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WHY DOES CHINA INVEST SO MUCH?

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Why does China invest so much?

Abstract. China has had a remarkably high ratio of investment to output throughout the period of economic reform, surpassing almost all other economies, whether developed or developing. The high investment rate is in turn an important proximate determinant of China's high rate of economic growth. This survey paper gathers together the available evidence to explain why investment is so high. It considers factors both on the demand and on the supply side, and in the latter case the availability both of resources and of funds. It analyses the rate of return on capital and its movement over time, and the factors which have kept it up. It draws on the literature to explain the high saving rate, and considers why the imperfect capital market and institutional deficiencies have not constrained investment. The state-owned and the private sectors are treated separately on account of their different objectives and behaviour and their differential access to funds.

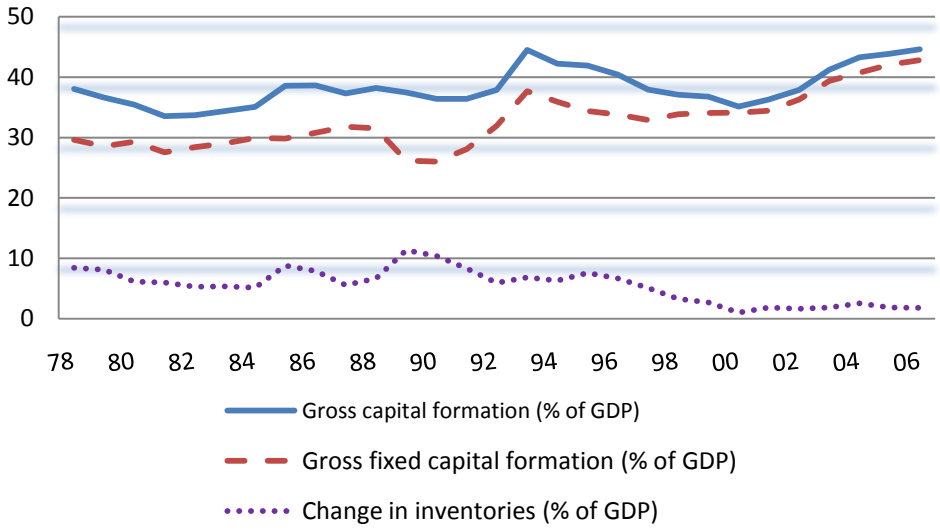
Key words: China; credit constraints; development state; financial market; investment; profit rate; saving

JEL classification: E2; G1; O5.

1. Introduction

An outstanding feature of the Chinese economy during the reform period is the remarkably high ratio of investment to output. Figure 1 shows the ratio over three decades: we see that real gross capital formation averaged a fairly steady 38% of real GDP. The rate of gross fixed capital formation increased significantly in recent years: the average rose from 29% up to 1990 to 36% thereafter, and has exceeded 40% since 2002. Inventory accumulation peaked in 1990, reflecting economic recession, and declined gradually owing to reforms away from the planned economy.

Figure 1. Gross Capital Formation and Its Composition



Source: *World Development Indicators*, December 2008.

Gross fixed capital formation is found to be an important proximate determinant of China's high rate of economic growth in cross-province and cross-country growth regressions (Ding and Knight, 2008a; 2009). It deserves to be understood. Two basic questions are raised, relating to the demand for and the supply of investment. What drives the demand for investment? Is investment governed by the supply side? The answers to both questions can throw light on the efficiency of China's investment. We consider these questions in turn. Section 2 analyses the demand for investment, and Sections 3 and 4 the supply side: resources for investment and funds for investment

respectively. The implications of the analysis for the efficiency of investment, and its implications, are examined in Section 5. Section 6 summarises and concludes.

2. The demand for investment

Within the framework of a competitive market economy, the implication of high investment is that it is highly profitable, and that the answer to the first question is to be found from estimates of the rate of return on capital. Within the framework of a neo-classical growth model, the implication of a high return on capital is that the economy is out of equilibrium, having a capital-labour ratio below its steady state level. Thus, capital accumulation takes place rapidly, and the return on capital can be expected to fall as the equilibrium capital-labour ratio is approached.

The issue has been examined within both these frameworks by Bai *et al*. (2006). The authors use data for the economy as a whole to measure the capital stock over the reform period and the rate of return on capital, in order to answer the question: does China invest too much? They make careful use of the National Bureau of Statistics (NBS) data, along with several necessary assumptions, to derive estimates of the real rate of return on capital in the economy as a whole over the reform period. The real rate of return is obtained from figures of non-labour income, capital stock estimated by the perpetual inventory method for 1952 and extended forward using gross fixed capital formation, assumptions about depreciation, and corrections for changes in the price of capital relative to output.

Their baseline return on capital estimated in this way was fairly steady at about 25% from 1979 until 1993, fell over the next five years, and remained roughly constant at 20% from 1998 until 2005 (Bai *et al*., 2006: table 1). These high rates derive from a very high capital share of income (quite close to 50% throughout), a low capital-output ratio (only 1.4 in the period up to 1993, then rising to about 1.6 from 1998 onwards), and a depreciation rate of some 10% throughout. Ignoring relative price changes, these illustrative numbers do indeed produce approximate rates of return of 25% in the earlier and 20% in the later period. In a comparison of 52 countries, the authors show

that China's return on capital is exceptionally high, even standardising for output per worker.

The authors also show that there were considerable differences in the return on capital across provinces, being highest in the east and lowest in the west of China, but that the provincial dispersion fell over time. They go on to modify their aggregate baseline estimates so as to take account of several possible complications. The most important of these are the deduction of taxes on enterprises (reducing the return substantially), the inclusion of inventories investment (also reducing it), and the exclusion of the (urban) housing sector (raising the return). When these adjustments are combined, the return to capital is found to average 10% throughout until rising somewhat after 2000 (Bai *et al*., 2006: figure 9). On the basis of these results, the authors conclude that China does not invest too much.

These bold calculations are open to criticism, and indeed they were criticised by discussants of the paper. In particular, it might be queried whether all non-labour income is return to capital. For instance, at the start of the period China had a centrally planned economy in which prices and wages, and therefore profits, were administered, and these controls were only gradually dismantled as urban reform proceeded. Much price reform took place in the 1980s: whereas in 1978 more than 95% of the prices of both producer goods and retail sales were fixed by the state, in 1991 the figures were 36% and 21% respectively (Dougherty and Herd, 2005: 5). Prior to market liberalisation the high share of profits was governed by the 'price scissors' policy, whereby depressed agricultural producer prices made possible low wages and relatively high industrial prices (for instance, Knight and Song, 1999, ch. 7). The state extracted the profits of the SOE sector to invest in planned industrial expansion; in this way it was the peasants who paid for industrialisation (Knight, 1995).

It was not possible from the authors' NBS sources to disaggregate by ownership type. However, a firm-level data set (taken from OECD, 2005) was used by one discussant (Blanchard, 2006) to show that there is a sharp difference between private and state-controlled enterprises. In 1998 the rate of return (after tax, including inventories

investment) in privately-controlled industrial enterprises was 10.2%, compared with 4.8% in state-controlled industrial enterprises (Dougherty and Herd, 2005: 19). The returns were higher but the difference was maintained in 2003, the corresponding figures being 15.0% and 10.2%. However, there was much variation within their state-controlled sample: both highly profitable sectors, such as monopolistic utilities, and much loss-making. Another source reveals wide variation in spatial profitability: in 2001 the return on net assets of local SOEs was positive in 12 and negative in 19 provinces, and varied from 6.6% in Guangdong to -8.3% in Heilongjiang (PRC, MF, 2009: 434).

This general pattern of results is confirmed in the detailed study of industrial firms by Lu *et al.* (2008). The authors examined nine indicators of profitability using corporate accounting data. Irrespective of the indicator used, they showed a trend fall in the profit rate up to 1998 and a subsequent rise, especially from 2002 onwards. For instance, pre-tax profit over net fixed assets was 25% in 1978, 3% in 1998, 9% in 2002, and 16% in 2006. Disaggregating by ownership type, the same indicator was 1.5% for SOEs and 12% for private firms in 1998 but rose to 12% for SOEs and 20% for private firms in 2005 (Lu *et al.*, 2008: figures 5, 8). Like Bai *et al.* (2006), the authors concluded from this trend in profitability that China's capital stock remained sub-optimal.

