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INSTITUTIONS AND CREDIT CREATION
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Sebastian Dullien

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CENTRAL BANKING, FINANCIAL INSTITUTIONS AND CREDIT CREATION IN DEVELOPING COUNTRIES

Sebastian Dullien

Abstract

This paper examines how developing countries can embark on a sustained path of strong investment, capital accumulation and economic growth without capital imports. It is argued that the key lies in the Keynesian-Schumpeterian credit-investment nexus: Given certain preconditions, the central bank can allow a credit expansion which finances new investment and creates the savings necessary to balance the national accounts. It is further argued and confirmed in empirical data that one of the biggest impediments to such a process is formal or informal dollarization which limits the policy scope of the central bank. Moreover, a stable banking system with a broad outreach as well as a low degree of pass-through between the exchange rate and domestic prices seem to be a necessary condition for this process to work.

I. INTRODUCTION

Already about two decades ago, Robert Lucas (1990) asked: “Why Doesn’t Capital Flow from Rich to Poor Countries?”, wondering why only very little capital in net term was flowing from the industrial world to developing economies. In the past years, this trend has even aggravated: Nowadays, in many cases, net capital flows have reversed and are now flowing from developing and emerging countries towards the rich world, especially towards the United States, United Kingdom, Australia and Spain. Not only China and other Asian countries are showing current account surpluses (and hence net capital exports). Also a number of Latin American countries have joined the group of current-account surplus-countries. Nevertheless, at the same time, GDP in the developing world has been growing with a speed and a persistency not seen for several decades. What is more, developing countries which are exporting more capital seem actually to grow faster than countries of similar endowments with lower capital exports or with capital imports (Gourinchas and Jeanne, 2007).

However, while this phenomenon has gained more attention over the past years, as Prasad et al. (2007) remark, this fact even seems to hold over a longer period. Over the whole period from 1970 to 2000, developing countries and emerging markets with more favourable and even positive current account positions (which implies net capital exports of these countries) have recorded higher per-capita GDP growth rates.

In addition, the growth process of these capital-exporting countries has been rather capital intensive: Even though not all countries have recorded an investment to GDP ratio as high as in China, all of the fast growing emerging markets and developing countries with net capital exports have shown impressive rates of domestic capital accumulation.

Against this background, the critical question is: If poor countries can develop and accumulate capital domestically without capital inflows (or even with net capital outflows), where do they get their capital from? And – since there are developing countries which did

not manage to embark on a growth trajectory with high capital accumulation – what are the policies which can help countries to accumulate capital without capital import?

This paper argues that the answer to this question can be found in the Keynes-Schumpeterian explanation for capital accumulation. In this approach, the financial system as a creator of credit plays a central role for the accumulation of capital. If the right structures are in place, the domestic financial system can provide inflation-free finance for investment without prior savings from domestic residents or the import of capital from abroad. In an economy with an under-utilized labour supply, the financial sector can create purchasing power which investors can use to increase the capital stock while the incomes created in this process provide *ex post* for the savings necessary to finance the investment.

The rest of the paper is structured as follows: Section II reviews the textbook approach to saving, investment and capital accumulation and contrasts it with the Keynesian-Schumpeterian approach to investments and savings. Section III takes a look at the preconditions under which a country can embark on a self-financed path of high investment and capital allocation. Section IV confirms some of the findings from the earlier sections with some cross country data. Section V draws some policy conclusions and section VI concludes.

II. RETHINKING THE SAVING-INVESTMENT NEXUS

Most of the standard macroeconomic textbooks¹ today argue in the exposition of long-run growth that the central limiting factor to economic development is the lack of capital endowment in less developed countries. This conclusion is usually reached both using a traditional neoclassical growth framework based on Solow (1956) seminal work as well as modern endogenous growth models which broaden the term “capital” to explicitly include human capital and knowledge capital.

In these models, output is a function of production factors, namely labour supply L and the capital stock K which are input to some production function of the form $y = K^\alpha (AL)^{1-\alpha}$ with α denoting the weight of capital in the production process and A denoting technological progress.

The capital stock K in these models is increased by investment. Investment in turn can only be conducted if individuals decide to refrain from consumption and save some part of their disposable income y and thus make resources available for investment. Increased savings then increase the amount of loanable funds available in the economy which in turn are funnelled by the financial system (which usually is not modelled explicitly) towards those firms which wish to undertake investment.

In this framework, endogenous changes in the interest rate balance supply and demand of loanable funds. If there is an excess of investment plans over savings, interest rates will increase. Higher interest rates lead to more savings by the single household as the intertemporal price of consumption today increases, thus increasing aggregate savings. At the same time, as firms adjust their investment to the marginal productivity of capital, investment demand will react negatively to rising interest rates, bringing supply and demand for loanable funds into equilibrium.

¹ For example, Mankiw (2006), but also Romer (2007) or Barro and Sala-I-Martin (2003). Note, however, that textbooks which explicitly focus on development economics such as Thirwall (2006) or Todaro and Smith (2003) focus much less on the neoclassical growth model.

From this approach, there would be only two possibilities for a developing country to increase its capital stock: Either households decide to consume less and save more of their income or the economy imports savings from abroad.²

Box 1

SAVINGS AND INVESTMENTS IN THE NATIONAL ACCOUNTS

In the logic of the national accounts, an excess of domestic investment over saving has to be equivalent to a surplus in the current account. The national income equation can be written in two ways. We know that first national income can either be saved or consumed as is embodied in:

$$Y = C + S$$

With Y denoting national income, C denoting consumption and S denoting savings.

At the same time, we know that national income is equal to aggregate demand which is defined as:

$$Y = C + I + Ex - Im$$

With I denoting investment, Ex denoting exports and Im denoting imports. Putting the two definitions together and using the identity that the current account is the surplus of exports over imports ($CA = Ex - Im$), we get

$$S = I + CA \quad \text{or} \quad I = S - CA$$

The two identities above already represent the different interpretation between the Keynesian-Schumpeterian view and the neoclassical textbook approach: While according to the first view, saving is determined by the income creation due to investment and external demand, advocates of the latter claim that the household's decision to save and to borrow or lend abroad determines domestic investment.

These main conclusions even remain intact in the modern endogenous growth theory. While the Solow model had assumed that technological progress A increases somehow exogenously, the new growth theory aims at modelling explicitly how technical progress takes places. In these models, capital usually has an even more important role than in the old growth theory. One strand of the literature models increases in the technological progress as a positive externality of capital accumulation. Another strand of the literature introduces knowledge capital or human capital, both of which are accumulated by investment in certain activities (such as research and development or education). Again, investment in human capital or research and development is constrained by the amount of resources available. Only if consumers first abstain more from saving or if firms import capital from abroad, overall output can be increased.

This conclusion is strongly at odds with the successful development stories of the post-World War II years (i.e. Germany and Japan) or of the past decades (i.e. the South-East Asian "Tigers" or China), neither a drop in consumption, a sizeable fall in the growth rate of consumption nor a net surge of capital inflows could be observed (see box 2 on Germany's and China's growth performance during their most vibrant periods of catch-up growth).

The suspicion that there might be something wrong with the standard textbook theory of capital accumulation in developing countries has lately further been confirmed by a number

² Please refer to box 1 for the national account logic of saving, investment and the current account.

of empirical studies. In the most comprehensive study, Prasad et al. (2007) show in a sample of 56 non-industrialized countries not only that net capital inflows over a long period (from 1970 to 2004) are in general associated with lower growth. They also test for a number of possible explanations, i.e. whether this result is distorted by the fact that possibly some successful countries started poor and had current account deficits, then grew fast and ended up richer and running external surpluses. Here they find that in a smaller sample of countries which experienced sudden “growth spurts”,³ investment started increasing before the start of the growth spurt at a time when aggregate savings were smaller than aggregate investment, with savings only subsequently increasing to a level above that of aggregate investment, resulting in a current account surplus. Hence, capital exports were largest shortly after a “growth spurt” started and petered out later in the growth process. They come to the conclusion that “from a saving-investment perspective, the evidence seems to challenge the fundamental premise that investment in non-industrial countries is constrained by the lack of domestic resources” and go on that “investment does not seem to be highly correlated with net capital inflows, suggesting that it is not constrained by a lack of resources” (Prasad et al. 2007: 179).

Prasad et al. try to reconcile these results with explanations which lead the textbook causation from savings to investment intact. Thus, they look into explanations of exogenous productivity shocks which lead to a stronger increase of domestic savings than of domestic investment given underdeveloped structures of corporate governance or financial systems. A second explanation proposed is that capital inflows cause negative externalities such as a potential overvaluation of the exchange rate.

Box 2

THE TALE OF TWO CATCH-UP PROCESSES: GERMANY AND CHINA

At first sight, China and Germany do not have much in common economically. China is a developing country which is at the moment experiencing a rapid transformation towards a more modern economy with strongly growing per-capita income. Germany is a traditionally industrialized country which for decades now has been among the world’s high-income countries.

Yet, Germany and China are two of the most impressive economic success stories of the past 100 years. After World War II, Germany managed to embark on a catch-up growth with propelled in close to the top in per-capita in terms of European economies, a position, it had never been before.¹ Within only 10 years from 1950 to 1960, per capita income in Germany relative to those in the United States rose from 41 to 72 per cent which implied more than a doubling of German real per-capita GDP in only one decade (see figure B.1). China has experienced a similar impressive growth since the 1990s: China’s per capita income relative to the United States rose from 6 per cent in 1990 to about 12 per cent in 2000 and continued to rise afterwards (see figure B.2). Just as in the case of Germany 40 years earlier, per-capita GDP in China in this period doubled (and continued its strong pace of expansion after a short pause after the Asian crisis in 1998).

