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ACCOUNTING FOR CHINA'S SAVING-INVESTMENT IMBALANCE FROM 2002–2008

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This paper decomposes and analyzes China's saving-investment imbalance (equivalent to current account imbalance) from 2002–2008. We first use the *Flow of Funds Accounts* to calculate the saving and investment rates (propensity) of the household, corporate and government sectors and to evaluate their relative contribution to the aggregate saving-investment surplus. The results indicate that the increase of saving-investment surplus can be attributed to the steady increase of saving by the household and government sectors and the short-term downsizing of investment by the corporate and government sectors. We then use more disaggregate supplementary datasets to explore the factors behind the evolution of the saving and investment rates for the three sectors. The rise of the household saving rate mainly sources from the urban sector. The corporate saving rate experienced a steady increase because of the rise of profitability. Government macroeconomic policies have had a strong influence on the saving and investment patterns of the corporate and government sectors.

JEL Codes: E21, E22, G21

Keywords: flow of funds accounts, investment, imbalance, saving

I. INTRODUCTION

China's skyrocketing current account surplus has drawn the attention of many economists over the past decade. The surplus was slightly below 2 percent of GDP from 1997–2001, but then rose strikingly to an unprecedented level of more than 10 percent, beginning to decline only after the global financial crisis in 2007. According to the national income identity, the current account imbalance can be alternatively defined as the gap between national savings (S) and domestic capital formation (I). That is, the national product that is not consumed or invested domestically must be equal to the net purchase of the rest of the world.

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Therefore, the central question regarding China's current account imbalance is why China's saving-investment pattern experiences such dramatic change.

There have been numerous studies trying to explore the reasons for China's rising saving-investment imbalance; however, most of them stress the importance of the saving rate and usually focus on one specific sector. From the household perspective, Modigliani and Cao (2004), Horioka and Wan (2007), Du and Wei (2010), Zhang and Wei (2011) propose that demographic characteristics have significant explanatory power in understanding China's increasing household saving rate. Blanchard and Giavazzi (2005) and Chamon and Prasad (2010) argue that the uncertainty related to China's social security and pension system has caused Chinese households to save as a precaution. From the corporate perspective, Song *et al.* (2011) argue that the financial depression in China has caused the rapid growth of corporate saving, which in turn has contributed to China's rising current account. Jin (2013) proposes that the developing countries such as China are characterized by labor-intensive industries and thus has less capital demand in the corporate sector, which drives capital outflow to the developed countries. From the government perspective, the net saving rate of the government is also regarded as an important factor to explain the current account surplus (usually termed "twin-deficit" or "twin-surplus" theory). Though this perspective is less frequently indicated as an important driving force of the current account imbalance in China, it is widely accepted in the literature, for example, Sachs and Wyplosz (1984), De Gregorio and Wolf (1994), Kim and Roubini (2001)[1].

Although identifying the aforementioned factors is important for understanding the mechanisms that give rise to the fluctuation of the current account, it is still not enough to present a complete picture explaining China's saving-investment pattern. In reality, these factors may work simultaneously and interactively in determining the current account. To comprehensively assess and predict the pattern of the current account, we need to decompose the aggregate saving and investment of each sector, evaluate their relative importance and analyze how they interact with each other to affect China's current account fluctuation. This is the focus of our paper.

We try to analyze China's saving-investment imbalance using *The Flow of Funds Accounts (FFA)* data. By explicitly analyzing the saving and investment pattern from 2002–2008, we find that the steady increase of the gross saving rate, together with the short-term decline of the gross investment rate, jointly contribute the enlargement of China's saving-investment gap. In particular, while China's gross saving rate grew steadily from 2002–2008, the gross investment rate declined in 2004–2005 and 2006–2007, driving up the jump in current account during the two specific periods. Further by-sector decomposition indicates that the household, corporate and government sectors contribute in different ways to the overall saving-investment imbalance. The saving rate in the household and government sectors experienced more significant increase than the corporate sector. The investment rate of the corporate and government sectors exhibited large fluctuation in response to the government's macroeconomic policy during the period, while the investment rate of the household sector was more stable.

[1]In addition, Chen and Yao (2011) find that the government sector's infrastructure investment plays an important role in raising China's saving rate.

We then use supplementary datasets to explore the factors behind the evolution of the saving and investment rates for the three sectors. First, the rise in the household saving rate is mainly sourced from the urban sector. Household investment, which primarily consists of real estate purchase, was stable despite the rapid increase of housing prices in the urban sector. Second, the corporate saving rate experienced a steady increase because of the steady increase of corporate profitability, but corporate investment experienced dramatic fluctuation during the period because of government macroeconomic policies. Small firms show larger net saving rates than large firms, justifying the effect of financial constraints on internal savings, which echo the argument of Song *et al*. (2011). Third, the rise of budget revenue, net social insurance revenue and land leasing revenue are the three main factors that jointly lead to the increase of the saving rate in the government sector. Government investment propensity also fluctuated heavily in response to the macroeconomic business cycle and the government policy adjustment.