Table 1, derived from the *Finance Yearbook of China*, shows that the finances of the SOE sector as a whole were dire in the late 1990s but improved over the period 1998-2007 (the earliest and the latest years for which the data are available). The number of SOEs was halved; this was almost entirely due to sales and closures by local governments. In the former year the profits of profit-making SOEs only just exceeded the losses of loss-makers, whereas in the latter year the ratio was over 5 to 1. The return on assets rose from being negligible to 5% over the nine years, and the growth in the return on net assets and in the profit margin on sales was even more dramatic. The proportion of profit-making SOEs rose from 31 to 57%, but even in 2007 as many as 43% recorded a loss. Considering only the industrial SOEs, the losses of loss-makers

expressed as a proportion of pre-tax profits rose from 3% in 1980-4 to 5% in 1985-9 to 20% in 1990-4 and to a likely peak in 1995-7 (for which years the data are not available); they were as high as 160% in 1998-9 but down to 23% in 2000-4 (PRC, NBS, 2005)

The sharp improvement in the profitability of the SOE sector after 1998 can be seen as a policy response to the collapse in profitability - which threatened state revenue, the banking sector with its rising non-performing loans (NPLs), and the continuation of economic growth. Budget constraints were hardened, a vast redundancy programme was imposed, and many inefficient and unprofitable enterprises were closed down or sold off. Lu *et al.* (2008) attributed the relative increase in SOE profitability since 1998 not only to SOE reform but also to the cancellation of bad bank debts and policies of sectorial entry restrictions favouring SOEs.

A high rate of profit on existing capital can serve as a proxy for the expected rate of profit on new investment. However, a high average rate does not necessarily mean that the expected marginal rate is also high. Moreover, even if the expected rate is high, this need not influence the demand for investment unless the profit motive is important in investment decisions. At least until very recently, the driver of much SOE investment could not have been expected profitability (Zou, 1991; Riedel *et al*., 2007: 155-6). The main objective of management in Chinese state-owned and state-dominated firms has been to maximise not profits but the growth of investment and output. The reward to such bureaucrats takes the form of prestige, power and the accompanying perks of commanding an organisation; the reward being greater the larger the organisation. Hay *et al.* (1994) found that in 1988 investment was still largely determined by state planners allocating investment funds. However, encouraged by the security that 'soft budgets' afforded, investment was supplemented from the share of profits that SOEs were now permitted to retain. Jefferson *et al.* (1999) found that, by the time of their enterprise surveys in the early 1990s, over 80% of SOEs were subject to the 'contract responsibility system'. This gave them incentives to meet contracted targets, often set by local governments in terms of output. Local government officials were in turn

responding to the incentives to promote local economic development that central government had created for them. For instance, Li and Zhou (2005) used turnover data on top province leaders between 1979 and 1995 to show that promotion and demotion depended on province GDP growth.

Table 1. The financial performance of SOEs (1998, 2003 and 2007)

	1998	2003	2007
Number of SOEs (000)	238	146	112
of which: central	23	19	22
local	215	127	90
Total profit (00m, yuan)	214	4,796	17,442
Profit making SOEs (% of total)	31	47	51
Profits of profit-making SOEs (00m, yuan)	3,280	7,589	21,220
Profits of loss-making SOEs (00m, yuan)	-3,066	-2,820	-3,778
Return on assets (%)	0.002	2.4	4.8
Return on net assets (%)	0.006	6.7	12.1
Profit margin on sales (%)	0.003	3.0	9.0

Source: PRC, MF (2009): 427-9. Note: Because there are inconsistencies in some of the published figures, we build up from the raw data.

As China opened up to the world, and especially after entry to the WTO in 2001, the prospects for profit by expanding exports created additional demand for investment. High export profits were possible, partly from the disequilibria that had been created by trade restrictions and partly from the undervalued Chinese currency. However, the role of exports can be exaggerated: domestic value added constitutes no more than half of export value (Koopman *et al.,* 2008). Thus export value added represented about 18% of GDP in 2007.

Potential investors must have confidence that they will achieve an adequate return on their investment. This may well require confidence in the security of their property and of their business agreement. Such confidence can be achieved either by means of a formal legal system or by means of informal substitutes. Clarke *et al*. (2008) examined how it was that Chinese investors had sufficient confidence in the security of property and in the enforcement of contracts to achieve such a high rate of investment. At the start of economic reform, administrative rules and interventions were adequate to resolve disputes, which were generally between parties under a common authority.

With decentralisation and privatisation, the need for other, formal or informal, rules grew. Clarke *et al*. (2008) argued that, although the formal legal system had made great strides, particularly since 1992, it had developed in response to economic growth rather than being responsible for it. Instead, informal sources of security were primarily responsible for creating investor confidence. The incentive system faced by both central and local government officials rewarded economic growth, and their predictable behaviour therefore provided security of property (except in the case of farmers losing their land for urban development). The traditional system of cultivating social networks – known as *guanxi* – helped to provide security of transactions.

There is empirical evidence that security of property and enforceability of contracts are indeed important for private investment. For instance, Cull and Xu (2005) investigated the determinants of profit reinvestment by private enterprises using the World Bank's investment climate surveys of 2,400 Chinese firms in 2000-2. Their analysis was restricted to private firms, defined as those in which private ownership exceeded 50%. The questionnaire provided proxies for perceived security of property rights and of contract enforceability and reported the share of private ownership in the firm (mean 96%). The profit reinvestment rate for firms with positive profits (mean 27%) was the dependent variable. Their estimates showed that, standardising for a set of control variables, reinvestment is higher the stronger are perceived property rights and perceived contract enforceability. Similarly, a greater share of private ownership, suggesting less scope for government interference, raises the investment rate. These results indicate the value of protective legal, administrative or social rules and the danger of arbitrary interventions if the objective is to promote private investment.

3. The supply of investment: resources

In most countries an investment rate as high as China's would generate severe macroeconomic imbalance. Given their much lower national saving rates, such a claim of investment expenditure on resources would generate a combination of inflation (of both investment goods and consumption goods) and deficit in the current account of the balance of payments. The high investment rate would be unsustainable. This raises

the question: how and why have the resources been available for China to invest such a high proportion of GDP? That in turn requires an analysis of the sources of and reasons for saving (defined as disposable income minus consumption).

In analysing saving and investment, we wish to distinguish three sectors: enterprises, households and government. It is not straightforward to obtain this breakdown from China's official statistics. However, Barnett and Brooks (2006) compiled estimates from flow of funds accounts for the three sectors. Their annual data cover the years 1999-2005 but they report average data also for the period 1995-9. Table 2 accordingly shows averages for the periods 1995-9 and 2000-5: saving, investment (gross fixed capital formation), and saving minus investment, all expressed as a percentage of GDP. Kuijs (2005) provided similar annual data for the 1990s but his estimates were made before the revision of GDP statistics that followed the 2004 economic census. Table 2 shows his estimates as well, and for 1995-9 as well as for 1990-4. The differences in the two figures for 1995-9 represent a combination of statistical revisions and differing assumptions. The Kuijs data thus permit a comparison of 1990-4 and 1995-9, and the Barnett and Brooks data a comparison of 1995-9 and 2000-5.

The national saving rate was fairly stable at about 40% of GDP throughout the fifteen-year period, whereas investment rose, possibly by as much as 4.5% of GDP. Thus, saving actually exceeded gross fixed capital formation throughout, although the difference, when expressed as a proportion of GDP, fell over time. Consider the sources of saving. In the 1990s households contributed a higher share of national saving than enterprises but in the early 2000s the contributions were reversed. At that time enterprises saved no less than 18% of GDP, and 35% of their value added; and households saved no less than 27% of their disposable income (Barnett and Brookes 2006: tables A2, A4). Government saving initially fell and subsequently rose. The recent rise was assisted by the improvement in government revenue-raising powers after fiscal and enterprise reforms: its revenue rose by 8% to 55% of GDP between 1995-9 and 2000-5 (Barnett and Brooks 2006: table A3).

