consumption. Once aggregate demand falls, investment will decrease. Thus, theoretically, high inflation has negative effect on economic growth. However, empirically, Barro (1996) only finds some country experience economic downturn after inflation level reaches certain level. According to Barro (1996), for a given rate of inflation, the variability of inflation has no significant relationship with economic growth. In this paper, we are not going to concentrate on this variable since inflation rate in the model above is only a control variable.

High population growth has been found to have a detrimental effect

on growth. If the population is growing, a part of the economy's investment is allocated to provide capital for new workers (Barro, 1996). The empirical evidence, provided by Barro (1996), confirms that the relationship between population growth and economic growth is negative. In this paper, population growth is only used as a control variable in the model. We still expect the coefficient of this variable to be positive.

The last two economic variables, industrial output growth and infrastructure investment ratio, are very important variables to explain China's economic growth. After the market reform in 1980, China's economy started to take off mainly due to urbanization and investments in fixed assets. In this paper, we use these two variables as control variables.

IV. Data and facts

Since it is hard to find accurate data on China's local government debt due to the opaque governance in China, it is necessary to find a proxy number for the amount of debt at local level. Because provincial short-term loans, as noted in previous section, are the best variables to represent local government debts, we will use this as the proxy for debt. Based on the table 2, the growth of provincial loans from state-owned banks especially in Northern provinces has increased dramatically over the past eleven years due to boom in housing market. As we can see from the table, the total amount of short-term loans borrowed by Shanxi, a resource-rich province in Northern China, was only 802 million yuan (133 million US dollar), but in 2010, the amount of short-term loans went up to 9634 million yuan (1605 million US dollar). The 110% increase in short-term loans in Shanxi province over the past thirteen years is just a tip of iceberg among all the local governments in China. Provinces in Southern China such as Hubei, as shown in Table 3, experienced a 200% increase in short-term loans over the past 17 years.

Thus, provincial short-term loan is the best proxies to represent local government debt (China's statistical yearbook).

Another proxy used in this paper is educational achievement, which represents human capital. Since many previous theoretical models of economic growth such as those of Barro (1991), Mincer (1981), and Nelson and Phelps (1966) use educational achievement to serve as a proxy for human capital, this paper will emulate the same proxy used in those studies. Data from China's annual statistical yearbook indicates that student enrollments in higher education have increased dramatically since the end of Cultural Revolution in 1979. For instance, the total of students enrolled into higher institutions in Anhui, one of the poorest provinces in China in 1979, was only 294000. Thirty-two years later, the number of higher institution students reached 990,000 in 2011. Not only has Anhui experienced this tremendous increase in human capital, but other provinces, which had the same economic growth level as Anhui in 1979, also have enlarged its human capital over the past 30 years. The increase in stock of human capital in most provinces in China indicates that the local governments have invested a lot of their funds to improve educational level in China. As a result, this paper will use student enrollments in higher education as a proxy to represent human capital.

Other key variables such as population growth, inflation rate, trade growth, government expenditure, disposable income growth, State-owned enterprise output growth, and infrastructure investment in percent of GDP are obtained from the China's Statistical Yearbook from 1994 to 2011. The main analysis is based on a panel of 31 provinces for the period 1994-2011. The data for infrastructure investment implies that China's economy is strongly dependent on government's infrastructure investments such as bridges and highways. For example, Beijing experienced a 17% annual increase in infrastructure investment from 1997 to 2011. At the same time, Beijing's annual real GDP growth reached

almost 14% before 2007. The fast economic growth in Beijing is also happening in other provinces especially those are heavily dependent on infrastructure investments.