This is not the first paper to bridge from the micro saving and investment mechanisms to the macro current account pattern. In a series of papers, Ma and Yi (2013, 2010) and Ma *et al.* (2012, 2013) calculate the sectoral saving and investment rate using the FFA data, and analyze the causes of China's rising saving and investment rate.[2] Our paper adds to the literature in the following four aspects. First, we further decompose the saving/investment rate into saving/investment propensity and the income share of each sector. The former measure is better for understanding each sector's microeconomic behavior, while the latter is associated with a country's income distribution. Second, though Ma and Yi (2013, 2010) and Ma *et al.* (2012, 2013) have identified a large number of important factors explaining China's high saving and investment rate patterns, most of them are medium-to-long term factors. Thus, they do not explicitly explain why the saving rate substantially exceed the investment rate during 2004–2007. In this paper, we show that, the saving of the household and government sector increased steadily in this period, but the investment of the corporate and government sectors fluctuated remarkably largely due to the change of government's macroeconomic policy. The sharp rise in saving-investment surplus in China thus resulted from the steady increase of saving rate along with the short-term downsizing of investment rate. Third, except for using the FFA dataset, we also use some more disaggregate datasets to analyze the factors that underlie the rise of saving and investment propensity. Fourth, we adopt a more accurate method to adjust for the "Acquisition Less Disposals of Other Non-financial Asset" item of the flow of funds table, which is unusually large in China's context and have significant influence on the income distribution across three sectors.

This paper has important implications for our understanding of China's current account imbalance. China's current account surplus has become global economic attention during 2004–2007 when the investment rate lagged behind the rising saving rate. However, most existing studies focus on the medium-to-long term factors, such as financial underdevelopment (Song *et al*., 2011), sex ratio

[2]Hung and Qian (2013) use cross-country panel data and find low elderly dependency, a low urbanization rate, strong economic growth and a weak social safety largely explain China's high overall saving rate. However, they do not demonstrate which sector contributes most to the overall saving rate and do not investigate why China's investment rate climbs with its rising saving rate.

(Du and Wei, 2010; Wei and Zhang, 2011), and industrial structure (Jin, 2013). These factors can hardly vary within a period as short as four years. Compared with the existing studies, our paper shows that the dramatic rise in China's saving-investment surplus is mostly associated with the short-term downsizing of investment of the corporate and government sector, which is to a large extent driven by the government counter-cyclical policies. During 2004–2007, the Chinese government took various tightening measures to mitigate the potential risk of economic heating, which downsized both corporate and government investment rate. Because the counter-cyclical policies were in essence short-term, there would have been no doubt that China's current account surplus would come back to normal interval afterwards.

The rest of the paper is organized as follows. In Section 2, we decompose sectoral savings and investments using FFA data. Section 3 further explores the factors that contribute to sectoral saving and investment using supplementary datasets. Section 4 concludes.

2. Decomposition Using Flow of Funds Account Data

2.1. *Data Source and Measurement*

To assess the macro-level saving and investment pattern in China, we mainly use the physical transaction part[3] of FFA data from 2002–2008. Regarded as an extension of the GDP account, the FFA provides information on the flow of funds across domestic sectors as well as between domestic and foreign sectors. In particular, the physical transaction part of the FFA records the source and use of the funds as well as its direction and the state of balance in the household, non-financial, government, financial and foreign sectors, making it the best suitcase for the study of saving and investment issues.

The National Bureau of Statistics of China publishes the FFA with a four-year lag policy, and the most recent data available for analysis cover the period from 1992–2010. Because the focus of our paper is to explain the current account rise period and also to avoid the influence of the financial crisis, we selected the period from 2002–2008 as our sample.

For analyzing the domestic saving and investment patterns as well as their relationship with the current account imbalance, we focus on the transactions of the household, non-financial corporate and government sectors. The three sectors account for 98 percent of China's disposable income. The financial sector is important because it can affect the behavior of the previous three sectors, but the sector itself only contributes less than 2 percent of the total disposable income. Thus, we do not analyze the saving and investment behavior of the financial sector on its own, but focus on its interactions with the other sectors in Section 3. The transactions between the domestic and foreign sectors is a residual term of the other four sectors. Once the saving and investment of the other sectors have been pinned down, the foreign transactions can be obtained mechanically.

[3]Another part of the FFA is the financial transaction section compiled by the People's Bank of China (PBoC).

However, the scope and classification of the FFA varies from country to country depending on the development of the SNA and the overall macroeconomic regime. One particular caveat of the FFA data in China is the item "Acquisition Less Disposals of Other Non-financial Asset" (ALDONA). Internationally, the item is particularly small and comprises three types of non-produced non-financial assets: natural resources, contracts leases and licenses, and goodwill and marketing assets (SNA, 2008). For example, this item accounts for approximately 0.4 percent and 0.2 percent of the sector's disposable income in the USA and EU countries, respectively. However, this item in China is sourced from local government leasing of urban construction land (China Statistics Yearbook, various years)[4], making it particularly large, accounting for 14.97 percent of the disposal government income and 7.79 percent and 1.83 percent of the corporate and household income, respectively. As land leasing is one of the most important parts of the Chinese government's *actual* fiscal revenue and Chinese corporate sector's *actual* investment expenditure, ignoring them will, to a large extent, overestimate the income of the corporate sector and underestimate the income of the government sector in China's context. To accurately measure sectoral-level saving and investment behavior, we make an adjustment by subtracting *ALDONA* from corporate income and adding it back to government and household income.

We also apply the Modigliani-Cohn correction to the calculation of sectoral savings. This correction takes into account the inflation factor, which may work through the Fisher effect and possibly understate corporate interest payments and overstate household interest receipts. Following Ma and Yi (2010, 2013), we make the adjustment by adding corporate saving by the erosion in real corporate debt arising from inflation, which is approximated by a product of expected inflation and net corporate debt[5].