However, there is another interesting parallel between the German and the Chinese experience: As can be seen in figure B.3, even the German capital stock was widely destroyed after World War II, Germany embarked on the growth process without any net capital exports. In fact, over the growth process, net capital exports even increased. When the current account turned negative in the early 1960s, the catch-up process also came to an end. In the 1980s, China still relied to a certain extent on capital imports as can be seen in figure B.4. As is visible in figure B.2, during this time, the catch-up process was in fact significantly slower than in later years. The most impressive growth experience of the 1990s (and ever since) has been going hand in hand with high and growing net capital exports.

³ Prasad et al. (2007) use the definition of growth spurts from Hausmann et al. (2005) who looked for periods in which strong growth was sustained for at least 8 years.

Box 2 (continued)

There are other interesting parallels: In both countries, changes in investment ratios seem not to have been triggered by changes in household savings ratios, but have shown separate trends: In Germany, the investment-to-GDP ratio rose from 1951 to 1954 from 20 to 25 per cent, and hovered between 23 and 25 per cent until the late 1960s. The household savings rate, on the other hand, started from a very low level of just 4 per cent of disposable income in 1950 (which even translates into a lower share of GDP as disposable income is only a share of GDP) a steady increase in the 1950s which lasted until the mid-1970s and only peaked several years after the investment-to-GDP ratio had begun to decline. With real wages increasing much stronger than household savings, this increase in the savings rate left ample room for buoyant consumption growth during the period. Hence, the growth spurt came about without a prior consumption restraint. As the government budget was fluctuating around a balanced budget over the period, the only possible conclusion is that the (albeit over the time shrinking) gap between household savings and corporate investment was financed by credit creation and retained earnings from profits created thanks to strong productivity growth: According to Bundesbank data (see figure B.5), from 1950 to 1960, domestic credit rose almost sixfold in nominal terms and from 27 per cent to 55 per cent of GDP.

As can be seen in figure B.6, the investment-to-GDP ratio in China has even been trending downward from 1985 to the early 1990s while the household savings rate has been increasing.² The steep increase in the investment ratio to a peak of 40 per cent in 1993 was followed by an increase in the household saving rate to a peak of 33.8 per cent in 1994 before both variables trended somewhat downwards again. Again as in the case for Germany, consumption in China grew vigorously over the period: The data from the National Statistics Office does not show any year after 1990 in which real household consumption grew by less than 4.5 per cent. Again, as in the case of Germany half a century earlier, from 1990 onwards (with the exception of the single year 1993), the gap between household savings and aggregate investment was financed by retained earnings and credit expansion: The ratio of domestic loans to GDP by the banking sector rose from 86 per cent in 1990 to a peak of 150 per cent in 2003.

The strong growth of credit in both cases, however, does not mean that domestic credit was the only source for finance of enterprises. In both cases, retained savings by the enterprises played an important role (in China today, these retained savings are an important factor to explain the high national saving rate). However, it can well be argued that the strong credit creation is a necessary condition for profit growth in an economy: Only if credit creation helps to maintain a high level of aggregate demand, firms will be able to make sufficient profits in the aggregate.

For the export sector, of course, the importance of domestic credit creation must be seen as much less important as it earned its profits not from domestic demand stimulated by credit creation, but from foreign demand. Nevertheless, one could also argue that there still is a significant effect of domestic credit creation for the export sector: First, the investment by domestic firms helps diffuse technology across the economy and hence to modernize the economy which can be expected also to have spillovers into the export sector and improve competitiveness there. Second, even if domestic credit might have played a smaller role in China's export sector (given the fact that a large part of Chinese exports today comes from foreign owned-enterprises and was hence initiated by FDI), for the Chinese owned part of these firms, part of the initial investment was in fact financed by domestic bank credit. Without an initial investment, it would have been close to impossible to earn profits to subsequently finance investment from.

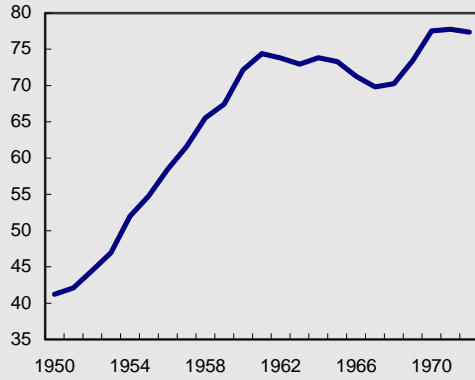
Finally, the growth stories of both Germany and China show an important parallel: In both cases, both domestic and external expansion run roughly in parallel, albeit there was a slight permanent positive contribution from net exports. Different from other countries which experienced limited export booms, the striking feature is that also domestic demand expanded briskly. This part of the growth process has clearly been driven by strong credit expansion.

¹ According to the data of Maddison (2007), Germany in fact used to have a per-capita GDP levels *below the average* of Western Europe for all of the century before the rearmament in the late 1930s.

² Measures for household saving rates in China are subject to ongoing disputes. However, most economists now agree that survey data is rather unreliable and try to construct saving rates from data for deposits or flow of funds. "Savings rate I" in the graph denotes the estimates from Modigliani and Cao (2004), while "Savings rate II" denotes the estimate from He and Cao (2007) which is available only for a shorter period of time, but until 2002.

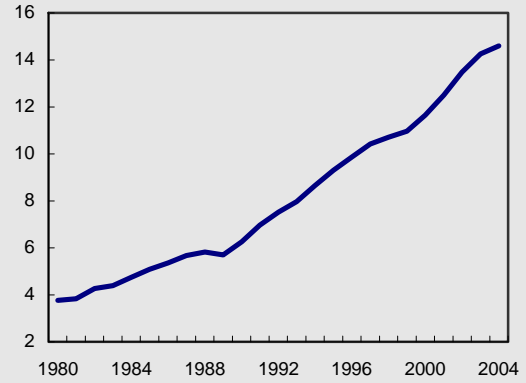
Box 2 (concluded)

Figure B.1
German real per capita GDP relative to the United States,
1950–1972, 100 = US



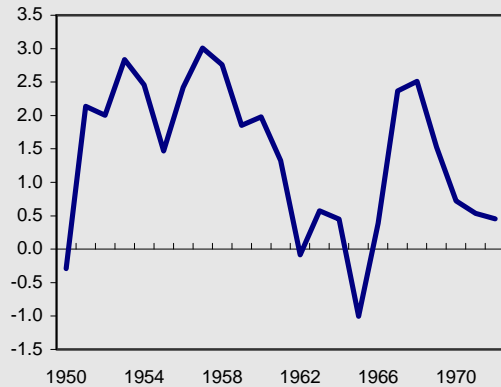
Source: Own calculations, based on Henson et al., 2006; and Bundesbank data.

Figure B.2
Chinese real per capita GDP relative to the United States,
1980–2004, 100 = US



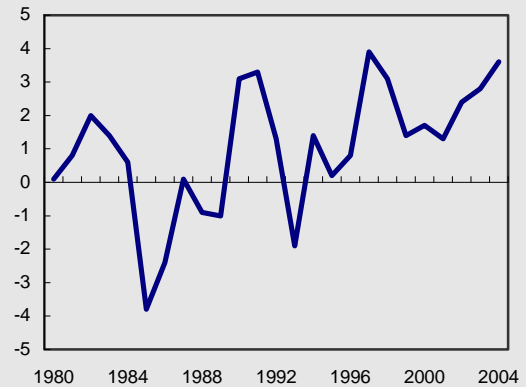
Source: Henson et al., 2006.

Figure B.3
German current account balance, 1950–1972
(Per cent of GDP)



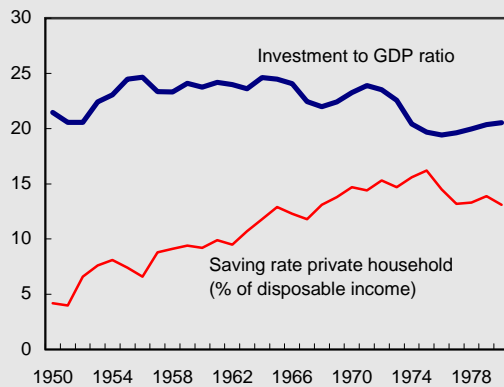
Source: Own calculations, based on Bundesbank data.

Figure B.4
Chinese current account balance, 1980–2004
(Per cent of GDP)



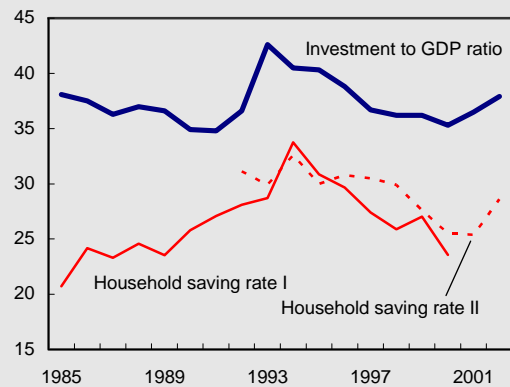
Source: IMF.

Figure B.5
Investment and household saving in Germany, 1950–1980



Source: Bundesbank.

Figure B.6
Investment and household saving in China, 1985–2002



Source: He/Cao, 2007; Modigliani/Cao, 2004; Chinese Statistics.