Fitted Line: Growth=0.177-0.0364 local loan, where the loan coefficient is significant at 1%
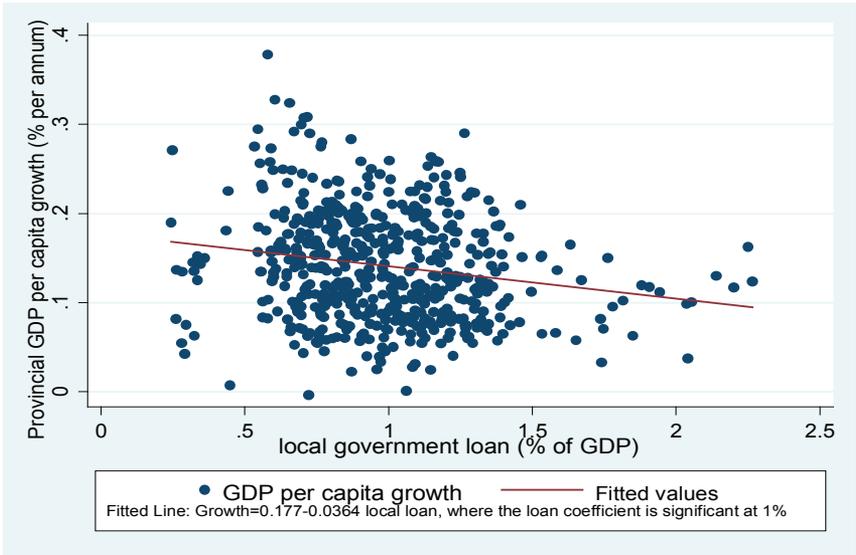
       Data on local government debt and growth clearly show that there is a negative correlation between government debt and growth of real per capita GDP. Figure shows a scatter plot of local government debt against subsequent growth of real per capita GDP over seventeen-year periods in the full sample. According to the OLS fitted line, the coefficient of local government debt is -0.036. Taken at face value (i.e., ignoring the potential endogeneity problem, and not controlling for other growth determinants), it suggests that a 10 percentage point increase in local government debt-to-GDP ratio is associated with a slowdown in per capita GDP growth of 0.36 percentage points. This result is quiet consistent with the similar result shown in Kumar and Woo (2010).

V.   Estimation Strategy

As noted above, this paper intends to fill up the research gap by analyzing the impact of China's local government debt on economic growth empirically. However, one of the most challenging obstacles facing this paper is to find an array of potential economic determinants, which can be used as control variables to explain economic growth. Even though Barro (1996) identifies an array of potential economic determinants by regressing output growth on an array of potential determinants, many variables he used in the paper cannot address the concern of robustness. By solving this issue, recent studies such as Sala-i-Martin et al (2004) focus on selecting the core set of growth determinants.

Sala-i-Martin et al (2004) uses Bayesian Averaging of Classical Estimates, which constructs estimates by averaging ordinary least squared coefficients across models, to conduct regressors selection, which can best explain economic growth. Of all 67 explanatory variables, they find 18 to significantly and robustly partially correlated with economic growth and another three variables to be marginally related. Among the 18 variables, there are a few economic variables such as share of government consumption in GDP, primary school enrollment, trade openness, and the average price of investment goods. The rest of the variables relates to socio-political factors such as fraction of population Confucian, which used to explain the economic growth in East Asia.

This paper also consider a variety of estimation methodologies, such as pooled OLS, random effect (RE), fixed effects (FE) panel regression, and GLS regression. Each of estimation method has a trade-off. Although one method corrects one particular econometric problem, it sometimes can lead to a different type of bias. For example, the slope coefficients from pooled OLS regression sometimes have the expected signs and the value is reasonably high. It also assumes that the slope coefficients of the X variables are all identical for all the

provinces. Obviously, there are restricted assumptions for OLS regression. Thus, the pooled regression may distort the true picture of the relationship between Y and the X's across the 31 provinces in China. One way to take into account the individual characteristic of each province is to let the intercept vary for each company but still assume that the slope coefficients are constant across provinces (Gujarati, 2003).

In addition, OLS regression sometimes encounters the presence of heteroscedasticity because the usual OLS method does not follow this strategy and thus does not make use of the "information" contained in the unequal variability of the dependent variable Y. In this case, generalized least squares (GLS) takes such information into account explicitly and is therefore capable of producing estimators that are best linear unbiased estimators (BLUE) (Gujarati, 2003).

VI.   Empirical results

This section reports econometric results estimating cross-province GDP per capita growth rates in China. Five regressions are run on 557 observations with 17 years of time span. Among the 31 provinces in China, autonomous regions inhabited by different ethical groups such as Yunnan and Guangxi are under direct control of central government. Also, municipalities such as Shanghai and Beijing are under the authority of central government.

The main results for local economies are presented in Table 1. Columns 1-5 show that the coefficients of local government debt are negative and are significant at the 1 percent level besides Column 1, with their values ranging from -0.022 to -0.047 across the various estimation techniques. The ordinary least squares (OLS) estimation in Column 1 suggests a 10 percentage points of GDP increase in local government debt is associated with a slowdown in growth in real GDP per capita of around 0.24 percent per year. The random effect (RE) and

general least square (GLS) in Columns 4 and 5 yield the same result. Even though the FE estimate of debt coefficient in Column 3 is somewhat larger than other estimates, it is still significant at 1 percent level. Also, the goodness of fit is quite promising, with an adjusted ranging from 0.63 for FE estimation to 0.8 for OLS estimation.