Table 2. Saving, investment, and saving minus investment, national and by sector, 1990-4, 1995-9 and 2000-5

	Kuijs		Barnett and Brooks	
	1990-4	1995-9	1995-9	2000-5
National (as % of GDP)				
Saving	40.5	39.8	39.4	41.7
Investment	31.5	35.0	37.9	38.9
Saving minus investment	9.0	4.8	1.5	2.8
Saving (as % of GDP)				
Enterprises	14.0	14.4	15.8	18.4
Households	20.3	20.0	18.7	15.9
Government	6.3	5.3	2.8	4.1
Saving (as % of saving)				
Enterprises	35	36	40	44
Households	50	50	48	38
Government	15	13	12	18
Investment (as % of GDP)				
Enterprises			29.7	29.3
Households			5.4	5.5
Government			2.8	4.1
Investment (as % of investment)				
Enterprises			78	75
Households			14	14
Government			7	11
FAI (as % of GDP)				
Enterprises	29.4	29.9		
Households	5.7	5.7		
Government	2.9	3.1		
FAI (as % of FAI)				
Enterprises	77	77		
Households	15	15		
Government	8	8		
Saving minus FAI (as % of GDP)				
Enterprises	-15.5	-15.4		
Households	14.6	14.2		
Government	3.4	2.2		
Total	2.5	1.0		

Sources: Kuijs (2005), table 1. Barnett and Brooks (2006), tables A2, A2a, A3, A3a, A4, A4a. Notes: Wherever possible, 'investment' is gross fixed capital formation. However, the breakdown by sector is available only for 'fixed asset investment' (FAI) in the Kuijs data. FAI includes expenditure on existing assets, such as land and buildings. 'Enterprises' are non-financial enterprises.

What made such a high national saving rate possible? Households have become a major source of saving since the start of economic reform. Over the reform period,

China's real GDP per capita rose nearly tenfold, from $165 in 1978 to $1598 in 2006[1]. One explanation is that, with higher income, households chose to save a higher proportion of their income (Riedel *et al.*, 2007). By contrast, Modigliani and Cao (2004) explained China's high private saving rate mainly in terms of the life cycle hypothesis. Their objective was to explain the remarkable rise in China's private saving rate, from some 3% in 1978 to some 33% in 2000. Rapid expected future growth of the economy can raise 'permanent income' and thus reduce saving out of current income. By contrast, the authors hypothesised that rapid long term economic growth resulting from the economic reform policy implied rapid growth in target wealth, which would raise the saving rate. They also hypothesised that the fall in the dependency ratio resulting from the one-child family policy also implied a rise in the saving rate. Indeed, the former effect was found to explain some 10 percentage points of the 30 percentage point rise in the saving rate, and the latter effect another 10 percentage points. Moreover, income per capita no longer played a role when added to their equation.

Wei and Zhang (2009) offered a further explanation for the rise in household saving. The saving rate and the 'sex ratio' (the ratio of boys to girls born 20 years previously) moved closely together. The saving rate was higher in regions with a higher sex ratio, and households with a son saved more than households with a daughter. The authors argued that a shortage of marriageable girls created competition among households with boys – which responded by saving more on the basis that wealth and housing would help their sons in the competition for brides. Wei and Zhang (2009) estimated that marriage competition could potentially account for half of the increase in the household saving rate over the period 1990-2007.

Yet another contribution came from the new opportunities that were opened up by the economic reforms. Under central planning and the communes there was very little incentive for households to save. This changed as households were given increasing scope for business and housing investment. Facing credit constraints, households

[1] The data are from *World Development Indicators*, April 2008; GDP per capita is gross domestic product divided by midyear population and is in constant 2000 US dollars.

responded to the new opportunities by saving for investment (Naughton, 2007: 429-30).

Economic insecurity grew over the reform period in both rural and urban China. Modigliani and Cao (2004) argued that the birth-control policy undermined the traditional role of children as old-age support and, in the absence of a publicly-provided social security system in rural areas, so encouraged households to save for retirement. Urban economic reforms created a new motive for saving from the mid-1990s onwards. As the private sector developed, as the 'mini welfare state' provided by state-owned enterprises was withdrawn, and as large-scale labour retrenchment occurred, the heightened insecurity among urban workers could be expected to induce additional saving in order to replace state-funded services and to build up precautionary assets

These arguments are supported by Chamon and Prasad (2008), who found that, contrary to the normal life cycle pattern, the relationship between the urban household saving rate and the age of its head is U-shaped. They explained the rise in the urban household saving rate by 7 percentage points between 1995 and 2005 in terms of a rising future need to invest in a house and on education in the case of young households and the need to self-insure against ill-health in the case of old households.

We saw that enterprise and government saving also contribute to China's high saving rate. On the one hand, the imperfect capital market makes firms, especially private firms, rely mainly on their own funds (i.e. retained earnings) to finance investment. This provides them with a strong incentive to save. On the other hand, the profitability of firms has increased significantly since enterprise reform began in earnest in the mid-1990s. Moreover, given that the government did not seek dividends from SOEs in the period 1994-2008 and that the real interest earned in savings accounts is very low, their rising profits tend to be reinvested.

Government saving has been high since 1978 as a result of a policy favouring government-financed investment over government consumption (Kuijs, 2005). The

Chinese government was willing and able to take a long run view because it expected to remain in power for many years, it was not subject to democratic pressures for 'jam today', and the rapid growth of household incomes provided a shield against social discontent.

Table 2 also shows the sectorial contributions to gross fixed capital formation. The enterprise sector invested about 30% of GDP in all three periods, and the household sector (housing and household producers) 6%. The government contribution looks surprisingly small (no more than 4% of GDP) but some of the investment by enterprises, representing infrastructure investment by state-owned public utilities in sectors such as power, electricity, water and transport, is more properly attributed to government, being both directed and funded by government. Net capital transfers were estimated to be 5% of GDP in the period 2000-5 (Barnett and Brooks, 2006: table A.4a). Nevertheless, as the enterprise sector accounted for more than three-quarters of total investment, it is enterprise investment which holds the key to China's remarkable investment rate.

The sectorial figures provided for the 1990s by Kuijs (2005) relate to 'fixed asset investment', not gross fixed capital formation, and contain expenditure on existing assets. However, Barnett and Brooks (2006) show the saving-investment balance for the period 1995-2005. We see from Table 2 that enterprises as a whole invested more than they saved (by 14% of GDP in the late 1990s and by 11% in the early 2000s). By contrast, households saved more than they invested (by 13% of GDP and 10% respectively), so almost precisely offsetting the enterprise sector deficit. There was a need for inter-sectorial as well as intra-sectorial financial intermediation, either through the banking system or in more informal ways. The net financial investment of the household sector was 11% of GDP in the period 2000-5, mainly (10% of GDP) in low-interest saving deposits. By contrast, the enterprise sector's net financial investment in the same period was -7% of GDP. The main (gross) sources of funding its excess of investment over saving were loans (11% of GDP) and foreign investment (3% of GDP) (Barnett and Brooks, 2006: tables A2a, A4a).

The fact that profitability increased for all ownership categories after 1998 despite the likely trend towards greater competition in product markets suggests that macroeconomic forces were at work. Between 1998 and 2007 the ratio of GFCF to GDP rose from 36 to 42%. Over the same period the share of profits in national income rose from 27 to 37%. It is thus possible that the relative increase in investment was funded, at least in part, through a redistribution of income from wages to profits, i.e. this additional claim on resources was met by forcing up prices relative to wages. In other words, causation might to some extent have run from investment to profits.

The underlying mechanism, attributable to Kaldor (1960)[2], takes the following form. Assume that the propensity to save out of profits is considerably greater than the propensity to save out of wages. Thus a redistribution of national income from wages to profits raises the national saving rate. Assume that investment is determined independently of saving. Accept that there is sufficient flexibility of prices and wages to ensure that output is normally at a level corresponding to the full employment of resources. This is achieved by a movement in the profit share to a level which equates saving to investment. The equilibrium share of profits is a function of the two saving propensities and an increasing function of the investment/output ratio.

This mechanism is most likely to operate at an early stage of development, before price and wage rigidities become important and before saving becomes a function of national income, or of permanent income, rather than of factor shares. It is more likely to apply in the medium run, rather than the short run when output adjustment might dominate or the long run when competitive factor market forces might dominate. The mechanism may have relevance to China at its current stage of development.