However, their empirical observations can also be interpreted as hinting at a much more fundamental problem with the causality between savings and investment proclaimed by textbook theory. This thought is not new. The causation between saving and investment has long been disputed and not yet been solved.⁴ Based on the works of Keynes and Schumpeter, some economists argue that the causation does not run from saving to investment, but rather from investment to saving.⁵ According to them, an autonomous increase in investment can in fact create the savings necessary to finance this investment on a macroeconomic level.

In this view of the saving-investment nexus, aggregate credit expansion comes before saving. The process of credit-expansion here starts with the wish of an entrepreneur to get some means of payment to invest into some new equipment or simply to buy intermediary products or hire workers in order to start, expand or start production. The financial system with the support of the central bank then expands the money supply *ex nihilo* (“out of nothing”) and lends the newly created liquidity to the firms. Money is then used by the entrepreneur to hire workers and buy material for new production. As Schumpeter (1951: 107) puts it:

[c]redit is essentially the creation of purchasing power for the purpose of transferring it to the entrepreneur, but not simply the transfer of existing purchasing power. The creation of purchasing power characterizes, in principle, the method by which development is carried out in a system with private property and division of labour.

While part of this monetary expansion might end up in higher prices if the entrepreneur has to compete for scarce resources, some part of it ends in a net expansion of aggregate output as formerly unutilized resources (i.e. unemployed workers) are put to work. As with a higher degree of utilization of resources and a higher employment rate, absolute aggregate disposable income increases, so does absolute aggregate saving even if the average saving rate of private households remains constant. Savings and investment in this approach balance via changes in nominal incomes and prices. If realized investment demand is higher than the savings households plan to make even at the higher realized output and employment, prices rise. In this case, aggregate nominal demand for consumption and capital goods is above the aggregate supply for these goods at the old price level. The excess demand thus drives up sales prices, which given an unchanged nominal income of private households leads to a revision of real consumption plans. The increase in sales prices in turn leads to a redistribution of real incomes from the household to the corporate sector. Thus profits in the business sectors increase which in the national accounting end up as retained profits and hence saving by the corporate sector.⁶ In the end, again, aggregate saving equals aggregate investment, but the transmission channel is fundamentally different than in the textbook approach.

⁴ See for a thorough exposition of the argument applied for the United States of America, Gordon (1995).

⁵ Prieue and Herr (2005: 149) call this approach therefore the “Keynesian-Schumpeterian approach to finance and development”.

⁶ In addition, one could argue with different propensities to consume between workers and entrepreneurs: With workers having in general a higher propensity to consume, the redistribution from wage income to profits might lead to higher national savings rate even if profits are distributed to the household sector.

Figure 1

THE TWO CONTRASTING VIEWS ON THE SAVINGS-INVESTMENT NEXUS

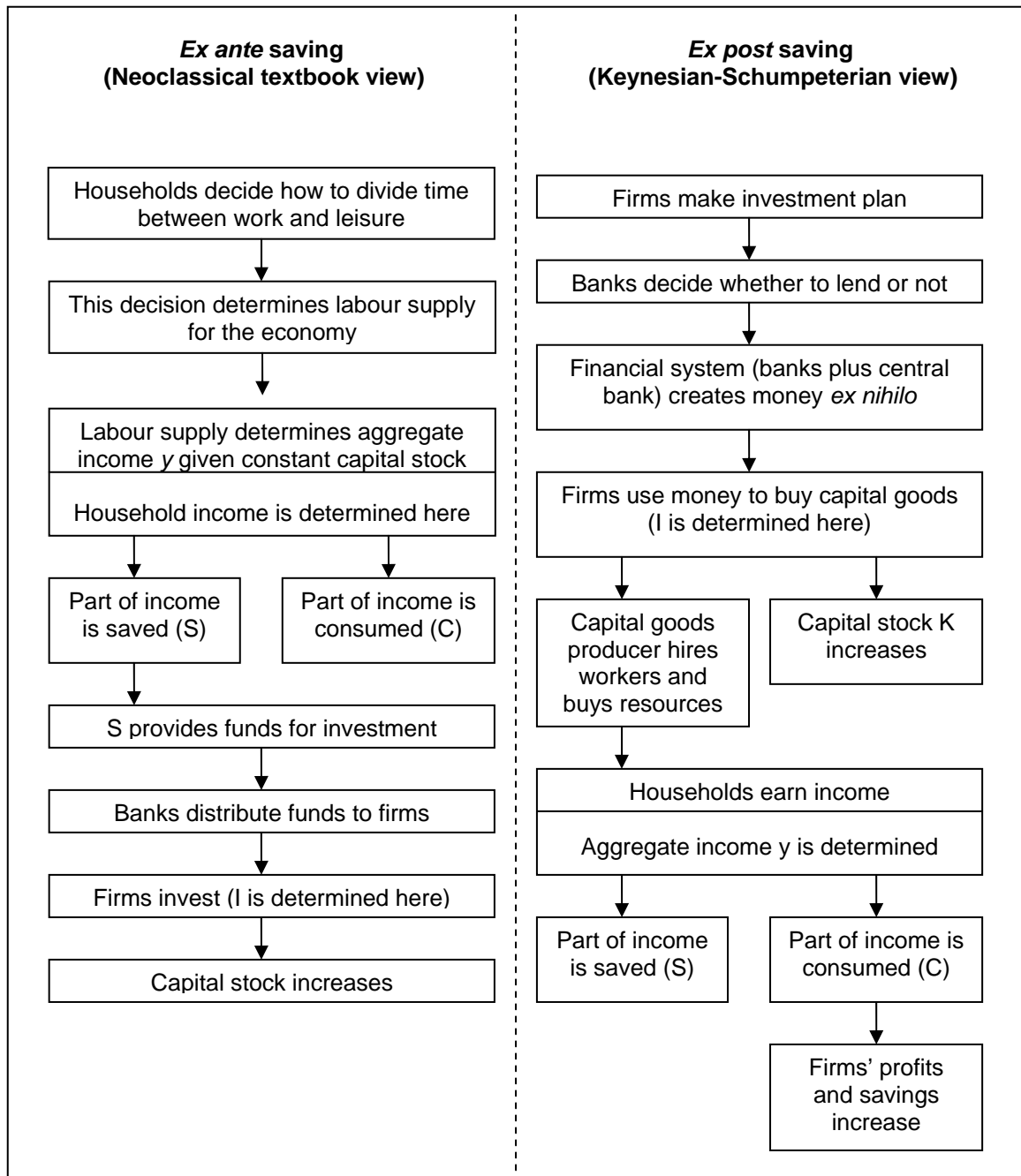


Figure 1 contrasts these two views on the causation from savings to investment. While for the predominate textbook approach, the decision of households to save a larger share of their income (or some increased “import of savings” from abroad) is the seminal part of the investment process, in the Keynesian-Schumpeterian perspective, it is the decision of the entrepreneur to invest and the willingness of the financial system to expand the credit supply which gets the investment process going.

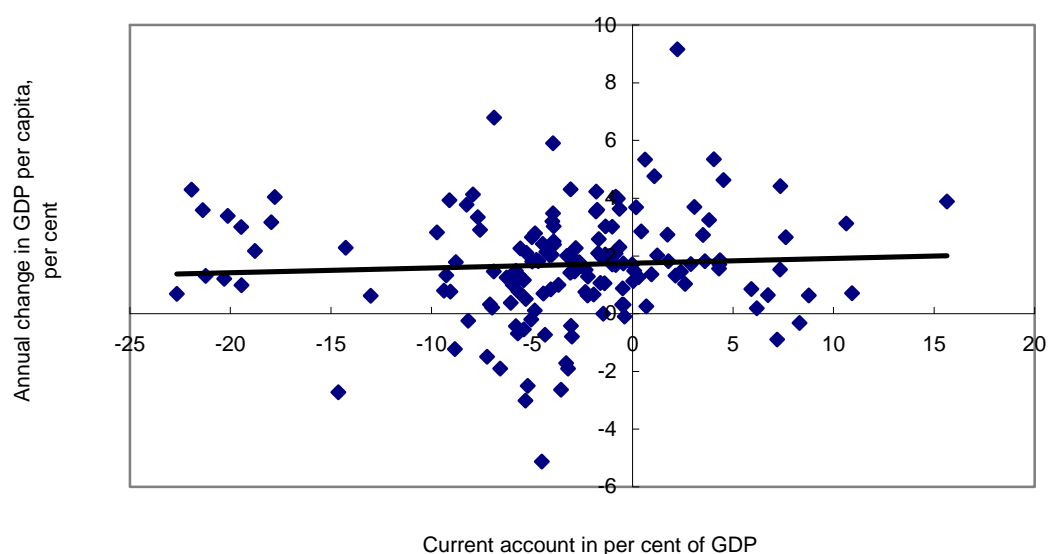
The advantage of the Keynesian-Schumpeterian approach is that it can easily explain how some developing countries have embarked on a positive growth trajectory without an ex ante increases in the household saving rate and without capital inflows: A change in overall

demand conditions (i.e. by some real exchange rate undervaluation strategy⁷ or some autonomous shift in the world market demand for a country's goods) can be seen as the trigger for an upward shift in investment plans by domestic enterprises and a credit expansion by the domestic financial sector. Given that the pool of underutilized labour is large in almost all developing countries (either in the form of open unemployment or in the form of hidden unemployment in both the agricultural and the informal sector), this then leads to an increase in employment in the modern sector which in turn leads to more incomes and savings. The expansion of the production of the modern sector moreover brings about the penetration of modern technology into the economy and hence an increase in productivity and goods supply, also adding to higher incomes.⁸

If the initial demand impulse is created by some deliberate undervaluation strategy (either by low nominal wage increases in an environment of fixed or quasi-fixed exchange rates or by a devaluation and subsequent wage and price freezes), one would exactly see the pattern which Prasad et al. (2007) are puzzled about: The strong investment growth (and subsequent GDP growth) would coincide with a favourable current-account position. This would also fit nicely into the fact that Prasad et al. (2007: 201) that in non-industrialized countries, growth spurts have usually been preceded by a correction of some prior overvaluation (or in other words, a real depreciation).