The coefficients on other explanatory variable (trade growth, government expenditure growth, disposable income growth, industrial output growth and investment in infrastructure to GDP ratio) are of the expected sign and mostly significant at 1% percent level across different estimation techniques. However, the coefficient for inflation is inconsistent with Barro's theory that inflation has negative effect on economic growth because in China's case, inflation tends to have positive effect on economic growth. Besides OLS estimation, all other estimations for inflation are significant at 1%.

After running test on heteroskedasticity given by Breusch-Pagan test, which tests the null hypothesis that the variance of the residuals is homogenous. Since the p-value is very small in this OLS regression, we would have to reject the hypothesis and accept the alternative hypothesis that the variance is not homogenous. Besides test on heteroskedasticity, we also conduct test on Multicollinearity. We use VIF, variance inflation factor, to test whether the OLS has strong multicollinearity. As a rule of thumb, a variable whose VIF values are greater than 10 may merit further investigation. In this case, the VIF and tolerance (1/VIF) value for yeardum2 is worrisome. However, since yeardum2 is a dummy variable control for year, the high VIF is negligible.

At last, model specification is final test we conduct on this OLS regression. A model specification error can occur when one or more relevant variables in the model. If relevant variables are omitted from the model, the common variance they share with included variables may be wrongly attributed to those variables,

the error term is inflated. We first use a link test command performs a model specification link test for single-equation models. We will be looking at the p-value for **_hatsq,** which stands for the variable of squared prediction**.** If the model is specified correctly, the squred predictions should not have much explanatory power. That is we would not expect the variable of squared prediction to be a significant predictor if the model is specified correctly. In this case, the p-value for _hatsq is 0.256. It indicates that the linktest has failed to reject the assumption that the model is specified correctly. Thus, it seems to us that we do not have a specification error. But now, we will conduct another test before we jump to the conclusion. After running ovtest, the test result indicates there is small probability that the model has omitted variables since p-value, 0.0483, is close to 0.05. The model may have specification bias, but both ovtest and linktest indicate the bias is not significant enough to be considered as problem.

Since the dataset for this regression model is a panel data, we have also run a panel regression with fixed effects. The result is similar to OLS regressions, but more variables become statistically significant. The coefficient of debt is negative and significant at 95 percent of confidence interval. Also, the coefficient of -0.026 for FE is still in a similar range with OLS. Besides running fixed effect regression, we also consider random effect regression. After running a Hausman test to test decide between fixed or random effects. The null hypothesis is that the preferred model is random effects vs. the alternative the fixed effects. It basically tests whether the unique errors are correlated with the regressors, the null hypothesis is they are not. Since the p-value is less than 0.05, we can conclude that we should consider fixed effect regression as the best choices for panel regression.

After running heteroskedasticity test for FE, the test results still indicates that the model has strong heteroskedasticity. Also, the Lagram-Multiplier test for serial correlation also indicates that the model has strong serial correlation. As a

result, in order correct both heteroskedasticity and serial correlation, general-least squares model is considered. The coefficient for debt in GLS regression is still significant with a correct sign.

VII.   Conclusion

Given the empirical evidence on the impact of debt on economic growth for a panel of 31 provinces in China over the period of 1994-2011, we can conclude that local government debt in China does have significant impact on China's economic growth. The results, based on a range of econometric techniques, suggest an inverse relationship between debt and economic growth, controlling for other determinants of growth: on average a 10 percentage point increase in the debt-to-GDP ratio is associated with a slowdown in annual per capita GDP growth of around 0.23 percentage points per year.

Although econometric model cannot provide a concrete result that China has already in a fiscal crisis, the negative correlation between debt-to-GDP ratio and economic growth suggests that if local governments in China continue the current spending path without considering any future consequences, local government debt eventually will follow the path of Greece and other countries with high government debts.

Table 1. Panel Regression-Growth and Local Government Debt, 1994-2011

Sample: 31 Provinces in China
Dependent Variable : Provincial Real per Capita GDP Growth

