

# China's Saving and Investment Puzzle\*

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## Why should we care about China's saving and investment?

- Help to understand China's pattern of growth, its sustainability and medium and long-term growth perspectives
- Inform the current debate on the types of risks and policy challenges stemming from China's high investment
- Policy implications, including the planned shift in government spending from investment to social spending and the increased role of private consumption.

\*These notes are largely based on Louis Kuijs's articles "How will China's saving-Investment Balance Evolve?" and "Investment and Saving in China".

## Road Map

- Background: growth accounting for China
- Sectorial decomposition of saving and investment
- Accounting for China's saving and investment
- Policy implications

# 1 Growth Accounting for China

$$\begin{aligned}\Delta \log Y_t &= \Delta \log TFP_t + \alpha \Delta \log K_t + (1 - \alpha) \Delta \log N_t \\ &= \Delta \log Y_t/N_t + \Delta \log N_t\end{aligned}$$

where  $Y_t$  is GDP,  $TFP$  is Total Factor Productivity,  $K_t$  is aggregate capital stock, and  $N_t$  is the aggregate hours. The growth of labor productivity,  $Y_t/N_t$ , can be further decomposed as

$$\Delta \log Y_t/N_t = \Delta \log TFP_t + \alpha \Delta \log K_t/N_t$$

where  $K_t/N_t$  measures the capital intensity.

Table 1. China: Growth accounting, 1978-93 and 1993-2005

	<u>1978-93</u>		<u>1993-2005</u>	
	pct per year		pct per year	
Average growth				
GDP	9.7		9.5	
Factors				
capital	8.9		11.8	
labor	2.5		1.1	
TFP	3.8		3.0	
		<u>share of total</u>		<u>share of total</u>
Contribution to GDP growth				
Total: GDP	9.7		9.5	
factors	5.6	60	6.3	68
capital	4.4	46	5.7	61
labor	1.2	13	0.5	6
TFP	3.8	40	3.0	32

Sources: NBS, and staff estimates.

Table 2. Sources and aspects of growth (1978-2005)  
(average annual increase, in percent)

	1978-93	1993-2005
GDP growth	9.7	9.5
Employment growth	2.5	1.1
Labor productivity growth	7.0	8.4
From TFP growth	3.8	3.0
From increasing K/L ratio	3.1	5.3
Memorandum items (in percent)		
Investment/GDP ratio (period average)	29.4	36.6

Source: NBS (2005), and staff estimates.

## Summary of Results for Growth Accounting

- TFP growth has contributed significantly to GDP growth.
- Contribution of physical capital accumulation has been large and growing, reflected by a high and increasing investment to GDP ratio.
- Between 1978-1993 and 1993-2005, the contribution of increasing capital intensity to labor productivity growth rose to two-thirds and the contribution of TFP growth declined.

## Saving and Investment

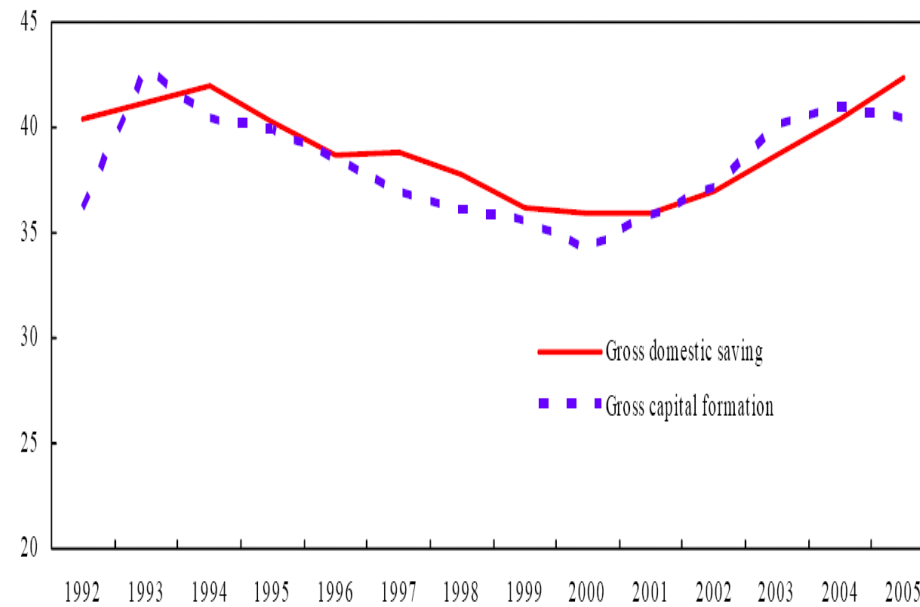


Figure 1: National Saving Investment (Source: Kuijs, 2006)



## Literature on saving patterns across countries and time

- The level of development (per capital income), with the positive influence of per capita income larger in developing countries
- Economic growth, with much of the causation running from growth to saving.
- Pension reform, with direct short-term effects depending on the financing of the transition deficits and long term effects depending on the degree of funding.
- Financial liberation, strong effect from expanding the supply of credit to people that had been credit-constrained

- demographics, with an increase in the share of young and elderly dependents in the population tending to reduce private saving
- urbanization
- uncertainty

Literature on saving leaves a large part of China's economic-wide saving unexplained!