We can calculate the saving rate and saving propensity for each sector based on the FFA data. The saving rate is defined as sectoral saving divided by gross national income, while the saving propensity of each sector is defined as sectoral saving divided by sectoral disposable income. These two measures have different implications. Because the sum of the saving rate in all three sectors equals the aggregate saving rate, the sectoral saving rate can be directly used to evaluate the relative contribution of the three sectors to the total saving pattern. Saving propensity calculates the proportion of income that is allocated between current and future consumption and thus is more related to understanding the agent's microeconomic behavior. The relationship between the two measures can be characterized by the following equation:

[4]In China's urban land system, the corporate sector pays to the government and household sector to purchase the use of right of land. For instance, in 2008, the corporate sector paid around 768.5 billion RMB for land leasing. The government and household sectors can retain benefits of 361.2 billion and 407.2 billion, respectively.

[5]Expected inflation is measured as the two-year moving average of the GDP deflator. Net corporate debt is estimated as corporate loans outstanding less the sum of corporate deposits and half of the currency in circulation. Corporate loans are calculated as the sum of short-, medium- and long-term loans minus loans to households. We also assume that changes in corporate disposable income are accommodated fully by household disposable income only.

$$\begin{aligned} Sectoral\ saving\ rate &= \frac{sectoral\ saving}{gross\ national\ income} \\ &= \frac{sectoral\ saving}{sectoral\ income} \times \frac{sectoral\ income}{gross\ national\ income} \\ &= sectoral\ saving\ propensity \times sectoral\ income\ share \end{aligned}$$

It can be seen that the sectoral saving rate is equal to the product of sectoral saving propensity and sectoral income share. A rapidly increasing sectoral saving rate may arise because of an increase in sectoral saving propensity or a rise in sectoral income share.

Similarly, the investment rate of each sector is defined as sectoral investment divided by gross national income, and the investment propensity of each sector is defined as sectoral investment divided by sectoral income. The relationship between the two measures corresponds with the following equation:

$$\begin{aligned} Sectoral\ investment\ rate &= \frac{sectoral\ investment}{gross\ national\ income} \\ &= \frac{sectoral\ investment}{sectoral\ income} \times \frac{sectoral\ income}{gross\ national\ income} \\ &= sectoral\ investment\ propensity \times sectoral\ income\ share \end{aligned}$$

3. Results

The national saving rate, investment rate and saving-investment gap (current account surplus) are reported in Table 1. China's saving-investment surplus increased rapidly from 2002–2008. The surplus as a percentage of GDP was 2.4 percent in 2002 but increased dramatically to 10.4 percent in 2007. Moreover, the rise in surplus is more striking in two specific periods. The first period is from 2004–2005, when the surplus as a percentage of GDP increased by approximately three percentage points within one year. Another period emerges from 2006–2007, when the surplus increased by nearly four percentage points. In sum, two features characterize the rise in China's current account imbalance from 2002–2008: on the one hand, current account surplus exhibited a continual rise during this period; on the other hand, there were strong fluctuations in 2004–2005 and 2006–2007.

TABLE 1
China's Saving Rate, Investment Rate and Saving-Investment Gap

Year	Saving Rate	Investment Rate	Saving-Investment Gap
2002	39.1%	37.8%	2.4%
2003	41.4%	40.9%	2.4%
2004	44.2%	42.8%	3.0%
2005	45.9%	41.2%	5.8%
2006	47.2%	42.1%	6.5%
2007	49.8%	40.9%	10.4%
2008	50.2%	43.2%	9.0%

Source: China Flow of Funds Account 2002–2008, authors' calculation.

TABLE 2
SAVING RATE, INVESTMENT RATE AND SAVING-INVESTMENT GAP IN EACH SECTOR

	Household			Corporate			Government		
Year	Saving Rate	Investment Rate	Saving-Investment Gap	Saving Rate	Investment Rate	Saving-Investment Gap	Saving Rate	Investment Rate	Saving-Investment Gap
2002	16.9%	8.9%	8.0%	16.2%	22.5%	−6.3%	6.0%	6.4%	−0.4%
2003	17.0%	9.7%	7.3%	15.6%	23.7%	−8.1%	8.8%	7.5%	1.3%
2004	18.0%	8.4%	9.6%	19.3%	28.4%	−9.1%	7.0%	6.0%	1.0%
2005	19.5%	9.3%	10.2%	19.3%	26.3%	−7.0%	7.2%	5.6%	1.6%
2006	20.7%	9.4%	11.3%	15.7%	27.3%	−11.6%	10.8%	5.4%	5.4%
2007	21.7%	8.5%	13.2%	17.7%	27.2%	−9.5%	10.4%	5.1%	5.3%
2008	22.3%	8.6%	13.7%	18.5%	29.0%	−10.5%	9.3%	5.6%	3.7%

Source: China Flow of Funds Account 2002–2008, authors' calculation.

To explore the driving force of the aforementioned two features of saving-investment imbalance, we further report the saving rate and investment rate separately in Table 1. From 2002–2008, China's gross saving rate increased steadily from 39.1 percent to 50.2 percent. The steady increase in the saving rate contributed a large proportion to the long-term expansion of the current account surplus. Contrary to the movement of the saving rate, the gross investment rate did not exhibit a sustainable upward trend, but had significant short-term fluctuations. From 2002–2004, the gross investment rate increased gradually from 37.8 percent to 42.8 percent, only slightly slower than the increase of the gross saving rate, thereby causing a marginal increase in the current account surplus. The increase of the gross investment rate began to slow down in 2005, while the gross saving rate continued increasing, thus accelerating the increase of the current account surplus in 2005. A similar combined driving force of rising savings and declining investment also led to the peak of the saving-investment imbalance in 2007.