Explanatory Variables	OLS (1)	Panel Regression (2)	FE (3)	RE (4)	GLS (5)
Population growth	-0.024	-0.045	-0.023	-0.045	-0.045
	-0.037	-0.047	-0.048	-0.047	-0.046
Debt to GDP ratio	-0.022*	-0.027**	-0.042**	-0.027**	-0.027**
	-0.009	-0.005	-0.011	-0.005	-0.005
Inflation rate	0.018	0.205**	0.219**	0.205**	0.205**
	-0.084	-0.05	-0.05	-0.05	-0.049
Trade growth	0.013*	0.041**	0.042**	0.041**	0.041**
	-0.006	-0.006	-0.006	-0.006	-0.006
Higher institution student enrollment growth	-0.033	-0.117**	-0.129**	-0.117**	-0.117**
	-0.036	-0.021	-0.021	-0.021	-0.021
Government expenditure growth	0.077**	0.032	0.02	0.032	0.032
	-0.022	-0.024	-0.025	-0.024	-0.024
Disposable income growth	0.161**	0.523**	0.507**	0.523**	0.523**
	-0.041	-0.029	-0.029	-0.029	-0.028
Industrial output growth	0.027**	0.032**	0.027*	0.032**	0.032**
	-0.01	-0.012	-0.012	-0.012	-0.012
Investment in infrastructure to GDP ratio	0.082**	0.050**	0.053**	0.050**	0.050**
	-0.015	-0.012	-0.013	-0.012	-0.012
Constant	-0.012	0.082**	0.103**	0.082**	0.082**
	-0.017	-0.01	-0.015	-0.01	-0.01
Observations	557	557	557	557	557
R-squared	0.8		0.63		
Number of Province Name		31	31	31	31
Standard errors in parentheses					
+ significant at 10%; * significant at 5%; ** significant at 1%					

	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Liaoning	Jilin	Heilongjiang
1994	1,428.95	927.05	1,310.16	802.06	674.37	2,412.02	1,099.77	1,396.60
1995	1,779.05	1,113.95	1,578.21	1,223.11	819.87	2,881.80	1,302.76	1,636.80
1996	2,082.83	1,357.38	1,894.66	1,420.11	1,002.98	3,556.74	1,608.84	1,909.80
1997	2,720.68	1,502.91	2,372.15	1,524.98	1,172.17	3,980.29	1,913.61	2,381.10
1998	3,326.57	1,629.12	2,795.20	1,741.79	1,318.75	4,439.65	2,118.79	2,702.90
1999	4,007.76	1,825.26	3,038.32	1,909.21	1,364.17	4,833.76	2,580.41	3,103.94
2000	5,944.60	1,863.60	2,933.19	2,453.15	1,340.74	5,195.56	2,651.18	3,145.10
2001	7,205.99	2,159.86	3,098.89	2,408.40	1,470.75	5,597.40	2,828.25	3,358.60
2002	9,230.78	2,519.04	3,488.18	2,903.18	1,649.78	6,247.40	3,057.70	3,624.00
2003	11,343.28	3,426.02	3,854.72	3,552.29	1,924.13	7,222.30	3,288.87	3,981.30
2004	13,577.45	3,821.38	6,152.20	4,016.12	2,239.76	7,753.00	3,435.02	4,038.90
2005	15,335.50	4,722.38	6,415.20	4,328.90	2,588.57	7,958.05	3,401.30	3,658.50
2006	15,486.90	5,106.94	7,411.88	4,788.51	3,205.19	9,117.20	3,870.30	3,971.90
2007	17,360.20	6,131.63	8,397.82	5,394.47	3,767.74	10,403.88	4,306.00	4,256.40
2008	19,431.08	7,277.46	9,453.30	5,960.33	4,527.86	11,794.60	4,835.89	4,532.70
2009	24,805.10	10,513.44	13,123.80	7,814.74	6,292.52	15,549.60	6,234.70	5,988.30
2010	28,748.10	12,864.75	15,755.74	9,634.32	7,919.47	18,689.80	7,205.94	7,230.50
2011	33,367.00	15,242.20	18,144.00	11,169.35	9,727.70	21,621.00	8,122.41	8,548.70