- Kraay (2000) found that China's national saving rate in recent years has been 15-20% higher than what would be expected based on these traditional determinants of savings (37%).
- To understand S and I, we need to look at sectorial composition.

## 2 Sectorial Decomposition of S and I

### Household Saving

The household budget constraint is

$$c_t + a_{t+1} + i_h = a_t(1 + r_t) + (1 - \tau_l)w_t l_t + d_t + T_h$$

where  $c_t$  is household nondurable consumption,  $a_t$  is financial asset holding,  $w_t l_t$  is labor income,  $d_t$  is dividend,  $T_h$  is government transfer to household (including pension and so on),  $\tau_l$  is tax on labor income. Household saving is defined as

$$\begin{aligned} s_t &= a_{t+1} - a_t + i_h \\ &= a_t r_t + (1 - \tau_l)w_t l_t + d_t + T_h - c_t \end{aligned}$$

## Enterprise Saving

Firms' budget follows

$$d_t = (1 - \tau_s) y_t - I_t - w_t l_t - b_t (1 + r_t) + b_{t+1} + T_e$$

where  $d_t$  is dividend payout,  $y_t$  is before-tax sales revenue,  $\tau_s$  is sales tax rate.  $I_t$  is gross investment,  $a_t$  is debt payment,  $a_{t+1}$  is new debt issuance,  $T_e$  is government capital transfer to firms.

$$I_t - ((1 - \tau_s) y_t - r_t b_t + T_e - w_t l_t - d_t) = b_{t+1} - b_t$$

where  $y_t (1 - \tau_s) - r_t b_t + T_e - w_t l_t$  is net corporate profit (including returns to capital),  $y_t (1 - \tau_s) - r_t b_t + T_e - w_t l_t - d_t$  is enterprise saving, or retained earning.  $b_{t+1} - b_t$  is net debt issuance.

## Government Saving

Government budget follows

$$g_t + i_{gt} + T_h + T_e + (1 + r_t)B_t = \tau_s y_t + \tau_h w_t l_t + B_{t+1}$$

where  $g_t$  is government consumption,  $i_{gt}$  is direct government investment,  $B_t$  is government bond

Government saving (or the negative of government deficit) is defined as

$$-(B_{t+1} - B_t) = \tau_s y_t + \tau_h w_t l_t - r_t B_t - g_t - i_{gt} - (T_h + T_e)$$

## National Saving

$$\begin{aligned} \text{National Saving} &= \text{Household Saving} + \text{Enterprise Saving} \\ &\quad + \text{Government Saving} \\ &= (a_t - b_t - B_t) r_t + y_t - c_t - (g_t + i_{gt}) \\ &= y_t - c_t - (g_t + i_{gt}) \end{aligned}$$

## An overview of sectorial patterns of saving



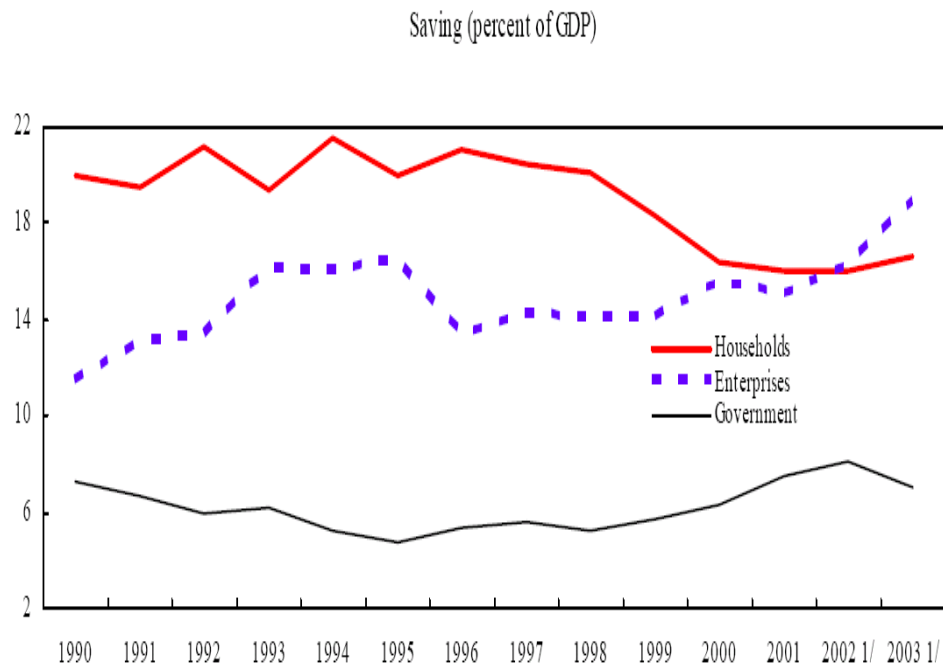


Figure 2: Patterns of Savings (Source: Kuijs, 2006)