We then decompose the aggregate saving and investment rates by each sector. As shown in Table 2, the saving rate of the household and government sectors increased steadily from 16.9 percent and 6.0 percent to 22.3 percent and 9.3 percent, respectively, during 2002–2008, and the saving rate of the corporate sector, though it exhibited large short-term fluctuations, remained nearly unchanged during the same period. We further break down the sectoral saving rate into sectoral saving propensity and sectoral income share. First, although the income share of the household sector decreased from 2002–2008, the saving propensity of the household sector increased drastically by 11.4 percentage points, leading to the steady rise in the household saving rate. Second, the saving propensity of the corporate sector, defined as the ratio of savings to disposable income, always remains 100 percent[6], and the income share of the corporate sector remains nearly constant during the same period. Thus, the saving rate of the corporate sector is quite stable from 2002–2008. Third, both the income share and the saving

[6]According to the FFA, corporate savings equals the value added minus labor compensation, production taxes, net asset payments and net transfer payments. Total corporate savings is always equivalent to the sectoral "total disposable income", where final consumption does not take place.

TABLE 3
Decomposition of Saving and Investment Rate in Each Sector

	Household			Corporate			Government		
Year	Saving Propensity	Investment Propensity	Income Share	Saving Propensity	Investment Propensity	Income Share	Saving Propensity	Investment Propensity	Income Share
2002	27.8%	14.7%	60.6%	100.0%	138.6%	16.2%	27.5%	29.1%	22.0%
2003	29.0%	16.6%	58.6%	100.0%	151.8%	15.6%	36.8%	31.6%	23.9%
2004	30.8%	14.4%	58.4%	100.0%	147.0%	19.3%	33.5%	29.0%	20.8%
2005	33.5%	16.0%	58.1%	100.0%	136.4%	19.3%	33.7%	26.5%	21.2%
2006	35.6%	16.2%	58.0%	100.0%	174.2%	15.7%	43.8%	21.9%	24.7%
2007	38.1%	14.9%	57.0%	100.0%	153.9%	17.7%	43.9%	21.7%	23.6%
2008	39.2%	15.1%	56.9%	100.0%	156.4%	18.5%	41.7%	25.2%	22.4%

Source: China Flow of Funds Account 2002–2008, authors' calculation.

propensity of the government sector increased steadily, causing the government saving rate to gradually move upward.

Similarly, we can break down the movement of the investment rate into sectors. The investment rate of both the corporate and government sectors increased slowly from 2002–2008, though the rate showed a temporary decline during 2004–2005 and 2006–2007, corresponding with the two peaks of the current account surplus. Most of the time, the investment rate of the household sector remained nearly unchanged, except for the periods 2003–2004 and 2006–2007, when it declined by nearly 1 percent. We then decompose China's sectoral investment rate into sectoral investment propensity and sectoral income share. The results are also shown in Table 3. Similar to the saving rate pattern, the household investment propensity remained roughly constant. However, the investment propensity of the corporate sector and the government sector exhibited large fluctuations in this period. The investment propensity of the corporate and government sectors declined drastically during 2004–2005 and 2006–2007.

Moreover, as sectoral investment is typically an important driving force for sectoral savings, it is particularly interesting to investigate the net savings of each sector. As is shown in Table 2, the net saving rate of the household sector is always positive and exhibited an increasing trend from 2002–2008. The net saving rate of the government sector is weakly negative in 2002, but afterward started to rise dramatically and reached high levels of 5.4 percent and 5.3 percent in 2006 and 2007 before decreasing to 3.7 percent in 2008. Finally, while the investment rate always exceeded the saving rate in the corporate sector, it does not quickly catch up with the growth rate of the net saving rate in the other two sectors; thus, the aggregate saving-investment imbalance expanded. A more detailed by-sector analysis of the possible reasons for the net saving patterns will be presented in Section 3.

4. Sectoral Characteristics of China's Saving-Investment Imbalance

To explore the mechanisms behind the saving and investment patterns for household, corporate and government sectors, in this section, we use several disaggregate datasets to investigate the underlying characteristics of each sector.

TABLE 4
THE SAVING PROPENSITY OF URBAN AND RURAL HOUSEHOLDS

	Urban Household Disposable Income (Yuan)	Rural Household Disposable Income (Yuan)	Urban Household Consumption (Yuan)	Rural Household Consumption (Yuan)	Average Urban Household Saving Propensity	Average Rural Household Saving Propensity
2002	7703	2476	6030	1834	21.72%	25.93%
2003	8472.2	2622.2	6510.94	1943.3	23.15%	25.89%
2004	9422	2936	7182	2185	23.77%	25.58%
2005	10493	3255	7943	2555	24.30%	21.51%
2006	11759	3587	8697	2829	26.04%	21.13%
2007	13786	4140	9997	3224	27.48%	22.13%
2008	15781	4761	11243	3661	28.76%	23.10%

Source: *China Statistics Yearbook*.