The hypothesis is difficult to test, partly because of endogeneity issues and partly because we do not expect the relationship to hold from one year to the next. Moreover, China's data on factor shares are weak - being available only by province and being published one year at a time and not as a consistent series. Construction of a national

[2] A lecture delivered at Peking University.

series requires weighted aggregation.[3] Furthermore, the year 2004 is missing and there is a discontinuity in the series between 2003 and 2005 which might explain much of the rise. This is likely to reflect new information emerging from the economic census of 2004. This information can represent changes in reporting either without changes in the economy or because of changes in the economy, e.g. the growth of the urban informal sector. Only in the latter case is the observed trend in the series a reliable indicator of a rising profit share.

It is possible to tell a plausible albeit untested story. The accelerated and sustained investment boom could be financed without causing inflation, at least in part because the resultant increased claims on limited resources forced up prices relative to wages, at least in the sectors where prices were not governed by world prices and the exchange rate. This redistribution was not neutralised by 'real wage resistance' and consequent inflation because the rapidly rising productivity of the urban economy permitted sufficient growth in living standards to accommodate the relative fall in the wage share (the recorded increase of real wages in 'urban units' being 11% per annum over the period 1998-2007).

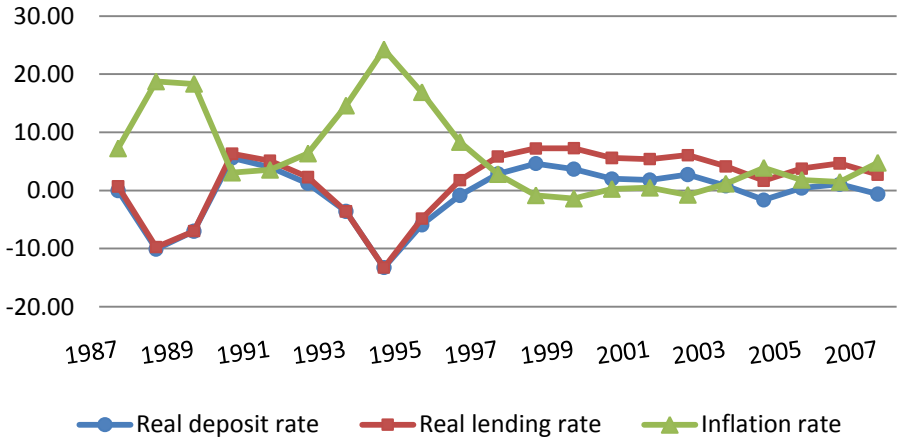
4. The supply of investment: funds

The differences in the behaviour of different ownership types can be explained in part by the inefficient financial system. This has been the subject of considerable research, which we draw on below. The formal financial system has until very recently been monopolised by the state-owned and state-controlled banks. Under central planning they simply acted as a conduit between government and the SOEs and did not perform the normal functions of commercial banks. As economic reform proceeded and a private sector developed, they gave priority to the state-owned sector. The private sector was forced to fund investment mainly from retained profits or from informal resources, normally at high cost. The state sector, by contrast, received easy bank loans at low interest rates. Loans were frequently made and used injudiciously, and this gave

[3] We are grateful to Yao Yang for supplying the calculated national figures.

rise to a burgeoning burden on NPLs. These in turn required the banks to engage in distress lending, so exacerbating the situation.

Figure 2. Real Interest Rates and Inflation Rate in China (Unit: %)



Data source: IMF, *International Financial Statistics* (August 2009 version) and World Bank, *World Development Indicators* (June 2009 version). Variable definitions: Real interest rate is calculated by the authors (subtracting the current annual inflation rate from the nominal rate); Nominal deposit rate (end of period): interest rate on institutional and individual deposits of one-year maturity; Nominal lending rate (end of period): prior to 1989, rate on working capital loans to state industrial enterprises and thereafter, rate on working capital loans of one-year maturity; Inflation rate: inflation is measured by the consumer price index.

China can be said to have a 'repressed' financial system (Riedel *et al*., 2007: 70-92). This repression can be seen as a means of placing resources at the disposal of the state. Both the interest rates that depositors receive and borrowers pay are well below the market-clearing rate. This is shown in Figure 2: both real rates of interest are low in relation to the likely rate of rate of return on investment, and even negative in the late 1980s and mid-1990s on account of bursts of inflation unanticipated by the rate-setting authorities. The excess demand for funds gives rise to credit market rationing. It is the state sector which benefits from the rationing process. The domestic share-issuing companies (known as legal entities) are very largely state controlled - with the central or local government being the dominant shareholder – and occupy an intermediate

position. This is one way in which the domestic private sector continues to be the victim of policy discrimination.

Riedel *et al*. (2007) take the view that China's financial system is one of the weakest links in the economy and that it will hamper future investment and economic growth. In that case, it must be asked why the inadequacies of the financial system have not held the economy back in recent years, and how they have permitted such remarkably high rates of investment and growth. After all, China's formal financial system is still dominated by the state-owned banks, lending primarily to the state sector: even in 2004 'the big four' accounted for 62% of outstanding bank loans and had an NPL rate of 16% (Allen *et al*., 2008: 533). The two stock exchanges, established in 1990, played a limited and inefficient funding role, being held back by speculation and insider trading. Allen *et al*. (2005) argued that, in the face of formal credit rationing, the private non-listed sector relied heavily on informal financial sources: retained profits, informal intermediaries, and trade credits. The authors' explanation for the puzzle of the high investment rate that has been achieved is that the formal and informal sectors together have done enough not to constrain investment more seriously.

Table 3 shows the sources of enterprise investment financing of the different ownership types over the period for which data are available**.** We see the importance of retained earnings and informal funds ('self-raised funds and others' in the table) for all types of ownership. This is especially true of individually-owned enterprises, which relied on such funding for over 95% of investment. Even SOEs – not being required to pay dividends to government - raised at least 60% in this way. Bank loans ('domestic loans') and capital transfers from government ('state budget') constituted 29% of SOE funding in 1994-6, rising to 36% in 2000-3. In the former period SOEs received 63% of all bank loans, and in the latter period 42%. By contrast, the corresponding shares of individually-owned enterprises were 2% and 5% respectively. The corporate sector (approximated by 'other types of enterprises') – most of it government-controlled – was on a par with SOEs by the early 2000s (receiving 25% of its funding from banks and 47% of bank lending).

Table 3. Investment financing by ownership and the distribution of loans by ownership (percentages; 1994-2003)

	1994-96	1997-99	2000-03
State-owned enterprises			
State budget	4.9	7.2	11.0
Domestic loans	24.3	23.2	24.7
Foreign investment	7.3	4.4	2.0
Self-raising funds and others	64.2	64.1	60.3
Collectively-owned enterprises			
State budget	1.7	3.2	5.5
Domestic loans	24.9	15.4	11.7
Foreign investment	7.6	6.1	4.11
Self-raising funds and others	67.33	76.95	80.2
Individually-owned enterprises			
State budget	0.0	0.0	0.0
Domestic loans	3.3	4.9	8.0
Foreign investment	0.0	0.1	0.1
Self-raising funds and others	96.8	95.6	95.8
Other types of enterprises			
State budget	0.6	0.6	0.8
Domestic loans	20.8	21.7	25.1
Foreign investment	37.1	31.1	11.8
Self-raising funds and others	48.7	52.0	74.5
Distribution of loans			
State-owned enterprises	62.8	64.2	42.1
Collectively-owned enterprises	19.0	12.0	6.4
Individually owned enterprises	1.9	3.4	4.8
Other types of enterprises	14.9	20.4	46.7

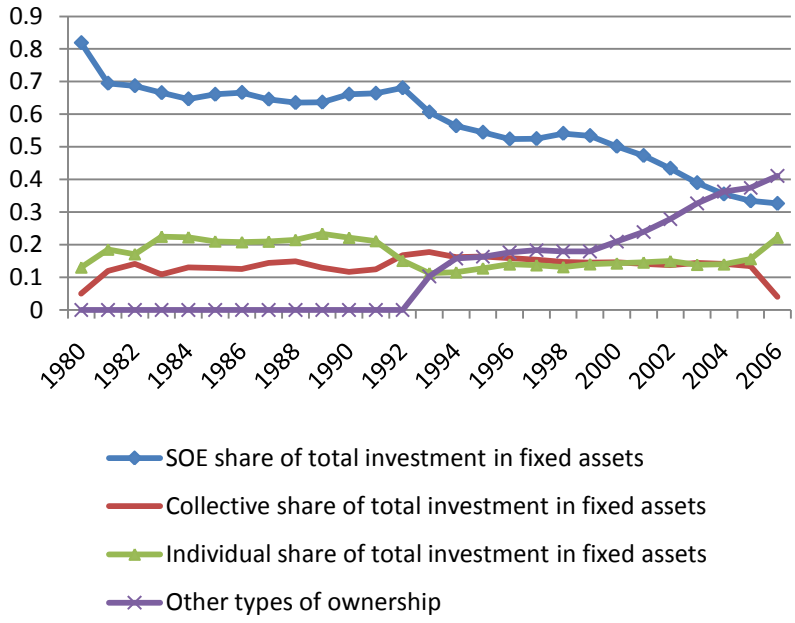
Source: Authors' own calculation based on NBS *Statistical Yearbook* (various issues). Notes: Figures for each period are the mean values of the annual proportions; 'other types of enterprises' refers to types of ownership other than state-owned, collectively-owned and individual economic units, i.e. it includes joint ownership, shareholding, foreign-funded, and Hong Kong-, Macao- and Taiwan-funded economic units.