Figure 2

CURRENT ACCOUNT BALANCES AND PER CAPITA GDP GROWTH, 1990–2005



Moreover, if we take a look at the internationally available data, we can see that even though current account deficit and hence capital imports are not systematically correlated to higher GDP growth, the growth of private credit in fact is systematically correlated to higher economic dynamics. figure 2 shows average current account balances in per cent of GDP and average annual growth rates of per-capita GDP for the years 1990 to 2005. In contrast to

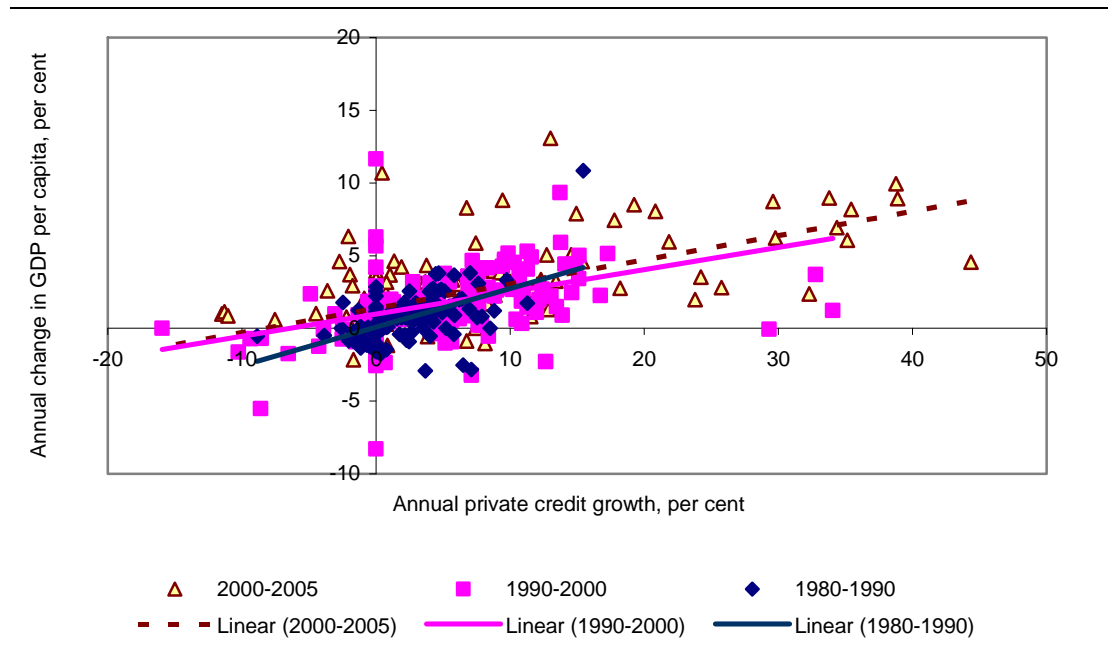
⁷ See i.e. Flassbeck et al. (2005) for a description of the Chinese undervaluation strategy.

⁸ Even if there is no unemployment and hence no underutilized labour, the Schumpeterian process of internal credit creation poses a possibility for growth-enhancing credit creation: If the credit created helps innovators with more advanced technologies to compete resources away from existing firms, this might increase productivity in an underdeveloped economy (with a lot of room for productivity improvements) so much that in fact the increase in aggregate supply *ex post* also helps to finance the initial investment.

Prasad et al. (2007), the graph contains all 151 countries for which the data is available in the IMF's World Economic Outlook Database, including a number of tiny countries, industrialized and non-industrialized countries and failed states. The positive correlation between current account balances and growth shown by Prasad et al. (2007) now seems to be less robust. However, what is clear is that there is definitely *no negative* correlation between current account balances and economic growth as would be expected from textbook theory. In contrast, if we take a look at the growth rate of inflation-adjusted credit to the private sector and economic growth – divided by decades as for only very few countries data is available for the whole period of 1980 to 2005 – in figure 3, we see a clear positive correlation between the two.

Figure 3

PRIVATE CREDIT GROWTH AND PER CAPITA GDP GROWTH, 1980–2005



III. THE ROLE OF CREDIT CREATION IN THE INVESTMENT-SAVINGS PROCESS

For the process of a credit-financed investment expansion described above, the financial sector is of crucial importance. The Keynesian-Schumpeterian investment-saving nexus can only work if the financial sector is able and willing to extend credit to companies which wish to expand production and investment. In order for the process to work, different levels of the financial sector thus have to interact smoothly and fulfil certain tasks. First, there are different types of financial institutions (private, state-owned) which interact with borrowers and savers (the lower tier of the financial system). They have to extend the loan and later provide households options to save (part of) their income. Second, there is a central bank (the upper tier of the financial system) which provides base money to the financial institutions to satisfy their liquidity needs. While to a certain extent, financial institutions can extend credit and broad money supply on their own, in the end they depend on the collaboration or at least the accommodation of their monetary expansion by the central bank which has to allow an increase in base money so that commercial banks can fulfil their reserve requirements.

Figure 4 shows this process more in detail with stylized T-accounts⁹ for the sectors of the economy involved (firms, households, financial institutions and the central bank) for an economy with a well-functioning financial system but underemployed resources:¹⁰ The process starts with the firm asking for a loan of 100 pesos and being granted that loan from a bank (labelled “financial institutions” as to prevent confusion with the central bank); consequently, the bank books the loan to the firm as an asset in its own balance sheet and credits the firm with a deposit while the firm books the loan as a liability and the deposit as an asset (accounting record 1 in the figure). The deposit here is created out of nothing (“*ex nihilo*”) and the broad money supply has increased.

Figure 4

THE STYLIZED CREDIT-INVESTMENT PROCESS

Firm				Household			
Assets		Liabilities		Assets		Liabilities	
[1] Deposit at bank	+100	[1] Bank Loan	+100	[3] Deposit at bank	+100	[3] Household wealth	+100
[3] Deposit at bank	-100						
[3] Capital good	+100						

Financial Institution				Central Bank			
Assets		Liabilities		Assets		Liabilities	
[1] Loan to firm	+100	[1] Deposit from firm	+100	[2] Loan to bank	+100	[2] Reserves	+100
[2] Reserves at central bank	+100	[2] Loan from central bank	+100				
		[3] Deposit from firm	-100				
		[3] Deposit from household	+100				

In a second step, the bank needs to get the base money necessary for the credit expansion (note that empirically, banks have to fulfil their reserve requirements only *ex post* so they expand credit before getting the reserves necessary to back them). For simplicity, we assume a minimum reserve requirement of 100 per cent on deposits, so the bank needs to get 100 pesos in central bank reserves. If the bank is solvent and has sound marketable securities, it can borrow these reserves from the central bank either via the discount window or via open market operations. For developing countries which do not have a working money market in which the central bank conducts open market operations, we for a moment assume that the commercial bank is provided with the base money necessary for credit creation by some direct monetary policy instrument such as rediscount quotas via which it can borrow base money.¹¹

The bank books the credit from the central bank as a liability and the newly created central bank reserves in its account at the central bank as an asset, the central bank books the credit to the commercial bank as an asset and the newly created central bank reserves as a liability (accounting record 2). Now, the central bank has created base money out of nothing and not only the broad, but also the narrow money supply has increased.

⁹ This process of credit creation *ex nihilo* is covered in most textbooks on money and banking, i.e. Mishkin (2007).

¹⁰ This part is based on Dullien (2004: 150ff).

¹¹ The question of monetary policy instruments in the process of credit creation is covered more in detail in section 3.2.

In a third step, the firm now uses the money to hire some formerly unemployed worker from the household sector in order to produce some capital good (i.e. build a factory building). Hiring the worker and paying him 100 pesos by bank transfer means a transfer of the deposit from the firm's account to the household's account in the bank.¹² At the same time, the firm gets the capital good newly produced while the household's net wealth increases by the amount of wages paid (accounting record 3). Thus, the capital stock has been increased just by employing formerly underutilized resources of the economy without any capital import and just by extension of the money and credit supply. In the end, households have increased their wealth by 100 pesos in bank deposits and the real capital stock has increased in value. Savings equal investment.

If now the household starts spending some of its income (as can be expected in the real world), we would see a further step in the income-creation: Demand for consumer goods would increase. As long as consumer goods are produced domestically and firms can expand their production, this would lead to a further increase in domestic employment, further increasing aggregate income. However, as households save part of their income, also aggregate saving increases, providing the *ex post* finance of the initial investment.