3.1. *The Household Sector*

China's household saving propensity increased steadily from 27.8 percent to 39.2 percent, but in the meantime, household investment propensity remained relatively stable. Therefore, the household sector contributed significantly to China's expanding saving-investment imbalance. As it is well-known that urban and rural households differ in many aspects in China, we calculate the saving propensity of urban and rural households separately using data published in *China Statistics Yearbook*. The raw data on average household income and consumption comes from *China Statistics Yearbook*, which is collected annually through Urban Household Survey and Rural Household Survey by National Statistics Bureau.

The results are reported in Table 4. It is worth noting that both the average urban and rural household saving propensity obtained in Table 4 are strictly smaller than the aggregate household saving propensity in Table 3. This is mainly because the average household saving propensity reported in Table 4 is obtained as one minus the ratio of average household consumption to average household disposable income, while Table 3 reports the aggregate household saving propensity as the ratio of aggregate saving of all households to aggregate income of all households by using the FFT data. As households with higher income tend to have a higher saving rate, these observations are given more weight in calculating the aggregate household saving propensity. Although two figures does not coincide in absolute value, the time-series trend can still shed light on the difference between urban and rural saving patterns.

It is shown that the average saving propensity of urban households increased from 20.41 percent in 2002 to 28.76 percent in 2008, but the saving propensity of rural households experienced little change during the same period[7]. Because the income share of the urban households is three times as large as that of the rural

[7]Note that saving propensity exhibited significant decline in 2005. As there were no existing studies that theoretically or empirically justify the sharp decline in 2005, we are not sure whether the change was caused by statistical amendment or some undiscovered exogenous shock. After 2005, saving propensity started to gradually increase again.

TABLE 5
Corporate Saving and Investment in Asie Data

Year	Savings/Assets (1)	Return/Assets (2)	Depreciation/Assets (3)	Investment Propensity (4)	Investment/Assets (5)
2002	6.6%	3.2%	3.4%	106.9%	7.0%
2003	7.6%	4.1%	3.5%	129.3%	9.8%
2004	8.0%	4.6%	3.5%	178.6%	14.4%
2005	8.9%	5.0%	3.9%	124.7%	11.1%
2006	9.5%	5.6%	3.9%	130.9%	12.4%
2007	10.4%	6.5%	3.9%	118.6%	12.3%

Source: CEIC Database.

households, it is therefore straightforward to attribute the growing saving rate of China's household sector to urban households.

On the other hand, the investment propensity of the household sector has been by and large stable from 2002–2008 (see Table 3). According to China's National Bureau of Statistics, household investment only includes households' expenditure on real estate assets. Thus, although China's housing prices have risen quickly in this period, this situation has no strong influence on the trend of household investment propensity.

In sum, China's household sector, on average, saves more than it invests in real estate assets, and thus exhibited positive net savings throughout these years. This fact is consistent with the existing studies on China's saving motives. Although there are some studies declaring that China's households save to purchase new houses (Zhang and Wei, 2011), most researchers still believe that the high saving rate of the household sector arises from a wide variety of reasons, such as maintaining a decent living standard after retirement, as a precautionary measure for future uncertainties, or simply as reflection of traditional cultural and social norms. Therefore, Chinese households have to maintain a positive net saving rate to satisfy these objectives.

3.2. *The Corporate Sector*

The Chinese corporate sector exhibited large fluctuations in its investment rate from 2002–2008, and it did not catch up quickly with the growth of net savings provided by the household and government sectors. In this section, we argue that government's macroeconomic control policies and financial underdevelopment are two important factors that directly cause investment to be lower than savings during the period.

To explore the two possible factors, we use time-series and cross-section analysis separately in the following two subsections. The first subsection analyzes the fluctuation of the corporate saving rate and investment rate from 2002–2008, with particular focus on the substantial decline of corporate investment propensity in 2005 and 2007. The latter subsection reveals how financial underdevelopment may affect saving and investment for firms of different sizes using firm-level data.

(1) Time-Series Pattern for Corporate Saving and Investment

We analyze time-series patterns for corporate savings and investment using China's Annual Surveys of Industrial Enterprises (ASIE) from 2002 through 2008. The ASIE dataset is a census of all non-state firms with more than 5 million yuan in revenue, plus all state-owned firms, and is conducted by China's National Bureau of Statistics. The survey provides detailed balance sheets of income distribution as well as cash flow information for all sample firms and thus can provide us with more detailed information to explore the change in investment propensity and corporate income. It is worth noting that the survey does not cover micro-scale firms or service firms. However, as the manufacturing firms are the most important component of China's modern corporate sector, and if the general economic rule applies to both manufacturing and service firms, the analysis from the ASIE can still shed light on the underlying mechanisms behind the aggregate pattern.

First, we analyze the change of the corporate saving rate from 2002–2008. Corporate savings, or equivalently, corporate income, is defined as net profits plus depreciation minus dividend payout:

$$Corporate\ savings = net\ profit + depreciation - dividend\ payout$$

Unfortunately, the ASIE data do not report firms' dividend payout. Therefore, we calculate the pre-dividend corporate income for most of our results in this section. Column 1 shows that the pre-dividend corporate income to assets ratio increased steadily from 2002–2007. In Column 2 and 3, we further decompose the corporate income to assets ratio into net profits to assets ratio and corporate depreciation to assets ratio. The increase in corporate income primarily results from the improvement of the net profits.