We should guard against exaggerating the uniqueness of Chinese enterprises, in particular private enterprises, in their heavy reliance on their own savings. For instance, Mayer (1988) found that in the United Kingdom in the period 1970-85 profit retentions accounted for 70% of corporate investment.. Nor is it the case that a more competitive financial system necessarily involves fewer financial constraints on investment. For instance, conducting GMM analysis on a panel of European countries over the period 1978-89, Bond *et al*. (2003) found that it was only in the UK, with the

most competitive financial sector, that cash flow and profit terms were statistically and quantitatively significant in explaining corporate investment. Their tests rejected the interpretation that this was due to expectations formation, and they concluded that financial constraints were relatively severe in the more market-oriented financial system. Results such as these might be explained in terms of risk aversion by borrowers and lesser information on borrowers in more competitive financial markets.

Haggard and Huang (2008) examined the policy of the Chinese government towards the private sector. They distinguished between government-controlled corporate firms and genuinely private domestic firms. They argued that the latter sector was still relatively small and subject to many controls and permissions, for instance with regard to the provision of finance and the requirement of official approval of investment projects above a certain size. Government had allowed the private sector to develop – based on its efficiency – but had not actively supported it.

Figure 3. Total investment in fixed assets by ownership



Data source: NBS *Statistical Yearbook* (Various issues).

This account is consistent with evidence on the changing shares of fixed asset investment (Figure 3). The ownership structure of investment altered dramatically after Deng Xiaoping's 'southern tour' in 1992. In the next 14 years the share of SOEs fell from two-thirds to one-third. However, this was largely due to the expansion of investment by shareholding companies ('other' ownerships) – mostly companies previously classified as SOEs, the ownership and control of which were still dominated by the state. We see that the contribution of individually-owned enterprises was no higher towards the end than it had been towards the start of the reform period.

In explaining these results, Haggard and Huang (2008) argued that, although the state-owned banks became more profit-orientated over the decade, private investment was constrained because licensing policies tended to confine private firms to low-profit activities. These policies were interpreted in terms of a concern to maintain power and control by the Communist Party (CPC). For instance, foreign firms, because they did not pose such a political threat, received more favourable treatment than did domestic private firms: their share of fixed asset investment rose from the low figure of 6% in 1993 to 9% in 2003 (Haggard and Huang, 2008: table 10.4).

A rather different picture of the private sector is painted by Guariglia *et al*. (2009). They used a large panel of Chinese firms (all SOEs and all large non-state firms) over the years 2000-07 to investigate the determinants of the growth rates of firms, as measured by their growth in assets. Whereas SOEs averaged proportionate asset growth of 1.1% per annum over this period (limited by the demand for rather than the supply of funds) the figure for private firms was as high as 8.5% per annum. The authors defined domestic private firms to include the corporate sector as well as individual owners. The corporate sector mainly comprises former SOEs, many of which remain state-controlled, and it is likely to have better access to bank loans than do genuinely private firms. However, the main result of their analysis was found to apply also to the private individual sector on its own.

The main result concerns the coefficient on the variable cash flow as a proportion of assets. It is small and not significant in the case of SOEs but positive, significant and

close to unity in the case of private firms. The authors' interpretation is that private firms, being deprived of bank loans, are financially constrained whereas SOEs, receiving abundant bank loans, are not. The standard criticism of such an interpretation is that cash flow might represent prospective investment opportunities rather than available funds (Hubbard, 1998). The authors try to guard against this possibility by using lagged values as instruments. It is notable that cash flow (defined as income plus depreciation) of private firms averages almost 100% of their increase in assets (both being expressed as a proportion of assets). The implication is that the high profitability and cash flows of private firms in the early 2000s made possible their high asset accumulation, notwithstanding the distortions in the credit market.

Dougherty and Herd (2005: 13) also provide a more optimistic account of private sector development than do Haggard and Huang (2008). They estimated (instrumented) value added production functions to calculate TFP by ownership type for the period 1998-2003 using a large, industrial, firm-level sample. The standardised productivity of domestic private firms was found to be at least 90% higher than that of firms more than half-owned by the state.[4] Whereas 28% of their sample of firms was privately-controlled in 1998, this figure had risen to 52% in 2003. The authors concluded that it was the superior efficiency of the private sector that had enabled it to expand rapidly over that period (Dougherty and Herd: 2005: 9, 26).

The study by Cull and Xu (2005) of the reinvestment rates of private firms, referred to above, also contained variables representing the availability of funds for investment. Their questionnaire indicated whether the firm had received a bank loan in the previous three years (28% had), and the collateral required as a proportion of loan received (averaging 25%). The greater the collateral required for a loan, the greater is the reinvestment rate, suggesting that firms that are more risky have to be more reliant on internal funds. Having had access to a bank loan actually raises, rather than lowers, the reinvestment rate, other things being equal. This result is consistent with it being the most profitable private firms, with the largest investment opportunities, that receive bank loans. Indeed, an equation predicting access to a bank loan indicates that access

[4] Expressing the coefficient 0.650 as a percentage increase.

depends on proxies to firm performance as well as proxies for the closeness of ties with government. This implies that the banking system in the early 2000s did, at least in part, apply normal commercial banking criteria in making loans, at least to private firms.

Cull *et al*. (2007) examined the role of trade credit in funding investment in China. Trade credit can be an important source of short term funds because of the informational advantages that suppliers often have over financial institutions. In China trade credit might also be a means for private sector firms to invest if they are unable to borrow from banks. In an analysis of large industrial firms, Cull *et al*. (2007) found that firms with better access to bank credit offered more trade credit. In the case of SOEs, profitability reduced the supply of trade credit, reflecting the investment opportunities that would be forgone. Less profitable SOEs received more bank loans, possibly reflecting financial distress, and they had the surplus funds to extend trade credit, possibly in order to retain their customers and suppliers. In the financially constrained private sector, by contrast, more profitable firms supplied more trade credit, reflecting their greater ability to do so. Although the authors concluded that trade credit was a likely source of funding investment by financially constrained private firms, its relatively small size meant that it could explain only a minor part of private sector investment.

5. The efficiency of investment: static

It is generally found in the literature linking financial development and economic growth that indicators of financial development foster economic growth (King and Levine, 1993; Levine, 2005; Wurgler, 2000). Allen *et al*. (2005, 2008) see China's experience as providing a counter-example. Despite the fact that the conventional proxies for the development of financial intermediation, such as the importance of banks and of formal lending, suggest that China's financial system is weak and undeveloped, China has achieved rapid economic growth. The authors' explanation is that informal sources of finance have developed in response to a need, and that these

alternative arrangements – including the use of retained profits, own savings, and informal borrowing – have proved an adequate remedy.

Does the immature financial system nevertheless impose costs on the economy, in the form of investment misallocation? Dollar and Wei (2007) examine this question, find that there is indeed misallocation, and attempt to quantify its cost. Their research is based on a sample of over 12,000 firms in 120 cities for the years 2002-4. The authors distinguish eight categories of ownership: state ownership (100%, 50-99%, and 1-49%), foreign ownership (with the same three categories), collective ownership and domestic private ownership. State firms are found to receive more investment funding from the banking system than private firms. Regression analysis shows the conditional value of the ratio of value added to capital to be 50% higher for private firms than wholly-owned state firms. Examining the determinants of the rate of profit on capital, the authors find a similar pattern. The partly state-owned firms generally occupy an intermediate position. The inference is drawn that non-state firms are held back by financial constraints. A similar analysis of the value added/labour ratio also reports wholly owned state firms to be different: they have the lowest returns not only to capital but also to labour. Dollar and Wei (2007) go on to conduct a heroic counterfactual simulation analysis in which the value added/capital ratio in the state-owned sector is raised to that of the private sector, and find that misallocation of resources is worth some 5% of GDP.