In the cases where demand runs into capacity constraints, an increase in prices could be expected, depending on market power of producers and the ease by which they can expand capacities. Those increases in prices lead to an increase in aggregate profits which the firms can save and which they use *ex post* to finance their investment. In this case, the real wage sum of the workers would not rise quite as much as in the first case. Instead, profits would increase more strongly and as a consequence savings by the corporate sector would rise.¹³

In this process, one factor might mitigate the increase in prices: If the entrepreneur has been successful in applying a new technology and hence produces more efficiently and hence at lower costs than firms already in the market, he might earn some extra profits due to lower costs even at constant prices. In this case, the innovative entrepreneur will earn the profits he can use *ex post* to finance the investment. In both cases, in the end, aggregate saving again equals aggregate investment, even if the process is slightly different.¹⁴

In the cases in which the innovative entrepreneur earns large extra profits or other firms with monetary liabilities towards their banks earn higher profits in the credit-investment process, even the stock of monetary assets need not to increase in the same amount as the initial credit creation. In as far as the firms use the increased profits to pay back a credit formerly extended to them by the banking sector, money is destroyed again and the overall money stock in the economy does not increase. One could expect that empirically, newly created credit is partly used to repay old loans and partly used to increase savings at the household level by increasing incomes.

However, while the mechanism of the credit-investment process as described is quite straightforward in an economy with a smoothly working financial system, for a typical developing country it might run into obstacles. Both the lower tier of the financial system

¹² Alternatively, one could assume that the firm changes its deposit into cash and hands it over to the household. This would imply a slightly different accounting, but the basic outcome would be the same.

¹³ The later mechanism has already been explained by Keynes (1930). Modern textbooks call this "forced savings". See i.e. Thirlwall's (2006: 438ff) exposition on the Keynesian view of investment finance in developing countries.

¹⁴ In fact, both in the catch-up processes in Germany as well as in China described in box 2, a large share of investment has been financed *ex post* by corporate savings. According to He and Cao (2007), corporate savings amounted to almost 40 per cent of total Chinese saving around the turn of the millennium.

(private and state-owned banks) as well as the upper tier (the central bank) can be constrained in their ability to fulfil their role in the Keynesian-Schumpeterian credit-investment process.

A. Impediments for financial institutions

First, there are a number of challenges for the first step of the credit creation, the decision of the lower tier of the financial system to extend credit to some enterprise which wants to conduct some investment project. The first problem is that a number of entrepreneurs and firms which in principle could conduct some profitable investment project have no or very constrained access to formal credit. There are a number of reasons for this phenomenon. First, in developing countries, the informal sector usually is of a larger relative size than in developed countries. Firms in the informal sector often do not have the legal status as an enterprise which makes financial institutions reluctant to lend to these entities. Moreover, firms in the informal sector often do not have a fixed (or legalized) business location. This is true not only for small vendors, but also for small craft industry. From the perspective of financial institutions, the lack of a business location makes it more difficult to recover a loan should the borrower not pay voluntarily. Finally, firms in the informal sector often lack standard forms of collateral. This might not only stem from the fact that they often do not have much capital to begin with, but also from the fact that the capital is often held in the form of a non-fungible assets, i.e. a piece of land which is the owner lives on but which he lacks a formal deed for.¹⁵ As these assets cannot be used as collateral in standard credit contracts, formal financial institutions have often refrain from lending against such securities.

While microcredit has experienced impressive growth rates in the past decade and has been widely lauded for its potential in economic development, it is questionable whether it is able to overcome this problem by itself. Proponents of microfinance have long been arguing that there is a large unmet demand for small-scale loans in developing countries. Robinson (2001) argues that in the poor world, there might be as many as 1.8 billion people in 360 million households who would have demand for microfinance products as well as the ability to serve a loan but do not have access to such services yet. Moreover, according to this view, microcredit can help significantly to alleviate poverty for those who are not extremely poor, but at least for the economically active poor: Microcredit might provide the working capital for small enterprises which allow them to buy some inventories and thus improve efficiency and increase incomes earned. In addition, microloans might help to smooth consumption in the wake of volatile cash flows. In fact, the strong growth of microfinance indicates that there really is a large unmet demand for financial products for the poor. As a tool for development strategies, microfinance has grown in importance as it was a move away from large-scale investment projects towards decentralized projects.¹⁶ Finally, there was the promise that microfinance might need initial support from international donors, but might in the end work profitable by itself (Robinson, 2001).

However, microcredit has often three characteristics which limit its suitability for investment in fixed capital. First, maturities in microcredit are often rather short, sometimes as little as three to six months.¹⁷ Second, interest rates for microcredit tend to be rather high as high monitoring and screening costs in the microfinance business forces financial institutions to recover these costs from their customers. Real effective interest rates in most widely cited programmes vary from 15 per cent annually for the Grameen bank in Bangladesh to 15 to 25 per cent for Rakyat Indonesia or almost 30 per cent on dollar-denominated loans for

¹⁵ See de Soto (2000) for an analysis of this problem.

¹⁶ See for a nice overview of this debate Nitsch (2002).

¹⁷ See Murdoch (1999) for several examples or Karlan and Zinman (2007) who show that even though the demand for microcredit can be expected to react quite strongly to an increase in maturities offered, usually short maturities are offered.

BancoSol in Bolivia.¹⁸ While these interest rates might be lower than those charged from informal money-lenders, they might just be too high to be realistically earned with some medium-sized fixed capital investment. In addition, loans in microcredit programmes are usually too small to buy a substantive capital good. Hence, microcredit loans are most often used as working capital in the service sector. While this kind of lending might improve the economic conditions of those receiving the loans, it has rather limited impact on the formation of fixed capital as is regarded central for capital accumulation and technological progress in neoclassical growth models.

A second problem often observed in developing countries in the credit-investment process is that loans are allocated according to political considerations or ties between bank managers and the corporate sector. This practice is problematic for two reasons: First, even if the central bank can create liquidity and the financial sector as a whole is thus not be constrained by a lack of base money, banks in developing countries are often weakly capitalized. Legal minimum capital-adequacy ratios hence limit the overall amount of loans provided by the financial sector. If a large share of the loans is not allocated by economic merit, this means the most innovative and efficient firms in fact might not have access to credit finance, while some inefficient firms might be kept in the market by cheap credit. In addition, over an extended period, allocating loans by political consideration or cronyism might exacerbate the problem of an undercapitalized banking sector: Loan decisions not made on economic merit can be expected to lead to a higher share of non-performing loans which on the one hand depletes the capital base of the banks and on the other hand might force financial institutions to charge higher interest rates to all of their borrowers. This in turn obstructs the medium- and long-term ability of the financial system to play its role in the Keynesian-Schumpeterian process of investment finance.

Of course, credit expansion for reasons beyond economic merit might for a while help increasing economic growth. If credit expansion works toward the extension of productive capacity, this process might go on for an extended period of time, even if borrowers in the long run will not be able to pay back their loan. The downside in this case is the accumulation of non-performing loans in the banking sector which in the end might lead to high fiscal cost. This might actually be what has been observed in China: One could argue that a non-trivial part of the loans by state-owned banks to state-owned enterprises over the past decade have been extended for reasons beyond the microeconomic consideration of the banks. These loans – while having supported economic growth and most likely having played a role in the modernization of the economy – will in the future pose a heavy fiscal burden for the Chinese Government.

However, the problem of personal ties and political factors influencing the loan decision does not mean that financial institutions necessarily need to be privately operated as has long been argued by the Bretton Woods institutions (i.e. World Bank 2001). Historical experience in a number of countries such as Chile (in the deregulation attempt of the 1980s) or in Indonesia (in the 1990s) show that a privatized banking sector does not necessarily allocate loans according to economic merit of the borrower.¹⁹ Instead, in these countries, conglomerates often just owned or acquired their own bank which in turn financed the conglomerate irrespective of the true economic performance of the enterprises in question, which in turn leads to problems closely resembling those of badly managed public financial institutions. In fact, recent research points toward the fact that state-owned banks have stabilized the credit-investment process in the wake of the Asian crisis (Amyx and Toyoda, 2006). Thus, what has been learnt over the past years is that state-owned banks need an adequate governance structure to play a constructive role in the economic development process. For example, the

¹⁸ Figures from Murdoch (1999).

¹⁹ For a comprehensive analysis of Chile's experience, see Diaz-Alejandro (1985).

IDB (2005) lists a number of preconditions which should be insured in public banking such as clearly defined social or economic objectives, a professional management with transparent hiring structures, prudential regulation of state-owned banks and independence in day-to-day business from elected politicians. These measures should ensure that state-owned (or development) banks play a constructive role in the credit-investment process and ease the lack of long-term financing which exists in many developing countries even for economically viable projects.

A third problem at the level of commercial banks (not limited to the case of developing countries, but often observed in countries which have liberalized their financial sector) is that financial institutions in some instances extend credit mainly to households for the sake of the financing of consumption or housing.

While most advocates of financial liberalization based on McKinnon (1973) or Shaw (1973) often do not cover in detail the distinction between credit to households and credit to the corporate sector, they implicitly recommend liberalization of lending to households as well, as according to Fry (1989: 17) “[a] common feature of all the models in the McKinnon-Shaw framework is that the growth maximizing deposit rate of interest is the competitive free-market equilibrium rate” and the policy conclusions of this are that “economic growth can be increased by abolishing institutional interest-rate ceilings, by abandoning selective or directed credit programmes, by eliminating the reserve requirement tax, and by ensuring that the financial system operates competitively under conditions of free entry”. However, starting from a situation of a repressed credit demand from households, it is to be expected that in a case of financial liberalization this demand is first fulfilled: As the financial repression has created a very high shadow interest-rate which liquidity-constrained households are willing to pay for consumer or housing credit, it is then extremely attractive for financial institutions to move into this market.