We then calculate the corporate investment pattern based on the ASIE dataset. Corporate investment is calculated as the sum of fixed capital formation and inventory increase, that is:

$$\begin{aligned} Corporate\ investment &= fixed\ capital\ formation + inventory\ increase \\ &= increase\ in\ the\ initial\ value\ of\ fixed\ assets \\ &\quad + inventory\ increase \end{aligned}$$

To investigate the microeconomic mechanisms behind the fluctuation of corporate investment propensity, we also follow Bayoumi *et al.* (2009) to link firm investment propensity with the investment to assets ratio and income to assets ratio, which are more commonly used to analyze firm decisions:

$$Corporate\ investment\ propensity = \frac{investment}{income} = \frac{investment/asset}{income/asset}$$

Column 4 presents the investment propensity, i.e., the ratio of corporate investment to saving. Column 5 reports the pattern of the corporate investment to assets ratio. Both the two ratios decreased during 2005–2007, confirming our results calculated from the FFA data[8]. Firms' behavior of cutting investment is consistent with the large fluctuation of the saving-investment imbalance during this period.

Why did the corporate sector experience higher investment propensity before 2004 but slower investment in 2005? A careful investigation of the history of this period attributes the reason to the government's macroeconomic control policies. From the second half of 2003, China encountered the risk of economic overheating and high inflation. Fixed investment in many manufacturing industries increased more than 100 percent annually from 2003–2004. To control the overheating of the economy, the central government took various counter-cycle measures after 2004, including monetary and fiscal policy measures as well as direct administrative approval. In particular, the Chinese government tightened their monetary policy in 2004. Unlike the monetary policies of the U.S. and Europe, China's monetary policy relies on a wide variety of non-market policy instruments, including the setting of administered deposit, minimum lending rates, reserve requirements, lending quotas, and "window guidance." In particular, the People's Bank of China (PBoC) has increased the deposit reserve ratio and the benchmark deposit interest rate since 2004 (Figure 1 and 2). In this period, both the ratios of M2 and bank credit to GDP began to decline (Figure 3). As a result, investment rate declined quickly.

Similarly, in 2006–2007, China encountered higher risk of economic overheating again. The government thus increased the benchmark deposit rate five consecutive times and the benchmark deposit rate ten consecutive times between January 2007 and December 2007 (also see Figure 1 and 2). Other than the increase of the deposit reserve ratio and the benchmark deposit rate, lending guidance and quotas were used as a key vehicle for controlling liquidity in the Chinese economy (Garcia-Herrero *et al*., 2012). The banking regulator, the China Banking Regulatory Commission (*CBRC*), assigned lending quotas to each of the major banks and an aggregated quota for the smaller financial institutions. The CBRC then monitored the banks to ensure they met their lending quotas[9]. As is

[8]It worth noting that Column 4 of Table 5 shows a generally lower ratio of corporate investment to savings than the numbers reported in Table 3. There are two reasons for the difference: (1) The ASIE dataset only contains manufacturing firms, while the FFA data contains all firms other than financial firms. (2) Because the information on capital formation is not directly available in the ASIE data, we use firm-reported fixed investment to proxy capital formation as an alternative, but fixed investment is not exactly identical to capital formation according to China's National Bureau of Statistics. For example, firm's expenditure on mining and purchase of computer software is included as capital formation but is not included in fixed investment.

[9]One reason that window guidance is so effective is that the senior personnel in the state-owned banks are appointed by the central government. Diverging from the guidance is likely to be costly for bankers concerned about their career path. This gives the *PBoC* influence over the lending behaviors of banks, especially state-owned banks. The *PBoC* also wields the threat of fining a bank that violates its credit limits (Chen *et al*., 2011).

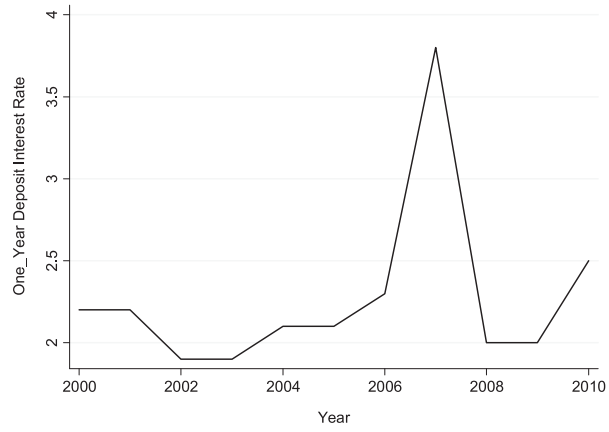

Figure 1. The one-year deposit interest rate set by PBoC
Source: People's Bank of China.

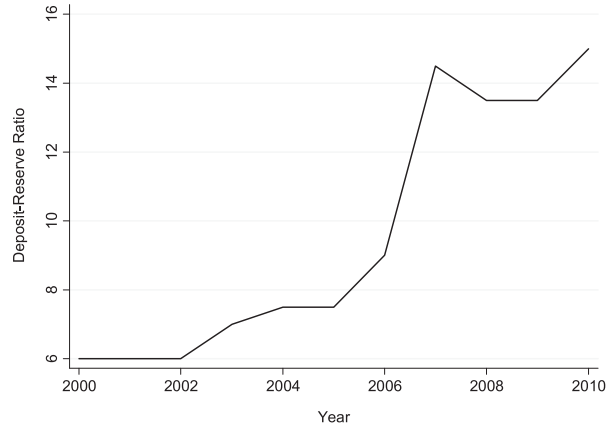

Figure 2. The deposit-reserve ratio set by PBoC
Source: People's Bank of China.

shown in Figure 3, the ratio of M2 and bank credit to GDP further declined during 2006–2007. Furthermore, the Chinese government also restricts private investment through direct administrative approval. The National Development and Reform Commission issued a directive to tightly control the risk of overinvestment with a list of "prohibited industries," which were barred from further expansion. These measures finally lead to the second round of investment reduction.