	Hubei	Hunan	Guangdong	Guangxi	Chongqing	Sichuan	Guizhou	Yunnan
1994	1,396.82	1,263.11	4,339.76	835.53	596.96	2,218.14	421.07	684.68
1995	1,750.41	1,494.03	5,495.69	1,055.67	755.39	2,804.16	513.41	924.67
1996	2,273.20	1,880.94	6,319.77	1,203.41	913.93	3,359.54	610.51	1,194.51
1997	2,979.33	2,123.00	8,195.83	1,423.48	1,156.13	2,948.15	761.88	1,496.95
1998	3,500.36	2,274.41	9,523.56	1,516.49	1,358.61	3,151.74	840.63	1,713.97
1999	3,528.13	2,408.36	10,934.76	1,719.19	1,611.68	3,924.16	899.83	1,824.04
2000	3,493.91	2,403.39	11,636.25	1,613.25	1,881.29	4,053.46	1,064.82	1,987.83
2001	3,787.25	2,787.92	13,093.72	1,764.05	1,871.98	4,498.55	1,212.23	2,173.45
2002	4,312.79	3,227.46	15,206.62	1,941.07	2,244.72	5,158.76	1,403.92	2,418.48
2003	5,000.74	3,796.31	18,190.85	2,320.66	2,774.81	5,910.59	1,714.04	2,955.57
2004	5,377.43	4,258.03	19,491.77	2,759.65	3,246.28	6,475.92	2,020.04	3,398.29
2005	5,649.67	4,590.03	23,261.21	3,056.86	3,719.52	6,743.00	2,303.90	3,987.58
2006	6,430.44	5,173.87	23,182.16	3,595.25	4,388.28	7,833.32	2,696.11	4,803.51
2007	7,496.46	6,037.40	26,776.12	4,287.79	5,131.69	9,200.93	3,128.63	5,671.66
2008	8,465.64	6,989.42	30,224.01	5,066.68	6,320.81	11,163.39	3,569.27	6,594.33
2009	11,659.37	9,369.81	38,893.06	7,268.41	8,766.06	15,680.33	4,656.50	8,779.63
2010	14,136.58	11,303.76	47,191.56	8,867.52	10,888.15	19,129.79	5,747.50	10,568.78
2011	16,395.39	13,186.68	53,411.83	10,408.54	13,001.39	22,033.21	6,841.92	12,114.59

Bibliography

Beamish, Freya. "Korea, Hong Kong, and Taiway: and the winner is?" *Lombard Street Research Montly Review* 279 (2012): 24.

Choyleva, Diana. "China's "shadow" banking shenanigans." *Lombard Street Research Monthly Review* 272 (2011): 22.

—. "China's banks- a disaster waiting to happen." *Lombard Street Research Monthly Review* 276 (2012): 26.

—. "China's challenge: letting the 'invisible hand' boost consumption." *Lombard Street Research Monthly Review* (2010): 31.

Dalio, Ray. *An In-Depth Look at Deleveraging*. Monthly presentation. London: Bridgewater, 2012.

Eichengreen, Barry, Donghyun Park and Kwanho Shin. "When Fast Growing Economies Slow Down: International Evidence And Implications for China." *NBER Working Paper Series* (2011): 1-50.

Elmendorf, Douglas W. and N. Gregory Mankiw. "Government Debt." *Handbook of Macroeconomics* (1998): 1-73.

Fan, Bonai, et al. "Government Waste in China: Situation, Causes, and Countermeasures." *JSTOR* (2010): 684-708.

Forsythe, Michael. "Bloomberg ." 18 December 2011. *China Debts Dwarf Official Data With Too-Big-to Finish Alarm.* 09 December 2012.

Mackenzie, Kate. "Financil Times." 21 December 2011. *China's worried local government.* 09 December 2012.

Reinhart, Carmen M. and S. Kenneth Rogoff. "Growth In A Time of Debt." *NBER Working Paper Series* (2010): 1-26.

Roubini, Nouriel. "Project Syndicate." 13 September 2012. *Fiddling at the Fire .* 9 December 2012.

Shirakawa, Masaaki. "Deleveraging and Growth: Is the Devloped World Following Japan's Long and Winding Road?" *Lecture at the London School of Economics and Political Science*. London: Bank of Japan, 2012. 24.

Standard & Poor's Ratings Services. "Asia-Pacific Banking Outlook in 2012." *S&P Monthly Outlook* (2012): 10-68.

Stein, Gabriel. "Beijing's false analogy with Japan." *Lombard Street Research Monthly Review* 257 (2010): 13.

Taylor, Michael. "Is a Japanese sovereign deby crisis inevitable?" *Lombard Street Research Montly Review* 280 (2012): 16.

—. "Korea and Japan-reflating and deflating." *Lombard Street Research Monthly Review* 249 (2009): 15.

Walter, Carl E. and Fraser J. T. Howie. *Red Capitalism: The Fragile Financial Foundation of China's Extraodinary Rise*. Singapore: John Wiley & Sons, 2011.

Woo, Jaejoon and S. Manmohan Kumar. "Public Debt and Growth." *IMF Working Paper* (2010): 1-47.

Yerxa, Gavin. "Project Firefly." 11 December 2011. *Is local government debt a serious threat to the Chinese state.* 9 December 2012 .

Zhu, Ze. *Essays on China's Tax System*. PhD Thesis. Rotterdam: Erasmus University , 2007.