This creates two problems: While consumer loans to households as well as loans for the construction of new housing might increase overall economic activity and hence aggregate incomes, it lacks a number of advantages of credit-financed investment in fixed assets other than housing: First, in contrast to the investment in the productive capital stock, neither consumption nor housing credit helps to increase the productive capacities of the economy, making inflationary effects of credit creation much more likely. Second, extending loans for consumption and housing construction does not help to disperse modern technology across the economy of a developing country: As new growth theory is arguing, technological progress is often embodied in new capital goods or accumulated by learning-by-doing of workers in the investment process. Both things can rather be expected in manufacturing than in construction. Investing in a new piece of machinery or some other piece of equipment financed by credit-creation helps hence to improve the average level of technology in an economy.

As a consequence of the different macroeconomic effects of strong credit growth to the different sectors, strong credit growth to private households moreover is less sustainable. As credit growth for investment purposes increase the aggregate productive capacities and hence has the potential to lift the medium and long-term growth rate of an economy which allows for a sustainable stronger credit growth, an increase in household debt does not. Hence, an expansion of credit to the household sector will necessarily come to an end sooner or later with possible detrimental effects on aggregate demand and growth.

B. Limits to central banks' credit creation

A second set of potential problems is concerned with the creation of base money by the central bank. As has been explained above, part of the Keynesian-Schumpeterian investment-credit creation process depends on the ability of the financial sector to expand overall credit

which in turn depends on the ability of the central bank to increase the supply of base money and distribute it to the commercial banks which are willing to extend credit to the non-financial sector.

The first obstacle for developing countries in principle could lie in the way how base money is distributed from the central bank to commercial banks. For most developing countries, the technical process of money supply is quite different from that in developed countries: While most industrialized countries rely on indirect instruments such as open market operations to provide liquidity to the banking system, many developing countries lack deep financial markets to conduct open market operations in and hence have to rely on direct monetary policy tools such as bank-by-bank rediscount quotas or credit restrictions (Chandavarkar 1996: 3). However, closer examination shows that this structural difference might have less impact on the credit-investment process than one could think. While open market operation frees central banks from allocating reserves to different banks or regions by discretion and hence uses market forces to do so, there are little a priori reasons why the allocation of reserves by the fiat of the central bank should hamper the credit creation per se. Of course, the absence of a working money market will result in some loan demand with higher expected returns to the banking system being not satisfied. However, as the literature on adverse selection, moral hazard and asset price bubbles underlines, loans with a higher expected return are not always the most efficient from a macroeconomic perspective. Hence, a slight distortion in the allocation of reserves and credit might not be severe from a macroeconomic level. As long as credit or rediscount quotas are not misused to push the commercial banking system into loans which are not economically viable, but the indirect monetary policy instruments are used in good faith, they need not per se be an impediment to the credit-creation process. Hence, market imperfections in the money market do not plausibly pose a major obstacle for most developing countries to use the banking system to expand credit to its corporate sector.

The second set of restrictions of the central bank in developing countries stem from structural features in the economy and can be expected to be much more serious. The most obvious impediment for such a credit expansion would be if the economy is officially dollarized²⁰ as in the case of Ecuador or Panama. In these cases, usually, a national central bank does not exist anymore (or is charged with function not related to the supply of base money such as the oversight of the national payment system). As base money can then only be imported, the country in question is dependent on capital imports (yet not necessarily on net capital imports) to finance a credit expansion.

A similar argument applies if the country in question has a currency-board arrangement. In this case, the country has committed its central bank by law only to extend the supply of domestic base money in exchange for foreign exchange reserves. The domestic supply of base money is then completely (or overly) backed by foreign currency in the vault of the central bank. Under this arrangement, again a completely domestically driven expansion of credit and investment might early hit its limits: As soon as the banking sector has exhausted the potential of loans at the given level of base money in circulation, the financial system by itself cannot

²⁰ This chapter will use the term “officially dollarized” for the phenomenon that one country uses the currency of another country as sole legal tender without being in a formal bilateral or multilateral currency union which gives it a say in monetary policy decisions. According to this definition, Montenegro’s economy would also be “dollarized” even though the country uses the euro, not the dollar as official currency.

extend loans any further. As in the case of dollarization, the economy might then be dependent on gross capital inflows to further extend credit supply.²¹

However, even if a country has a central bank which is not constrained in its emission of domestic currency by a currency-board arrangement, this central bank does not necessarily have the freedom to expand the supply of base money at will. As will be shown below, a domestic credit expansion might lead to a depreciation of the domestic currency. Given the structure of the economy or other exchange rate arrangements, the central bank might want to take this effect of its credit expansion on the exchange rate into account.

If the country in question has a fixed exchange rate, an exchange rate band or a crawling exchange rate, the expansion of money supply is limited to what is compatible with the exchange rate target. If the country in question does not have a fixed exchange rate, a high degree of foreign-currency denomination of the liabilities in the economy might force the central bank to prevent a strong depreciation even if domestic economic considerations made a strong monetary expansion and a depreciation desirable. If the country's firms, government and financial institutions are indebted in foreign currency and do not have corresponding assets denominated in foreign currency, a depreciation might lead to a reduction of net wealth and a contraction of demand. In the case of a depreciation of the domestic currency, the debt burden of firms, households and the government rises as the nominal debt in domestic currency increases while the income flows remain relatively unchanged. In the case of strong devaluations, this might even lead to the bankruptcy of firms or financial institutions and in the consequence to a banking crisis, as has been seen in the number of countries which experienced "twin crisis" (a currency and a banking crisis at the same time) over the past decades. Thus, central banks might be limited in their ability to expand credit by the requirement to defend the exchange rate.

To understand which structural factors make this constraint more or less binding, we need to have a look at the determination of exchange rates and the mechanism by which a domestic credit expansion might put pressure on the exchange rate. The exchange rate is determined by the supply and demand for foreign currency. Two factors are the main determinants of this supply and demand: The supply and demand of foreign currency arising from external trade relations (import and exports) and the supply and demand of foreign currency for investment motives (including speculative motives). The process of domestic credit-financed investment expansion influences both factors: First, as the increased investment also increases domestic incomes, import demand will be stimulated depending on the degree to which capital goods and consumer goods are imported. A country with very little domestic manufacturing industry to start with might actually see a rather large increase in imports stemming from increased investment demand, while a well-diversified economy might see only a small increase in imports. Second, with an increase in aggregate incomes and aggregate savings, households might increase their demand for foreign assets and hence again the demand for foreign currency, again putting downward pressure on the exchange rate.

In modern exchange rate theory, the exchange rate is usually seen as a relative asset price for domestic and foreign investment.²² Each household can decide to hold its wealth in different assets, i.e. domestic money, domestic bank deposits, domestic bonds, domestic stocks, real estate, real fixed capital or (unless restricted by capital controls) foreign currency, foreign

²¹ Of course, with a fractional reserve system (minimum reserve requirements below 100 per cent), a dollar gained by (gross) capital inflow can support more than one dollar in aggregate credit expansion due to the credit multiplier.

²² See for a simple textbook exposition Krugman and Obstfeld (2006: 13).

deposits, foreign bonds or foreign stocks.²³ As has been argued above, investment finance by monetary expansion leads to an increase in the supply of monetary assets. In the stylized example above, the household in the end just held the newly created money supply as part of its wealth.

If, however, the household decides not to hold its wealth in domestic currency but to buy foreign currency, this could create pressure on the exchange rate. Similarly, if the households do not have confidence in the stability of the domestic currency and no access to foreign assets, they might not be willing to hold currency but decide to buy real estate, precious metal or similar goods as a store of value. This might put upward pressure on real estate prices or on prices of those goods which are used as an inflation hedge. As these goods usually have a dual role both as inputs into the production and as inflation hedges, pushing up their prices might lead to higher overall inflationary pressure. Consequently, as Charles Goodhart (1989: 33) notes, while credit and the money supply can be created endogenously by the credit process, it is not clear whether the newly created money is finally demanded by the general public which is a precondition for a stable equilibrium (emphasis as in the original text):

I will accept always any money offered me in payment for some sale at an agreed price, so that any addition, e.g. caused by a bank loan, is always snapped up, but it does not mean that I will want to hold that amount of extra money in ultimate equilibrium. Demand for money, in the sense of the optimal amount that I would want to hold in equilibrium in a given context, is not the same thing as – or determined by – the credit-counterpart supply of money. The credit market is distinct and different from the money market [...]

I agree that at any moment the actual supply of money is determined, under present circumstances, primarily in the credit market – as the credit-counterparts approach indicates – and that it is willingly accepted. But I deny that this actual stock is necessarily also demanded in the equilibrium sense outlined above.

Thus, the crucial question is: Are households really willing to hold (part of) their newly earned income in domestic monetary assets? Only if they are willing to do so, the central bank is free to accommodate the credit-creation of the lower-tier financial institutions. Hence, for the ability of the central bank to accommodate a domestic credit-financed investment process, three factors are of crucial importance:

- (i) The degree to which the central bank has to look after the exchange rate and prevent depreciations;
- (ii) The extent to which an expansion of domestic income leads to higher import demand and hence a higher demand for foreign currency; and
- (iii) The degree to which households decide to hold additional savings in domestic currency instead of foreign assets or in inflation hedges.

The first of these aspects is best covered by recent research. The publication of the seminal work by Calvo and Reinhart (2002) which found that most developing countries use their interest rate policy or foreign exchange interventions to prevent large swings in the exchange rate even if they officially have proclaimed to have a floating exchange rate has triggered a vast amount of research looking into possible reasons for the “fear of floating”. Early work has focused on the question in how far foreign debt denominated in foreign currencies

²³ For the average household in a developing country, the most likely holding of foreign asset will be in the form of foreign currency, i.e. physical dollar bills the use of which is very hard to restrict by capital controls.