(2) Cross-Section Patterns for Corporate Savings and Investment

Except for the time series patterns for corporate savings and investment, there are also significant variations across firms with different characteristics. Recent literature has noted that China's rising current account surplus can be partly attributed to the relatively slow growth

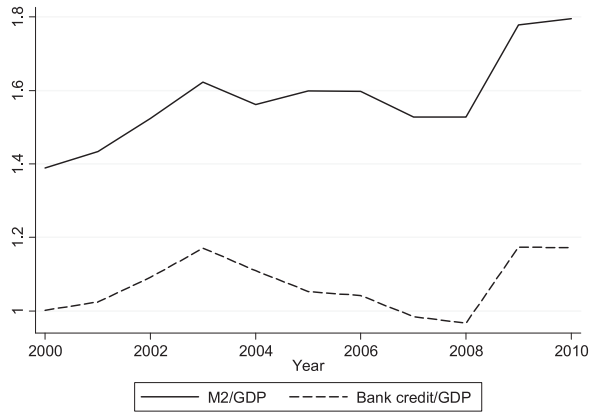

Figure 3. The ratio of M2 and bank credit to GDP
Source: *China Statistics Yearbook*.

of corporate investment, which cannot absorb excessive savings from the household and government sectors in the context of financial underdevelopment in China (Song *et al*., 2012). The problem is more serious for small firms. Under financial constraints, small firms are less likely to finance their working capital or fixed investment from banks and thus have to keep money on hand (Bates *et al*., 2009). Therefore, small firms usually have a higher saving rate than large firms.

We check the issue by investigating corporate saving and investments patterns for firms of different sizes using the ASIE dataset. We define firms with assets larger than the 75 percent percentile as large firms, and firms with assets lower than the 25 percent percentile as small firms. The results are reported in Table 6. All results are calculated as a weighted average. The weight in the first three columns is assets, while the weight in the last column is the amount of savings. We can see that the saving-asset ratio of small firms is much larger than that of large firms. However, the investment-asset ratio and investment propensity of small firms is much lower than those of large firms. Thus, consistent with theoretical predictions, small firms have positive net savings, while large firms have negative net savings.

3.3. *Government Sector*

Government behavior has always been one of the most important factors for understanding the Chinese economy. Table 2 shows that the net saving rate of the government sector was only slightly negative in 2002, but then rose to a positive level and increased gradually until 2008. On the savings side, saving propensity and the saving rate of government sector has increased over the years. However, on the investment side, the government's investment propensity and investment

TABLE 6

Savings and Capital Formation of Large and Small Firms

Year	Savings/ Assets	Capital Formation/ Assets	Net Savings/ Assets	Capital Formation/ Savings
Large Firms				
2003	6.7%	7.4%	−0.7%	110.3%
2007	8.8%	10.1%	−1.4%	115.4%
Small Firms				
2003	11.3%	3.2%	8.2%	28.1%
2007	15.3%	6.4%	8.9%	41.9%

Source: Annual Surveys of Industrial Enterprises, authors' calculation.

TABLE 7

Budgetary Fiscal Surplus, Social Insurance Net Revenue and Land Leasing Net Revenue as a Percentage of Government Disposable Income

Year	Budgetary Fiscal Surplus/Total Government Income	Social Insurance Net Revenue/Total Government Income	Land Leasing Net Revenue/Total Government Income
2002	−12.5%	2.3%	4.3%
2003	−9.8%	2.9%	7.9%
2004	−6.7%	3.7%	7.5%
2005	−6.1%	4.2%	5.8%
2006	−3.5%	4.6%	15.2%
2007	2.6%	4.9%	7.6%
2008	−1.9%	5.5%	5.3%

Source: FFA data, *China Statistics Yearbook*

rate rose slowly from 2002–2004 and then declined from 2005–2007, exacerbating the rise of the government's saving-investment gap.

This subsection aims to analyze the aforementioned facts by addressing three questions: First, why did the Chinese government's saving propensity gradually increase? Second, why did the government's investment propensity have great fluctuations before and after 2005? Third, why did the Chinese government sector have positive net savings on average?

(1) The Fast Rise of the Government Saving Rate

China's government saving primarily consists of three parts: budgetary fiscal savings (budgetary revenue minus budgetary government), social insurance net revenue (social insurance revenue minus payout) and land leasing net income (land leasing revenue minus compensation to households and smoothing cost). From 2002–2008, government savings from all of the three sources rose dramatically (Table 7). First, government budgetary revenues steadily increased from 2002–2008. According to *China Statistics Yearbook*, though China's government ran a fiscal deficit from 2000–2006 (see Table 7), the ratio of budgetary fiscal deficit to government income narrowed steadily from −13.2 percent to −3.5 percent. In 2007, China's budgetary fiscal status

reversed and it began to run a fiscal surplus afterward. In 2007, the budgetary fiscal surplus accounted for 2.6 percent of total government income. Second, social insurance revenue also contributed substantially to the Chinese government's savings. With more and more young members of the labor force participating in social insurance, China's social insurance revenue expanded rapidly. In the meantime, as China's dependency ratio reached a low level over the past decade, the proportion of retirees was low relative to the labor force, thus the increase of social insurance expenditure is not as rapid as the increase of social insurance revenue. According to the FFA dataset, from 2002–2008, the ratio of social insurance net revenue to total government income grew by 3.2 percentage points. Finally, land leasing net revenue also became an important source of government revenue, as China was experiencing a period of rising housing prices. In 2006, the ratio of land leasing net revenue to total government income reached its peak at 15.2 percent.