## An overview of sectorial patterns of investment

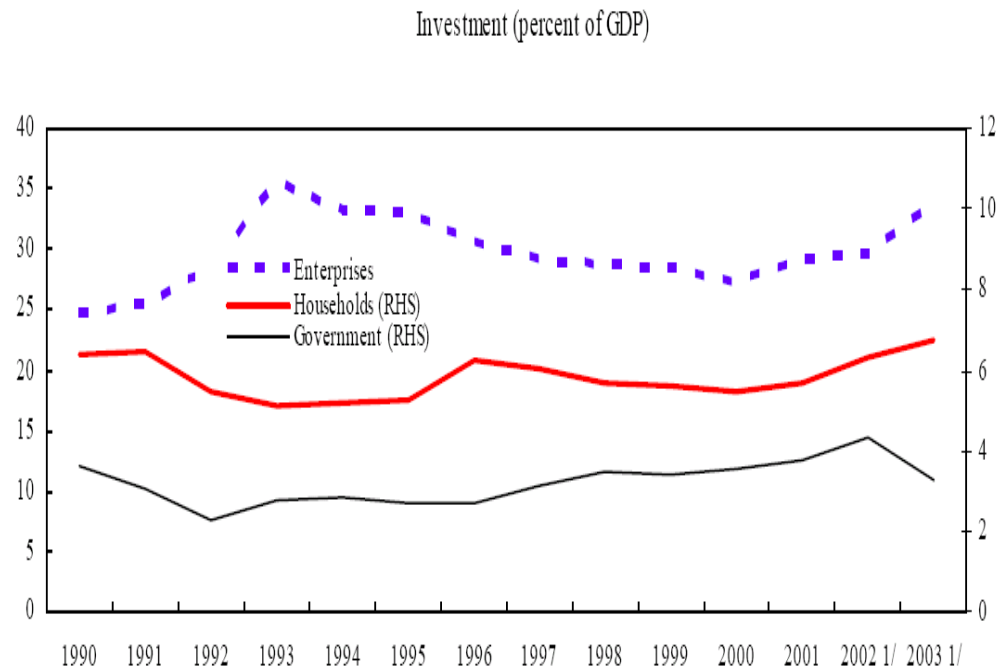


Figure 3: Patterns of Investment (Source: Kuijs, 2006)

Who does the saving?

Table 3. Saving and Investment in China (percent of GDP) 1/

	1996	2000	2004	2005
<b>Households</b>				
S	20.1	14.8	15.6	16.2
I	5.9	4.9	5.8	5.8
S-I	14.1	9.8	9.8	10.4
<b>Enterprises</b>				
S	13.5	15.5	18.9	20.4
I	29.9	26.1	31.8	31.3
S-I	-16.4	-10.6	-12.9	-10.8
<i>memo item</i> : net capital transfers received	3.0	4.6	4.7	4.5
<b>Government</b>				
S	5.1	5.7	5.9	5.7
Direct investment	2.6	3.2	3.3	3.3
S-I	2.5	2.5	2.6	2.4
<i>memo item</i> : net capital transfers received	-3.0	-4.6	-4.7	-4.5
<b>China</b>				
Gross national saving (above the line)	37.5	35.2	41.4	43.9
Gross capital formation	38.4	34.2	40.9	40.4
Current account (bop data) 2/	0.8	1.7	3.6	7.2

Source: NBS, and author's estimates.

1/ Estimates, using new production-side GDP data, with estimates for the flow of funds data (see Appendix

2/ There is a discrepancy between on the one hand the difference between gross national saving and gross domestic capital formation from the national accounts and on the other hand the current account data.

This discrepancy was about 3 percent of GDP in 2004.