Guariglia and Poncet (2008) also address the issue of investment misallocation. They pose the question: how do various indicators of financial development affect the growth rates of the capital stock and of total factor productivity (TFP) growth? They use annual province data over the period 1989-2003, and attempt to solve the obvious endogeneity issues by means of system GMM estimation and reverse causality tests. Three sorts of financial indicators are introduced: conventional proxies for financial intermediary development, such as the extent of bank loans; China-specific indicators of state intervention, such as the importance of bank loans made by the four main state-owned banks; and indicators of ‘market-driven financing’, such as the share of investment financed by self-raised funds.

In both the equation for capital accumulation and the equation for TFP growth, the conventional proxies for financial development and the indicators of state intervention have negative coefficients. Only in the case of self-raised funds is the coefficient positive. When the importance of foreign direct investment (FDI) in total investment is interacted with the financial variables, it is found to ameliorate the negative coefficients. The conclusions drawn by Guariglia and Poncet (2008) are that the formal banking sector constrained provincial growth over this 15-year period although inflows of FDI helped to ease the constraint; and that the availability of informal financing (from retained profits, own saving, or informal credit) promoted provincial growth.

Nevertheless, the high degree of self-financing in the private sector is not without its problems. According to the agency theory, pressures from external investors, as well as managerial ownership, encourage managers to pursue value-maximizing investment policies (Jensen, 1986). Without external monitoring and effective internal controls, corporate managers have incentives to expand too far and too fast by simply investing their internal funds in low-return projects and activities. Thus the weak governance arrangements that arise, at least in part, from the immaturity of China's financial system may well have reduced the efficiency of investment.

6. The efficiency of investment: dynamic

Ding and Knight (2008a) examined the impact of investment in fixed assets on the growth of GDP per capita over the period 1980-2000, using system GMM estimation methods in an attempt to establish causal relationships. The effect of investment as a whole was positive and significant: a one percentage point increase in the ratio of fixed investment to GDP was associated with a 0.15 percentage point increase in the growth rate. They found a sharp contrast when investment was disaggregated by ownership status. Investment made by SOEs was wasteful: increasing the share of SOEs in total fixed investment by one percentage point was associated with a decrease in the growth rate of 0.08 percentage points. Variation in the share of investment by collective firms

made no significant difference. Investment by private firms (including the corporate sector) had a powerful effect: a one percentage point rise in the investment share of the private firms was associated with a growth rate higher by 0.13 percentage points. Thus, the decline in the state's share of enterprise investment (shown in Figure 3) helped to raise the growth rate.

Nevertheless, it is an important question: will the high rate of investment in China carry the seeds of its own destruction? This could happen in various ways. First, the rapid accumulation of capital can lead to a fall in its marginal product. Within a competitive framework, this should reduce the rate of profit on capital and so deter future investment. That is the mechanism suggested by Bai *et al*. (2006), who found that the profit rate on capital had not fallen and remained high despite rapid capital accumulation. Moreover, Lu *et al.* (2008) found that the profit rate in industrial firms had risen substantially over the previous decade. Both studies concluded that China's high investment rate did not pose a threat to the profitability of future investment. However, less sanguine evidence is offered by Qin and Song (2009), who attempted to measure the extent of over-investment in China using province data over the period 1989-2004. By estimating a production function they were able to estimate the profit-maximising level of investment. Defining over-investment as actual minus profit-maximising investment, they found that there was widespread over-investment and that the more marketised, coastal provinces were technically more, but allocatively less, efficient, i.e. tended to show a greater degree of over-investment.

There are several possible reasons why the rapid accumulation of capital did not involve a fall in the prospective rate of profit so steep that further investment would have been deterred. One possibility is that at the start of economic reform the ratio of capital to other factors of production was far below its equilibrium level, i.e. the marginal product of capital was remarkably high. In a neoclassical growth model a higher saving and investment rate implies a higher capital-labour ratio, and a correspondingly lower marginal product of capital, in the steady state: the economy has further to travel to its long run equilibrium. The answer might thus be that the Chinese economy was initially in extreme disequilibrium.

Secondly, rapid capital accumulation could take place without a significant rise in the capital-labour ratio occurring. It is true that between 1978 and 2005 the capital stock rose by 10.5% per annum and the labour force rose by only 2.4 % per annum, the implication being that the capital-labour ratio increased more than seven-fold.[5] However, it is widely accepted that at the start of economic reform China had a labour surplus economy *par excellence* (for instance, Knight and Song, 1999: ch.2; 2005: ch.2). Unemployment took a disguised form, both in the cities and in the countryside. Government preferred urban people to be underemployed in the factories rather than unemployed on the streets, but enterprise reform, starting in earnest in the late-1990s, together with urban economic growth released underemployed labour mainly into more productive activities. The land reform of 1979-85 ensured that all rural households have their own leasehold land. Early estimates of surplus labour on the land (surveyed in Taylor, 1988) suggested that 30% of peasants could be withdrawn from farming without loss of agricultural production. Thus, the reallocation of rural labour to activities in which its marginal product was higher – initially through rural industrialisation and subsequently through rural-urban migration – helped to keep down the effective capital-labour ratio.

Thirdly, starting from a situation of dire misallocation of resources, the reform process involved drastic structural changes – from agriculture to industry, from the state sector to the private sector, and from domestic to foreign markets. Each of these transfers offered profitable opportunities and moved the economy towards its production frontier (Ding and Knight, 2008b). The rapid growth of the economy meant that relative resource reallocation could take place without serious excess capacity and resultant collapse in profits occurring in the relatively declining sectors.

A fourth factor helping to maintain the rate of profit on physical capital was the rapid growth of the complementary factor, human capital. The objective of compulsory basic education (six years of primary school and three years of middle school) was established in 1986, and had generally been met in the 1990s, at least in urban areas

[5] Calculated from Bai *et al*. (2006: table 1) and *China Statistical Yearbook 2006*: 60, 125, 128.

and the more prosperous rural areas. Higher education, although neglected until after the mid-1990s, was expanded remarkably thereafter. The proportions of adults with middle school, high school and college education in the census year 1982, along with the figures from the national samples for 1995 and 2005, are shown in Table 4. The proportion of adults with higher education rose from 1 to 7% between 1982 and 2005, and the proportion with more than primary education doubled, from 28 to 58%.

Table 4. Educational attainment of population aged 20 and above (percentage)

	Higher education	Senior middle school education	Junior middle school education	Primary school education
1982	1.00	8.74	18.53	31.41
1995	2.95	10.52	31.20	35.29
2005	6.64	12.34	38.54	29.37

Source: Authors' own calculation based on 1982 China population censuses and 1995 and 2005 one percent sample surveys.

Both the stock of human capital (generating externalities) and its growth (increasing labour productivity) are found to be important contributors to China's rate of economic growth (Ding and Knight, 2008a). The availability of educated labour encourages and assists the absorption of new technology into the economy. Much fixed investment of machinery and equipment embodies improved technology, some domestic and some imported from abroad. Thus, technological progress – increasing 'efficiency units' of labour and thus decreasing the effective capital-labour ratio - has helped to keep up the profitability of investment. However, there is no consensus on the rate of technological progress in China over the reform period. The various growth accounting exercises produce estimates ranging from 1.5 to 3.9% per annum (Borenzstein and Ostry, 1996; Hu and Khan, 1997; Woo, 1998; Young, 2003; and Brandt et al., 2008), reflecting in part the different assumptions made. In any case, if investment raises efficiency both by embodying technological progress and also by improving resource allocation, total factor productivity growth is a positive function of investment and cannot be separated from it.

A fall in investment for any reason could in turn reduce aggregate demand in the economy, so further depressing investment. The virtuous circle of 'high confidence, high investment, high growth, fulfilled expectations, high investment…' could in this way be transformed into a vicious circle of 'low confidence, low investment, low growth, fulfilled expectations, low investment…'.