(“original sin”) might have caused the fear of floating. Hausmann et al. (2001) for example find that countries which are unable to borrow abroad in their domestic currency are much more reluctant to accept a freely floating exchange rate, as a change in the exchange rate might increase the debt burden and might even push a country towards a position in which the external debt is not sustainable anymore.²⁴

Honig (2005) has extended the analysis towards the question in how far domestic liability dollarization also has an influence on the fear of floating. Honig argues that if domestic banks accept dollar deposits from domestic residents, they take on foreign exchange risk. Even if they make dollar loans to domestic companies, this does not eliminate foreign exchange exposure, but only transfers the risk from the bank to the borrower. Large exchange rate swings might lead to credit defaults as the firms usually earn revenue in domestic currency and might not be able to repay their foreign-currency loan should the domestic currency depreciate sharply. While removing exchange rate risk from the banks’ balance sheets, making loans in foreign currency thus significantly increases default risk. Consequently, to guard the stability of the financial system and the business sector, the central bank will have to limit exchange rate fluctuations. In his empirical cross-country analysis, he finds strong support for this hypothesis: An increase in dollar-denominated credits (and to a lesser extent of dollar-denominated deposits) in a country’s banking sector significantly reduces the probability of the country allowing its currency to float freely.

Therefore, from a central bank perspective, the less dollar liabilities (both external and domestic) exist in an economy, the less is the risk that a fluctuation in the exchange rate wrecks havoc with the government’s, the corporate sector’s or the financial sector’s balance sheet and hence the larger is the freedom to accommodate a domestic credit and investment process.

Coming to the question in how far an expansion of domestic demand increases the demand for import and hence the trade-related demand for foreign asset, there is ample literature with estimates of the income elasticity of import demand. Applying this research to the scope for domestic credit-finance of the investment process would mean that the larger the income elasticity of import demand, the smaller a central bank’s scope for such an expansionary policy. Usually, the income elasticity of demand is estimated to be larger than 1 for most developing countries²⁵. However, there is a vast difference between developing countries. For China, Tang (2003) estimates the income elasticity of import demand at only 0.73, while Shahe Emran and Shilpi (2007) find a value of 1.25 for India and Melo and Vogt (1984) a value of 1.9 for Venezuela. The literature on how to explain international differences of income elasticity on import demand is rather sketchy. While Melo and Vogt (1984) claim that trade-liberalization leads to higher income elasticity of demand (a finding that is confirmed by Mah, 1999), there is little systematic cross-country research on this topic. However, it would be plausible to argue that a well-diversified economy which produces a wider scope of consumer and capital goods would have a lower income elasticity of import demand. Moreover, one could assume that poor countries the consumers of which do not yet consume many sophisticated manufactured goods have a lower income elasticity for import demand than medium-income countries.

²⁴ The experience of Brazil in the year 2002 is an example for this mechanism: When in the run-up of the 2002 presidential, speculators pushed the real to record-low levels against the United States dollar, the government debt rose to levels which were close to those considered to be unsustainable. As Williamson (2002) wrote at that time, a further loss of confidence could have easily pushed the country into default. A rescue package of the IMF however, helped to stabilize the currency and thus prevented default.

²⁵ See i.e. figure 1 in Lo et al. (2007: 135).

The third factor important for the credit creation process, the willingness of the household sector to hold monetary assets denominated in domestic currency instead of putting savings into foreign assets or real assets as inflation hedges are somewhat less well covered by recent research. However, portfolio theory building on the seminal work by James Tobin (1958) or Harry Markowitz (1952, 1959) provide a sensible starting point for this analysis. According to this theory, money has to be seen as an asset which has also additional characteristics as the ability to being used as a means of payment.²⁶ Rational investors diversify the risks related to their investments by allocating different shares of their wealth into different kinds of assets. Thus, they will hold a share of their wealth in money depending on the rate of return of money (that is, nominal interest paid on deposits minus inflation), the rates of return on other assets, the volatility in the returns of each asset and the investors' expected need for liquid needs for payment purposes. The larger this share, the more can the central bank accommodate the credit supply by the financial sector without risking a depreciation of the exchange rate or an increase in the prices for inflation hedges and hence problems in the banking sector or the ignition of a inflation-wage spiral which would lead to a further debasement of the domestic currency.

For determining which measure for the return on assets as well as for the volatility of return to use, it is important to remember the basics of portfolio theory. Portfolio theory builds on the notion that the individual tries to maximize expected utility in different future states of an uncertain world. However, usually it is not money which is seen as providing utility by itself, but real consumption paid for with the money. Hence, what is important is the return and volatility of return in terms of potential consumption.

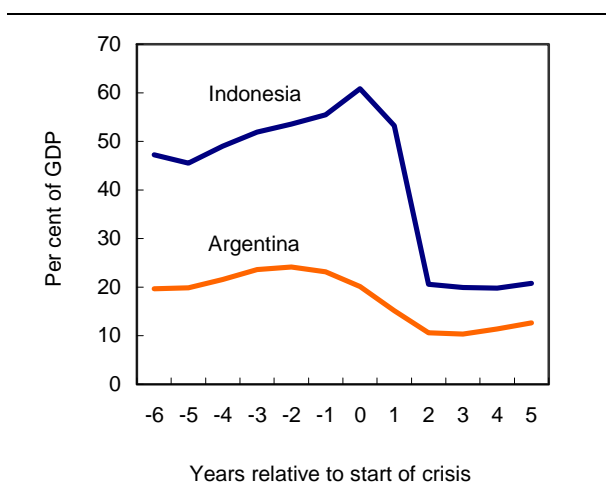
It is quite obvious that trying to increase the return on monetary assets in an economy by increasing interest rates is not a suitable path for a central bank to increase the scope for financing investment with monetary expansion. While central banks could of course use their monetary policy instruments to increase interest rates, this would also lower the demand for credit and the investment activity of enterprises and would thus be incompatible with increasing the scope for the Keynesian-Schumpeterian credit-investment process. In addition, higher interest rates lead to the problem of adverse selection among the borrowers which in turn might lead to more credit rationing in the financial sector.

Hence, the factors to target would be the volatility of real return of monetary assets and the liquidity value of domestic monetary assets. As argued above, the average household deciding on whether to hold his assets in domestic money or in foreign currency cares whether the domestic currency can give a reasonable degree of price stability for the goods it is consuming. Hence, a reasonably low and stable rate of consumer price inflation can be expected to increase the willingness to hold domestic currency. Second, if a large share of consumer goods is imported and there is a large pass-through from changes in the exchange rate to consumer price inflation, foreign currency becomes more attractive as it can be expected to lose less value should there be erratic fluctuations of the exchange rate. Schelkle (2001: 185ff) shows in a portfolio model that for reasonable assumptions, the share of foreign assets held by individuals is a positive function of the correlation between exchange rate movements and the domestic price level. This conclusion provides some rationale for heterodox price controls in the wake of large exchange rate swings such as the freeze of utility rates legislated by the Argentinean Government after the devaluation of 2001–2002: By

²⁶ For the following discussion, money will be used as to describe a broad monetary aggregate including both cash in circulation as well as liquid liabilities by the financial sector fixed in nominal terms. The argument thus does not distinguish between cash and demand deposits as they are very close substitutes in the eyes of the private household. Moreover, as can be easily shown in the balance sheet approach used above, a change of deposits into cash by the household would not have macroeconomic implications as it is shown in the annex to this paper.

keeping the inflation rate of goods for daily consumption low relative to the depreciation, Argentina managed to induce people to keep their assets in domestic currency and hence prevented the depreciation-hyperinflation spiral which many commentators at that time predicted for Argentina. In the end, the Argentinean financial sector contracted much less than those of other crisis countries as i.e. Indonesia in the Asian crisis. As shown in figure 5, in Indonesia, the ratio of credit to the private sector to GDP fell from 63 per cent before the crisis to around 20 per cent after the crisis – a contraction by 68 per cent. In Argentina, the ratio fell from 24 to 10 per cent – a contraction by less than 60 per cent.

Figure 5
CREDIT TO PRIVATE SECTOR IN ARGENTINA AND INDONESIA^a



^a Start of crisis defined as year 1997 in the case of Indonesia and 2001 in the case of Argentina.

These considerations also point to another problem of some (but not all) developing countries: In poorer countries, wealth owners often do not consider the national consumer price index as central for their own consumption possibilities. Instead, they often spend a disproportionate share of their income on imported luxury goods. In addition, they consider trips to the United States or Europe for medical treatment or they wish to send their children to college in the industrialized countries. All of these purchases have to be paid for by foreign currency or their prices are at least linked to the exchange rate. Hence in these cases, wealth owners can be expected to prefer a smaller share of domestic monetary assets in their portfolio.

What is closely related to the question of the consumption value of domestic currency is the question of the liquidity value of holding domestic monetary assets. As Roy (2000) argues following Whalen (1966) and Tsiang (1989), individuals hold money in their portfolios for precautionary motives: They want to be prepared to meet sudden expenses or liabilities not anticipated in payment date or size. As long as there are liquidation costs for assets different from money and significant costs of illiquidity, economic agents will keep a certain share of their wealth in the asset generally accepted as means of payment. However, in an economy in which contracts and other payments are dollarized, the domestic currency loses liquidity value relative to foreign assets, as sudden expenses or liabilities occur in foreign currency. Hence, the more informally dollarized an economy, the less will a rational household save in domestic currency should its income and savings increase. As Roy (2000: 120) argues, in a dollarized economy, households are confronted “with an exchange rate risk [for holding] domestic currency, not foreign currency”. Thus, being confronted with a dollarized economy does not only make the economy more vulnerable for exchange rate fluctuations as argued above, but in addition it might lead to a larger depreciation of the domestic currency for a given expansion of the domestic credit and money supply. Therefore, even informal dollarization can be expected to be detrimental to the Keynesian-Schumpeterian credit-investment process.