## Figure 4: Who Does The Saving? (Source, Kuijs, 2006)

Table 4. China: Comparing Saving with Other Countries.1/  
(in percent of GDP)

	China	United States	France	Japan	Korea	Mexico	India
Total Domestic Savings	41.7	14.3	20.7	25.5	31.0	20.8	28.3
Household saving	16.0	4.8	10.8	8.2	4.5	8.0	22.0
Enterprise saving	20.0	10.3	9.5	19.4	14.8	10.6	4.8
Government saving	5.7	-0.9	0.3	-2.2	11.7	2.2	1.5
Difference China-others <i>due to:</i>		27.4	21.0	16.2	10.7	20.9	13.4
Household saving		11.2	5.2	7.8	11.5	8.0	-6.0
Enterprise saving		9.7	10.5	0.6	5.2	9.4	15.2
Government saving		6.6	5.4	7.9	-6.0	3.5	4.2

Source: NBS (national accounts), via CEIC, OECD National Accounts, and Indian authorities.

Data for China is for 2005 (estimated), for Mexico 2001, for India 2004, and for other countries 2002.

Figure 5: Cross-Country Comparison (Source: Kuijs, 2006)

## Patterns for Households Saving and Investment

- Household saving in China contribute significantly to national savings.
- Household saving rate, as share of household disposable income, rose steadily from about 5% before 1978 to over 30% in the mid-1990s (Modigliani and Cao, 2004). Thereafter, it declined to around 25% in 2000, at which it remained since.
- As share of GDP, household saving rate is estimated to have been around 16% in recent years.
- This number is significantly higher than OECD countries, but less than India.

- Investment by households, largely in residential real estate, increased as a share of GDP in recent years, but is not much out of line with levels in other countries.
- The balance between saving and investment came down from 14-16% of GDP in the mid 1990s to around 10% of GDP in recent years. The bulk of households' net saving is in bank saving deposit.



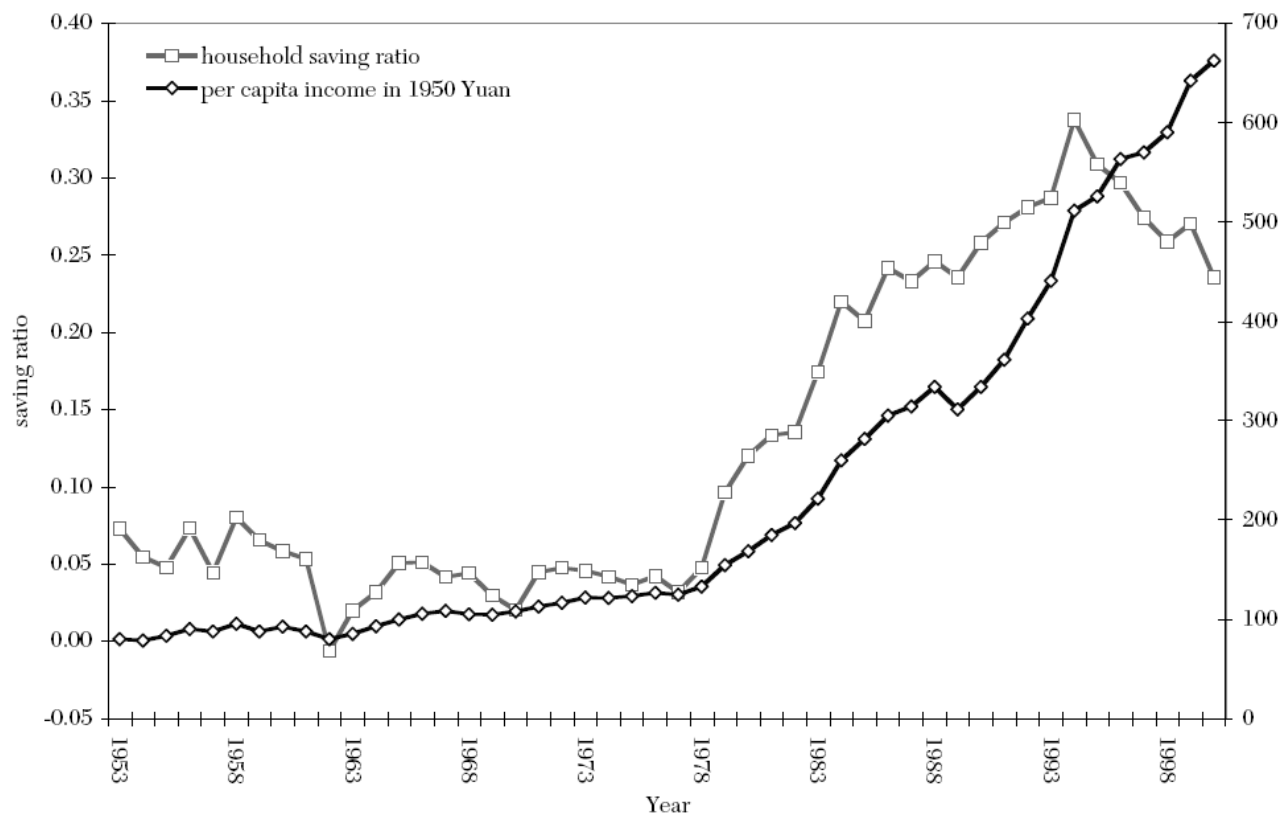


Figure 1: China's Household Saving Ratio and Per-Capita Income: 1953–2000

Figure 6: Household Saving Ratio (Source: Modigliani and Cao, 2004)