Gong and Lin (2008) had this mechanism partly in mind in explaining the business cycle in China. They viewed the normally high investment rate as the product of a low real interest rate and the availability of an unlimited supply of unskilled labour. However, they noted that capacity utilisation had declined in certain years, and that this had deterred investment, so generating economic recession, i.e. below-trend growth. Their explanation ran as follows. A positive supply shock (the result of the relaxing of policy constraints) causes high investment. This generates inflation. The resulting anti-inflation policies create over-capacity in the capital stock, so reducing investment and slowing economic growth.

Although the account of Gong and Lin (2008) fits some of the facts well, it leaves one question unanswered. The investment function in their model depends on expected capacity utilisation. This would be inconsistent with the assumption of rational expectations and would require some other assumption, such as that of bureaucratic incentives, 'irrational exuberance' or 'animal spirits', to explain the periodic over-investment.

One possible explanation for the early reform period is provided by Kim (1994). Given the powerful incentives of SOE managers to increase investment, informational weakness enabled them deliberately to understate their investment costs and capital capacities to the planners. Thus, the discrepancy between micro incentives and macro objectives could at times generate 'investment overshooting'. Soft budgets and low interest rates on loans allayed any concerns of investors about future macroeconomic corrections.

Drawing on Keynes' emphasis on animal spirits and the associated herd behaviour, some modern macroeconomic models incorporate imperfect information and the simple decision rules to which this can lead. It is possible for such rules to produce biased correlations of beliefs and so generate waves of optimism and pessimism among investors (De Grauwe, 2008). Applying these ideas to China, there are reasons to expect irrational exuberance at a time of new and rapidly changing circumstances. According to Naughton (2007: 102), Deng's 'southern tour' in 1992 - opening the way for entrepreneurship - set off 'a gold rush mentality and financial excess'. Much of that investment boom was due to local governments, which were responding to an exogenous shock, i.e. the relaxation of constraints. The strength of their response can be explained by an incentive structure that rewarded local growth - in particular short term growth - a lack of concern about risk on account of soft budgets, and an inability to foresee and to see the new and emerging bigger picture.

Another explanation for China's cycles is provided by Brandt and Zhu (2000). Arguing with reference to the period prior to the drastic reform of the SOEs, the authors attributed fluctuations in investment and output to the declining profitability of SOEs combined with continued state support for them Their growing losses required an increased transfer of both subsidies and credit. Credit allocation had been decentralised from government to the state banks early in the reform process. Despite indicative quotas, the local branches of state banks tended to collude with local governments in the pursuit of local economic development, so favouring the more profitable non-state sector beyond quota. The continued state support for SOEs resulted in rapid growth of the money supply and accelerating inflation. This forced the central government to react by recentralising and imposing strict controls on credit, both overall and to the non-state sector, so inducing periodic recessions in investment and output. An implication of the interpretation provided by Brandt and Zhu (2000) is that the subsequent reform of the SOE sector provides some protection against the virtuous circle of high investment and growth being brought to an end by this source of shocks.

6. Conclusion

In economic research there is often a trade-off to be made between asking specific but narrow questions that can be tested rigorously and asking broad but important questions which do not lend themselves to formal tests. Despite the evidence and argument that we have mustered from the considerable literature on investment in China, we do not have a precise answer to the basic question: why is investment so high in China? However, we can tell a plausible story.

Approaching the question first from the demand side, we adduced evidence that the overall rate of return on capital was initially high and remained reasonably high. Moreover, the return on capital in industry rose substantially after 1998 in both the state and non-state sectors. Although there is a potentially important difference between the observed return on capital and the perceived future return on investment, this might well be the underlying reason why investment remained so high.

Why did profitability remain promising enough to induce so much investment despite the remarkable rate of capital accumulation? It was probably maintained by rapid total factor productivity growth and the ready supply of surplus labour that could be combined with the increase in the capital stock. Both would have helped to keep up the marginal product of capital. Starting from a situation of dire resource misallocation, economic reform and marketisation achieved efficiency gains through the reallocation of resources towards more productive uses – from the state sector to the private sector, from agriculture to industry, and from domestic to foreign markets.

Entrepreneurial expectations of rapid economic growth were crucial for high investment. At the level of political economy: when the new leadership took power after the death of Mao it decided that economic development would have to be the policy priority if Communist Party rule was to survive. China became a ‘development state’. Incentives were provided at all levels of governance to promote economic growth – in the country, in the province, in the city and in the county. Business decisions could therefore be taken with confidence that policies for rapid growth would be pursued. The ‘coordination problem’ which besets enterprise in many poor

countries – that each investment is unprofitable if made on its own but all can be profitable if made together – could be solved in this way.

It is arguable that the Chinese economy has been in a virtuous circle with sustaining feedback effects. High investment produced rapid economic growth and rapid growth in turn produced buoyant expectations which then elicited high investment. The fact that the economy was growing rapidly meant that this relative resource reallocation could occur without the growth of huge surplus capacity and the collapse in profitability of much of the relatively declining sectors. The fact that investment, much of it embodying improved technology, was so high in turn raised the rate of technological progress, which helped to keep up the marginal product of capital and thus, once the economy was marketized, the rate of profit on investment. The positive interaction between investment and efficiency gain from both technological progress and resource reallocation suggests that endogenous growth theory offers a better theoretical framework for analysing investment in China than does neoclassical growth theory.

We have produced plausible accounts of the remarkably high saving rate in each of the three sectors: enterprises, households, and government. The inefficient and repressed financial system may well have played a part: financially constrained private firms and households which saw profitable opportunities may have increased their saving in order to make their investments. Without a national saving rate that matched the investment rate, the investment boom could have collapsed in the face of the ensuing macroeconomic imbalances.

The supply of funds does not fit neatly into the explanation for high investment in China. Whereas a ready supply of bank loans at low interest rates has generally been available to the SOEs, non-state enterprises have had to rely on own savings or informal loans at high interest rates. Thus, investment has been biased towards the less profitable ownership sector.

Despite the lower profitability of this sector, SOE managers were keen to invest, partly because their objectives were more growth-oriented than profit-orientated and partly because, until the late 1990s, they faced soft budgets and therefore had no need to be risk-averse. The high investment of the private sector occurred despite the discriminatory policies that they faced: the capital market imperfections, the controls on their investment (e.g. licensing requirements), and the legal weakness of contractual and property rights. This success was partly because the corporatized former SOEs were generally sufficiently state-owned to be state-controlled. It was also partly due to the greater efficiency of private firms, which enabled them to achieve higher profit rates than the state-owned or state-controlled sectors.

There are several necessary conditions for China's high rate of investment, although none is likely to be sufficient on its own. Our story would have been incomplete without examination of the reasons not only why the demand for investment was initially high and yet remained high but also why resources were available and funds could be secured for investment.

Our analysis provides insight into the question: will investment remain high in China? On the demand side, a combination of technological progress, efficiency gain, abundant unskilled labour, and self-sustaining investor confidence has maintained the prospective rate of return on investment despite the rising capital-labour ratio. There is no compelling reason why this should not continue for some years. However, potential threats include the rapid emergence of labour scarcity to which the economy cannot adapt fast enough, and a negative shock which breaks the virtuous circle sustaining investor confidence. A negative shock could arise from the speculative bursting of a financial bubble, such as might occur as a result of the 2008-10 monetary expansion that was intended to counter economic recession, or through the eventually inevitable but unpredictable unwinding of China's present extreme external imbalance. On the supply side, the literature implies that saving will be heavily dependent on government policy. The household saving rate might fall if the family planning policy is relaxed, if public provision of pensions, health care and social security is improved, or if, as can be predicted, the dependency rate rises over the next decade. Further financial

liberalisation and the ending of 'financial repression' are likely to equalise the cost of capital, raising it for state-owned and state-dominated forms and lowering it for private firms. The effect on saving is ambiguous – reducing the need for financially constrained enterprises to save but raising the interest paid to savers, and the effect on investment is likely to be to raise its efficiency and thus its rate of return.

References

Allen, Franklin, Jun Qian and Meijun Qian (2005). 'Law, finance and economic growth in China', *Journal of Financial Economics*, 77: 57-116.

Allen, Franklin, Jun Qian and Meijun Qian (2008). 'China's financial system: past, present and future', in Loren Brandt and Thomas Rawski (eds), *China's Great Economic Transformation*, New York: Cambridge University Press.