(2) The Fluctuation of Government Investment

The fluctuation of China's government investment over these years reflects the changing target of China's fiscal policies. From 1998–2003, China was experiencing an economic downturn caused by the East Asian financial crisis. The Chinese government adopted many countercycle measures, such as allocating more fiscal expenditure to infrastructure investment, issuing government bonds and directly borrowing from banks, to boost investment. However, as the Chinese economy later gradually came out of recession, it began overheating surprisingly quickly in 2004. The Chinese government had to reverse the direction of policy and began to implement tightening fiscal policies, such as postposing the budgetary plan on infrastructure, to reduce government investment. Because government fiscal and monetary policy also has strong externalities for the corporate sector, corporate investment correspondingly began to decline (see Section 3.2). A similar policy reversal happened during the financial crises in 2007 and 2008. In 2007, as the subprime crisis started to affect the Chinese economy, the government quickly adopted a "Four-trillion Yuan" policy bundle to stimulate the economy. It soon turned out to be too strong and caused an overheating of the economy. The government then quickly cut back many government-subsidized loans in 2008, thus greatly reducing government as well as corporate investment propensity.

There are several other pieces of evidence that can support the government's action in influencing the business cycle of investment. First, if we use fiscal deficit to measure the government's action of stabilizing economy for various stages of business cycle, it can be shown that fiscal deficit was very high in 1999–2003 when the Chinese economy experienced an economic downturn, but then it gradually turned into surplus when the economy started to recover (see Table 7). Second, infrastructural investment is a main part of the Chinese government's preferred

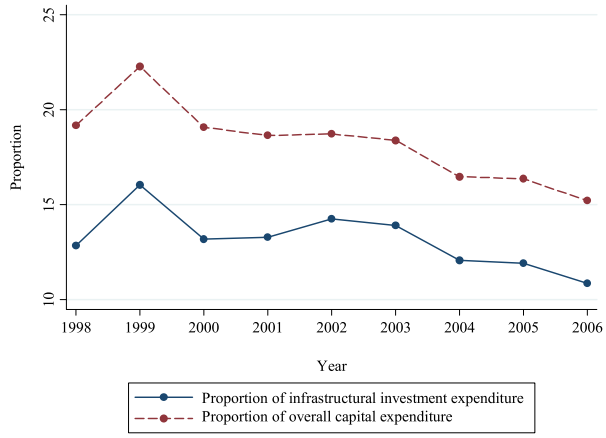

Figure 4. Proportion of capital expenditure in the government's total expenditure [Colour figure can be viewed at wileyonlinelibrary.com]

Source: *China Statistics Yearbook*.

investment. Figure 4 shows that the proportion of expenditure on infrastructural investment also has large decline after 2004.

(3) Understanding the Net Savings of the Government Sector

A more interesting fact is that China's government sector has exhibited a positive net saving rate since 2003. According to the FFA data, the net saving of the government sector was at the peak of 1.4 trillion yuan in 2007, and it is completely used for *net financial investment*.

Why does the Chinese government invest excessive savings in financial assets rather than fixed investment? There are two main reasons. First and most importantly, some of the government's revenue (both budgetary revenue and land leasing revenue) is used to increase the equity of SOEs. In recent years, local governments' bulk revenue from land leasing revenue has largely been used to establish SOEs named UDICs (Urban Development and Investment Corporations), which take responsibility for infrastructural investment on behalf of the government. Second, the Chinese government runs a positive budgetary surplus and has social insurance net revenue. Both of these sources can only be invested in the form of financial assets (such as bank deposits) and cannot be used for fixed investment, due to safety and liquidity requirements. As shown in Column 2 of Table 7, budgetary surplus and social insurance net revenue account for 0.6 percent and 1.1 percent of GDP in 2007, respectively.

5. Conclusion

This paper accounts for China's saving-investment imbalance (equivalent to current account imbalance) by using FFA data. We find that the increase of the saving-investment surplus can be attributed to the steady increase of saving by the

household and government sectors and the short-term downsizing of investment by the corporate and government sectors.

We then use supplementary datasets to explore the factors behind the evolution of the saving and investment rates for the three sectors. We find that the rise in the household saving propensity is mainly sourced from the urban sector, which has steadily increased since 2002. Household investment propensity, which mainly consists of real estate purchase, was stable during the period despite the rapid increase of urban housing prices. Corporate saving propensity experienced steady increase because of the steady increase of corporate profitability, but corporate investment experienced dramatic fluctuations during the period because of government macroeconomic policies. Small firms show a higher net saving rate than large firms, justifying the effect of financial constraints on internal savings. The rise of budgetary revenue, net social insurance revenue and land leasing revenue are the three main factors that jointly lead to the increased saving propensity in the government sector. Government investment propensity also fluctuated heavily because of the government's counter-cycle policies.

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