## Patterns for Enterprise Saving and Investment

- Enterprise saving constitute a large and increasing source of saving in China.
- In recent years, it has overtaken household saving as the largest source of financing.
- Investment by the enterprise explains most of the cyclical variation in investment.
- The saving investment deficit of enterprises is around 11-13% of GDP in recent years.

- Of the deficit in 2002, 4.5% of GDP was financed by capital transfer from the government. The remaining 6-8% of GDP is financed by outside financing, mainly bank loan and foreign investment.

## Patterns for Government Saving and Investment

- Government saving is remarkably high compared to other countries.
- Direct investment by the government has been relatively steady at levels comparable to other countries.
- As a result, the government runs a significant saving-investment surplus, which forms an additional financing source.

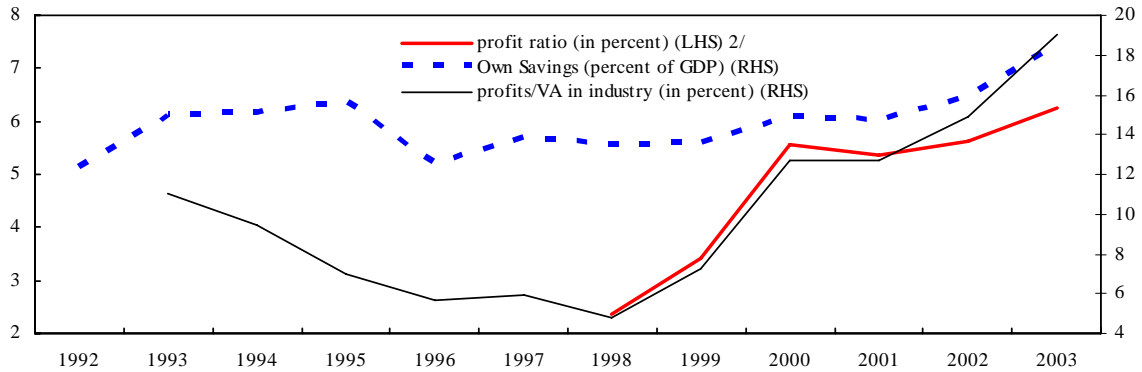
## A closer look at financing of non-financial enterprise investment

$$I_t = ((1 - \tau_s) y_t - r_t b_t - w_t l_t - d_t) + T_e + (b_{t+1} - b_t) + FDI$$

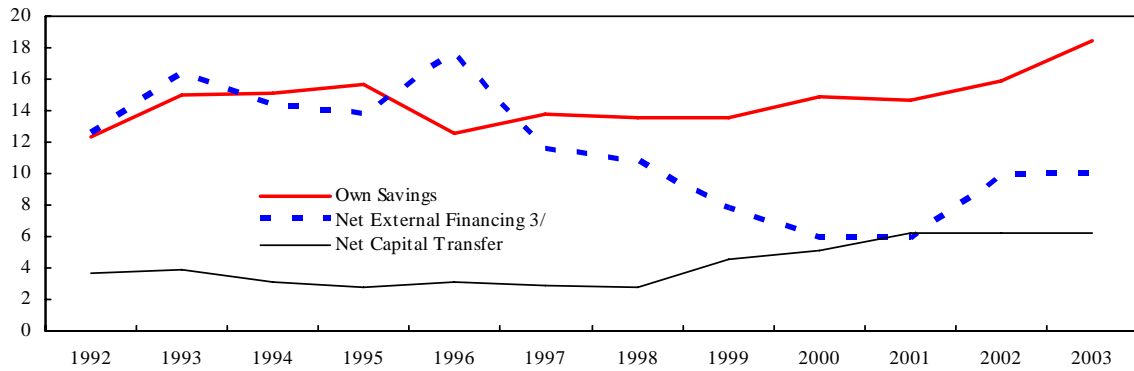
- own saving
- government capital transfer
- bank loan
- FDI