Bai, Chong-en, Hsieh, Chang-Tai and Yingyi Qian (2006). 'The return to capital in China', *Brookings Papers on Economic Activity*, 2: 61-88.

Barnett, Steven and Ray Brooks (2006). 'What's driving investment in China?', International Monetary Fund, *Working Paper WP/06/265, November*.

Blanchard, Olivier (2006). 'Comments and discussion', *Brookings Papers on Economic Activity*, 2: 89-92.

Bond, Stephen, Julie Ann Elston, Jacques Mairesse, and Benoit Mulkay (2002). 'Financial factors and investment in Belgium, France, Germany and the United Kingdom', *Review of Economics and Statistics*, 85, 1: 153-65.

Borenzstein, E. and J. Ostry (1996). 'Accounting for China's growth performance', *American Economic Review*, 86, 2: 224-8.

Brandt, Loren and Xiaodong Zhu (2000). 'Redistribution in a decentralized economy: growth and inflation in China under reform', *Journal of Political Economy*, 108, 2: 422-39.

Brandt, L., C. T. Hsieh, and X. D. Zhu (2008). 'Growth and structural transformation in China', in L. Brandt and T. Rawski (eds), *China's Great Economic Transformation*, New York: Cambridge University Press.

Chamon, Marcos and Eswan Prasad (2008). 'Why are savings rates of urban households in China rising?', *NBER Working Paper No. 14546, December*.

Clarke, Donald, Peter Murrell and Susan Whiting (2008). 'The role of law in China's economic development', in Loren Brandt and Thomas Rawski (eds), *China's Great Economic Transformation*, New York: Cambridge University Press.

Cull, Robert and Lixin Colin Xu (2005). 'Institutions, ownership, and finance: the determinants of profit reinvestment among Chinese firms', *Journal of Financial Economics*, 77: 117-46.

Cull, Robert, Lixin Colin Xu and Tian Zhu (2007). 'Formal finance and trade credit during China's transition', World Bank, *Policy Research Working Paper 4204, April*.

De Grauwe, Paul (2008). 'Animal Spirits and Monetary Policy', *CESIFO Working Paper No. 2418*.

Ding, Sai and John Knight (2008a). 'Why has China grown so fast? The role of physical and human capital accumulation', University of Oxford, Department of Economics, *Discussion Paper No. 414*.

Ding, Sai and John Knight (2008b). 'Why has China grown so fast? The role of structural change', University of Oxford, Department of Economics, *Discussion Paper No. 415*.

Ding, Sai and John Knight (2009). 'Can the augmented Solow model explain China's remarkable economic growth? A cross-country panel data analysis', *Journal of Comparative Economics*, forthcoming.

Dollar, David and Sheng-jin Wei (2007). 'Das (wasted) capital: firm ownership and investment efficiency in China', International Monetary Fund, *Working Paper WP/07/9, January*.

Dougherty, Sean and Richard Herd (2005). 'Fast-falling barriers and growing concentration: the emergence of a private economy in China', OECD Economics Department, *Working Paper 471, ECO/WKP(2005)58, December*.

Gong, G and J. Lin (2008).'Deflationary expansion: an overshooting perspective to the recent business cycle in China', *China Economic Review*, 19, 1: 1-19.

Guariglia, Alessandra, Xiaoxuan Liu and Lina Song (2009). 'Internal finance and growth: microeconometric evidence from Chinese firms', University of Nottingham, mimeo.

Guariglia, Alessandra and Sandra Poncet (2008). 'Could financial distortions be no impediment to economic growth after all? Evidence from China', *Journal of Comparative Economics*, 36: 633-57.

Haggard, Stephan and Yasheng Huang (2008). 'The political economy of private sector development in China', in Loren Brandt and Thomas Rawski (eds), *China's Great Economic Transformation*, New York: Cambridge University Press: 337-74.

Hay, Donald, Derek Morris, Guy Liu and Shujie Yao (1994). *Economic Reform and State-owned Enterprises in China, 1979-1987*', Oxford: Clarendon Press.

Hu, Z. and M. Khan (1997). 'Why is China growing so fast?' *International Monetary Fund Staff Papers*, 44, 1: 103-31.

Hubbard, Glenn (1998). 'Capital-market imperfections and investment', *Journal of Economic Literature*, 36: 193-225.

Jefferson, Gary H., Zhang Ping and John Z. Q. Zhao, 'Structure, authority and incentives in China's industry', in Gary H. Jefferson and Inderjit Singh (eds), *Enterprise Reform in China. Ownership, Transition and Performance*, Washington DC and New York: World Bank and Oxford University Press: 43-64.

Jensen, M. (1986). 'Agency costs of free cash flow, corporate finance and takeovers', *American Economic Review*, 76, 323-9.

Kaldor, Nicholas (1960). 'Capitalist evolution in the light of Keynesian economics', in *Essays on Economic Stability and Growth*, London: Duckworth: 243-58.

Kim, Iksoo (1994). 'The political economy of investment control in post-1978 China', in Qimao Fan and Peter Nolan (eds), *China's Economic Reform. The Costs and Benefits of Incrementalism*, London: St Martins Press: 75-103.

King, R. and R. Levine (1993). 'Finance and growth: Schumpeter might be right', *Quarterly Journal of Economics*, 108, 717-37.

Knight, John (1995). 'Price scissors and intersectoral resource transfers: who paid for industrialization in China?', *Oxford Economic Papers*, 47, 1: 117-35.

Knight, John and Lina Song (1999). *The Rural-Urban Divide: Economic Disparities and Interactions in China*, Oxford: Oxford University Press.

Koopman, Robert, Zhi Wang and Shang-Jin Wei (2008). 'How much of Chinese exports is really made in China? Assessing domestic value-added when processing trade is pervasive', NBER Working Paper, No. 14109, June.

Kuijs, Louis (2005). 'Investment and saving in China', World Bank Policy Research Working Paper No. 3633, June.

Levine, Ross (2005). 'Finance and growth: theory and evidence', in Philippe Aghion and Steven Durlauf (eds), *Handbook of Economic Growth, Volume 1A*, Amsterdam: Elsevier B.V.

Li, Hongbin and Li-An Zhou (2005). 'Political turnover and economic performance: the incentive role of personnel control in China', *Journal of Public Economics*, 89, 9-10: 1743-62.

Lu, Feng, Guoqing Song, Jie Tang, Hongyan Zhao and Liu Liu (2008). 'Profitability of China's industrial firms (1978-2006)', *China Economic Journal*, 1, 1, February: 1-31.

Mayer, Colin (1988). 'New issues in corporate finance', *European Economic Review*, 32: 1167-89.

Modigliani, Franco and Larry Shi Cao (2004). 'The Chinese saving puzzle and the life cycle hypothesis', *Journal of Economic Literature*, 42: 145-70.

Naughton, Barry (2007). *The Chinese Economy. Transitions and Growth*, Cambridge, Mass. and London: The MIT Press.

People's Republic of China, Ministry of Finance (PRC, MF) (2009). *Finance Yearbook of China 2008*, Beijing: Ministry of Finance.

People's Republic of China, National Bureau of Statisitics (PRC, NBS) (various years). *China Statistical Yearbook*, Beijing: China Statistics Press.

Qin, Duo and Haiyan Song (2009). 'Sources of investment inefficiency: the case of fixed asset investment in China', *Journal of Development Economics*, 90: 94-105.

Riedel, James, Jing Jin and Jian Gao (2007). *How China Grows. Investment, Finance and Reform*, Princeton, New Jersey: Princeton University Press.

Wei, Shang-Jin and Xiaobo Zhang (2009). 'The competitive saving motive: evidence from rising sex ratios and savings rates in China', *NBER Working Paper15093*, June.

Woo, W. T. (1998). 'China's economic growth: sources and prospects', in M. Fouquin and F. Lemoine (eds), *The Chinese Economy*, London: Economica.

Wurgler, Jeffrey (2000). 'Financial markets and the allocation of capital', *Journal of Financial Economics*, 58, 187-214.

Young, A. (2003). 'Gold into base metals: productivity growth in the People's Republic of China', *Journal of Political Economy*, 111, 1: 1220-61.

Zou, Hengfu (1991). 'Socialist economic growth and political investment cycles', *European Journal of Political Economy*, 7: 141-57.