Figure 4. China, Financing Enterprise Sector Investment, 1992-2003 1/

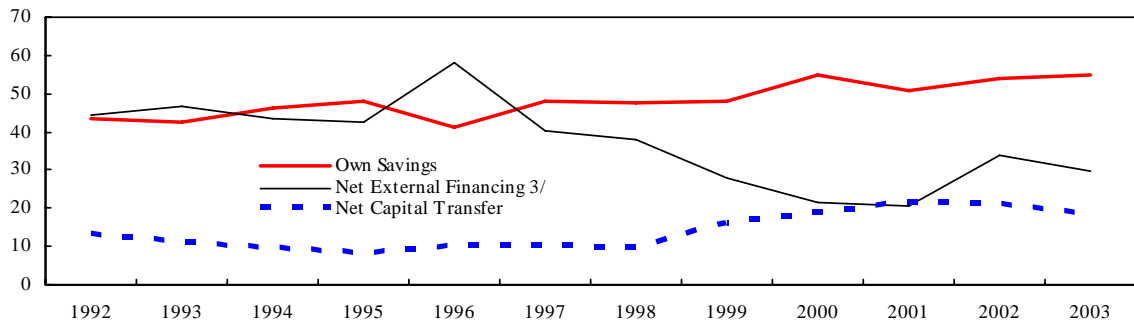
Enterprise Investment Financing and Profitability



Enterprise Investment Financing (percent of GDP)



Contributions to Funding Enterprise Investment (percent of total)



Source: NBS, and staff estimates.

1/ The observations for 2002 and 2003 are estimations (see annex). They are subject to significant uncertainty and may not necessarily be consistent with the "below the line" data on assets.

2/ Profits to costs, in industry.

3/ Including net FDI.

- Own saving from retaining earnings has increased from around 12.5% of GDP in 1996 to 18% in 2003, driven by increasing profitability.
- Capital transfer from the government form a significant form of financing.
- The enterprise sector's net external financing was high in the first half of the 1990s, contributing to 40-60% of investment.
- Financed largely via borrowing from the banking sector early on and in recent years net FDI.

## 3 Accounting for China's High Saving

Households (Modigliani and Cao, 2004)

- The economic reforms since the end of 1970s, and the increase in growth and growth prospects they generated
  - According to Life Cycle Hypothesis, Working-age cohorts save while retirees dissave.
  - Productivity growth implies younger cohorts have higher life time resource than older ones, hence their saving are larger than the dissaving of the poorer retired generations.



- The introduction of the one-child policy
  - leads to a gradual increase in the ratio of employment to total population, therefore increase the fraction of savers relative to dis-saver.
  - makes it harder for people to rely on their children as sources support in old ages.
  
- Withdraw of government in many aspects
  - pension coverage is low
  - higher cost of health care
  - higher cost of education

- Underdevelopment of financial market
  - China's consumer credit is 17% of GDP, lower than that in developed countries
  - Saving provides a way for self insurance against future bad states, say unemployment.
  - Household investment, say housing purchase, education, is largely financed through own savings.

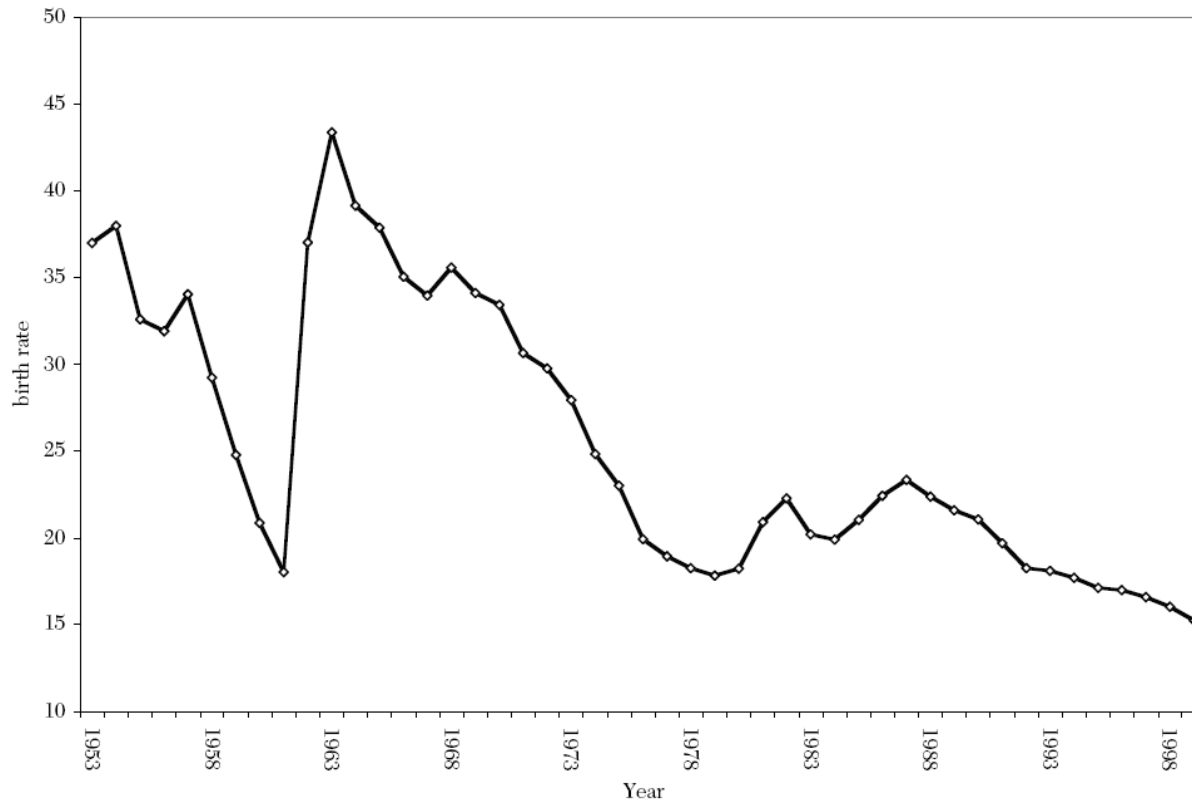


Figure 2: China's Birth Rate Per Thousand Persons: 1953–99

Figure 7: Demographics (Source: Modigliani and Cao, 2004)

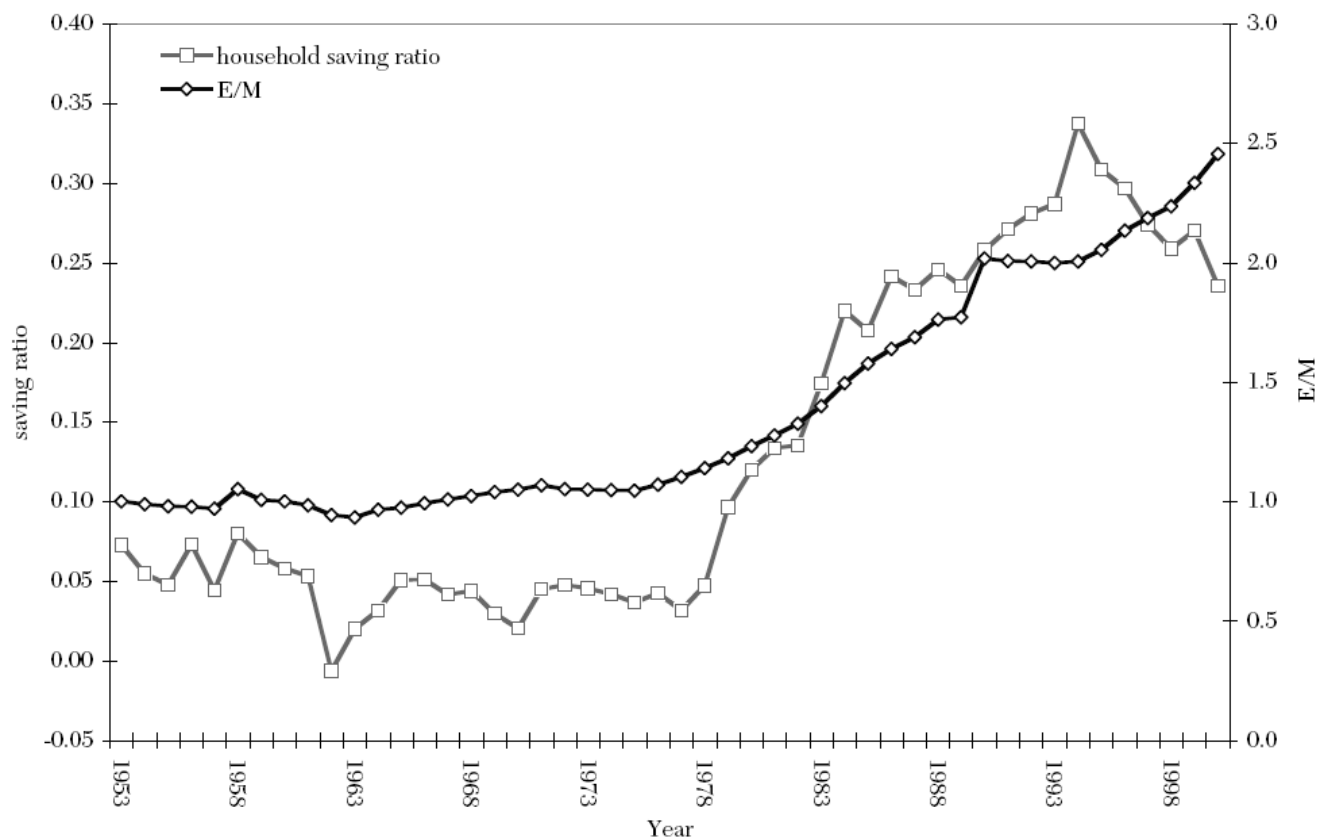


Figure 3: Saving Ratio and E/M

Figure 8: Household Saving Ratio and Demographics (Source: Modigliani and Cao, 2004)



Figure 4: Saving Ratio and Long-Term Income Growth

Figure 9: Source: Modigliani and Cao (2004)

## Enterprises (Kuijs, 2005)

- high share of industry in GDP, resulting in high capital income share in total value added
- low dividend payout, in particular for state-owned enterprises
- Increase in profitability, from 10.6 as share of value added in 1995 to 17.3% in 2000 to 21.6% in 2005, due to restructuring of SOEs
  - share of private company increases, while share of SOEs decreases
  - transfer social responsibilities to the state, hence improving their core profitability

- third world labor cost, but first world price (through export)

## Government

- Government consumption is low in China.
- Direct government investment similar to other countries
- About 5% of GDP of government saving is transferred to SOEs.
- High government saving has been the result of a growth-oriented economy policy emphasizing investment



Cross countries regressions:  $S, I = f ()$

- GDP per capita
- growth
- young and old age dependency ratio
- urbanization
- industry
- public spending

Table 5: Regression results for Gross Domestic Saving

	1 OLS	2 OLS	3 Panel-within
log of real per capita GDP 1/	2.92 ** 0.38	2.97 ** 0.71	9.67 ** 1.01
Real GDP growth	0.03 0.09	0.20 0.26	
Real GDP growth (-1)			0.15 ** 0.07
Young dependency ratio	-0.19 ** 0.02	-0.18 ** 0.04	0.02 0.03
Old dependency ratio	-0.73 ** 0.10	-0.72 ** 0.19	-0.39 ** 0.17
Urbanization ratio	-0.06 ** 0.03	-0.10 * 0.06	-0.19 ** 0.05
Public spending/GDP 2/		0.21 0.16	
Industry/GDP	0.58 ** 0.03	0.52 ** 0.10	0.53 ** 0.04
Constant			-58.67 ** 8.00
Dummies for decades	*		
Dummies for 5 year periods			*
R-squared	0.49	0.49	0.89
Adjusted R-squared	0.49	0.45	0.86
S.E. of regression	10.05	6.77	5.08
Akaike info criterion	7.46	6.73	6.27
Schwarz criterion	7.51	6.92	7.25
Durbin-Watson stat	0.41	0.50	1.26
Number of observations	995	96	896

Notes: Standard errors in brackets.

1/ in US\$ 2000 prices, at current exchange rates.

2/ Public spending on health, education, and social security and welfare.

The regression results suggest that gross domestic saving is

- positively correlated to GDP per capita
- positively correlated to the growth in GDP per capita
- negatively correlated to the old age dependence ratio
- negatively correlated with urbanization rate
- seemingly not obviously correlated to public spending on health, education, and the social safety net.

- strongly positively correlated to the share of industry in GDP.
- The expected level of saving and investment is 32% and 34% of GDP in recent years, still far below the actual 45% and 41% of GDP in 2004.

## 4 Policy Implications

### Financing Patterns

- The decreasing role of net external financing, especially through bank loans, indicates that systematic risks to the banking sectors stemming from China's appear to be smaller than many expected.
- But high and increasing financing of enterprise investment through retained earnings poses its own risks and policy challenges
  - Large-scale rechanneling of profit back in investment by firms makes investment more procyclical and prone to boom and bust cycles.

- The allocation of capital does not receive the same scrutiny as in the case of channeling via the financial sector, which is likely to affect its efficiency.
- These issues are of particular concern in an environment of low dividend payout and weak corporate governance.
- For SOEs
  - To improve the allocation of public resources, a dividend payout policy for SOEs needs to be developed.
  - It would be appropriate to make the issuance of capital transfer more transparent
  - Strengthening corporate governance.

## Short and medium terms prospect and macroeconomic policy implication

- A shift in government spending from investment to spending on health and education would directly reduce national saving and investment. Expanding social safety net is also desirable.
- Changes in the policy framework away from the promotion of capital-intensive industry towards labor intensive activities including services will increase the share of labor income in the economy, and therefore the average propensity to consume.

## Longer-term saving prospects and the impact of policy

- An eventual moderation of economic growth and demographic changes - with relatively fewer workers - are likely to decrease household savings.
  - A slowdown in long-term GDP growth of 2% would lead to a decline in the household saving rate of 5% (Modigliani and Cao, 2004)
- Pension system reform may increase national saving, depending on the degree of funding in the eventual system.
- Further development of financial markets will reduce the number of credit-constrained people and small enterprises, and the associated need for saving for anticipated purchases of consumer durables, life-cycle events, and investment.