Both the argument of the real purchasing power as well as the liquidity value of the domestic currency as determinants of the individuals’ willingness to hold domestic assets also gives support for trying to guard a somewhat undervalued exchange rate: If there is a sizeable probability of some appreciation in the future, it is only rational for risk-averse individuals to hold domestic monetary assets. First, an appreciation would make their imports cheaper and

hence defend the purchasing power of domestic monetary assets relative to foreign currency. Second, a possible appreciation of the domestic currency in the future significantly diminishes the value of foreign currency holdings for precautionary motives: If there is a significant chance that the savings in foreign currency lose value relative to possible unanticipated expenses or liabilities (which usually will come up in domestic currency), individuals will most likely decide to hold their precautionary savings in domestic currency.

IV. SOME CROSS-COUNTRY EVIDENCE

The conclusions above about the structural features of an economy which allow for a domestically financed credit-investment process can also be confirmed when we take a look at the developing, emerging and transition countries which over the past decade have shown the fastest accumulation of capital. Table 1 presents all countries with an investment-to-GDP ratio of 25 per cent or more for the years from 1993 to 2003.²⁷ For a closer inquiry, a number of very tiny countries (with less than 200,000 inhabitants) or countries with special factors distorting the investment figures have been dropped so that we are left with 20 small, medium, or large economies with a investment-to-GDP ratio of 25 per cent or more. The countries which are further inquired are printed in bold type in table 1, while for the countries dropped from further inquiry, a short explanation is given.

Table 2 gives additional structural information on these high-investment countries. Column 3 of the table reports the average current account balance in per cent of GDP for the years 1993 to 2003. A negative figure denotes a deficit in the current account which by definition means a net capital import of the same magnitude. A positive figure here shows a sustained current account surplus and hence a corresponding net capital export. Column 4 reports the ratio of self-financed investment to GDP. This is the sum of the investment-to-GDP ratio and the current account balance and hence the aggregate savings-to-GDP ratio ex-post achieved. Column 5 reports the share of dollar-deposits in the banking system as reported in Levy Yeyati (2005), a widely used measure for gauging dollarization with the last year available reported in column 6. Column 7 reports the pass-through coefficient for a change in foreign prices to the domestic price level as reported in Devereux and Yetman (2003). Column 8 finally shows the share of the population with access to bank accounts as reported in Demirgüç-Kunt et al. (2008).

What is first interesting to note is that the top of the league of countries with high investment-to-GDP ratio is made up from countries which have completely self-financed their strong capital accumulation from 1993 to 2003: Here, we find the five Asian countries: China, the Republic of Korea, Singapore, Malaysia and Thailand. Further down the league, but also among the self-financers, we find Hong Kong (China), Gabon and the Islamic Republic of Iran.

A second group with investment-to-GDP ratios just slightly below those of the first group contains a number of countries which mainly have experienced rapid capital accumulation with foreign capital. This group is mainly made up of central and eastern European transition countries: Slovakia, the Czech Republic, Estonia and Belarus, but also contains the Caribbean countries: Jamaica and Dominica, the Central American countries: Honduras and Nicaragua and the Asian countries: Viet Nam and Mongolia.

²⁷ Unfortunately, for some of the countries no data after 2003 was available. In order to keep the data comparable, the time span for this inquiry was moved to 1993 to 2003, rather than taking the latest data for some countries into account. However, the vast majority of countries experiencing a strong capital accumulation from 1993 to 2003 have continued to do so until today.

Table 1

COUNTRIES WITH AN INVESTMENT TO GDP RATIO OF 25 PER CENT OR MORE, 1993–2003

Country	Average Investment- to-GDP ratio 1993–2003	Remark
Equatorial Guinea	0.79	Oil discovery in 1996, large inflows of foreign investment as a result, now much lower investment
Lesotho	0.50	Construction of a large water project by foreigners which makes up large share of gross fixed investment
Saint Kitts and Nevis	0.45	Tiny – about 42,000 inhabitants
Antigua and Barbuda	0.44	Tiny – about 83,000 inhabitants
Grenada	0.37	Tiny – about 110,000 inhabitants
China	0.34	Included
Democratic Republic of the Congo	0.34	Oil discovery
Republic of Korea	0.33	Included
Singapore	0.33	Included
Malaysia	0.31	Included
Saint Vincent and the Grenadines	0.31	Tiny – about 110,000 inhabitants
Thailand	0.29	Included
Slovakia	0.29	Included
Czech Republic	0.29	Included
Jamaica	0.28	Included
Viet Nam	0.28	Included
Mongolia	0.28	Included
Qatar	0.28	Included
Hong Kong (China)	0.27	Included
Estonia	0.27	Included
Gabon	0.27	Included
Dominica	0.27	Included
Iran (Islamic Rep. of)	0.27	Included
Honduras	0.26	Included
Tunisia	0.25	Included
Nicaragua	0.25	Included
Belarus	0.25	Included
Sri Lanka	0.25	Included
Saint Lucia	0.25	Tiny – 160,000 inhabitants

Note: Countries in bold are included in the further inquiry. Countries in normal type are excluded. Reasons for exclusion are given in the right column.

When we compare the structural data on the financial sector of these countries, we find that there is a sharp difference in the degree of the dollarization in the respective financial sectors of the self-financing countries and those that have relied on capital imports. All of the Asian countries on top of the league that have self-financed their capital accumulation show a very low degree of deposit dollarization with China recording a maximum of slightly above 5 per cent. All of the following countries that have relied on capital imports, in contrast, show significantly higher degrees of dollarization with the Czech Republic marking the minimum with roughly 10 per cent and Nicaragua recording a degree of dollarization of more than 70 per cent. There is only one exception to this rule: Hongkong (China), which as an offshore financial centre shows a high degree of dollarization while it has managed to finance all of its capital accumulation by itself.

Table 2
STRUCTURAL INDICATORS FOR HIGH-INVESTMENT COUNTRIES

Country	Investment- to-GDP ratio (1993– 2003)	Current account balance in per cent of GDP (1993– 2005)	Self-finance capability as share of GDP	Financial dollarization in per cent	Year for column (5)	Pass- through of import prices to domestic prices	Access to banking system in per cent of population
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
China	0.34	1.90	0.36	5.6	2003	0.19	42
Republic of Korea	0.33	1.58	0.34	4.0	2001	0.02	63
Singapore	0.33	16.68	0.49			-0.48	98
Malaysia	0.31	4.03	0.35	3.3	2004	0.03	60
Thailand	0.29	1.88	0.31	1.3	2001	0.03	59
Slovakia	0.29	-5.26	0.24	14.0	2004		83
Czech Republic	0.29	-4.38	0.24	10.2	2004		85
Jamaica	0.28	-5.27	0.23	37.6	2004	0.48	59
Viet Nam	0.28	-4.27	0.23	29.8	2004		29
Mongolia	0.28	-2.99	0.25	46.2	2004		25
Qatar	0.28	-0.18	0.27	22.8	2004		
Hong Kong (China)	0.27	2.18	0.30	47.8	2004		
Estonia	0.27	-7.66	0.20	26.6	2004		86
Gabon	0.27	8.46	0.36			0.22	39
Dominica	0.27	-18.74	0.08	25.1	2004	0.22	66
Honduras	0.26	-4.12	0.21	35.5	2004	0.52	25
Tunisia	0.25	-3.53	0.22			-0.01	42
Nicaragua	0.25	-22.07	0.03	70.3	2004	7.14	5
Belarus	0.25	-4.19	0.21	48.0	2004		16
Sri Lanka	0.25	-3.53	0.21	23.8	2004	-0.01	59

Source: Data for columns (2) and (3) are from the IMF *International Financial Statistics* and the WEO Database. Self-finance capability as share of GDP equals national savings and is computed by the sum of column (2) and (3). Data on financial dollarization in column (4) comes from Levy Yeyati (2005). Data on pass-through of import prices on domestic prices is taken from Devereux and Yetman (2003). Data for the access to banking services comes from Demirgüç-Kunt et al. (2008).

At first sight, one could suspect that this correlation has a strong regional component: After all, the fast-growing (and self-financing) Asian countries on the top of the league have all low degrees of dollarization while the Latin American countries show a high degree of dollarization. Yet, on closer examination, this is not entirely true: Viet Nam, which is often seen as the next Asian tiger (and might share a lot of structural similarities to other countries in the region), has a quite high degree of dollarization in the banking system – and has consequently relied on the import of capital for its domestic investment spree. A similar point holds for Mongolia which also as an Asian country has experienced a high degree of dollarization and net capital inflows.

It is also interesting to note that all the self-financing countries with high investment-to-GDP ratios have low values for the pass-through of foreign prices on the domestic price level, ranging from 0.03 for Thailand and Malaysia²⁸ to only 0.19 for China. As far as data is available, the pass-through is significantly higher for most of the countries which had to rely on foreign capital.

²⁸ Neglecting the negative value for Singapore.

Finally, the countries which have managed to embark on a self-financed process of strong capital accumulation systematically show a rather high degree of access to the banking system: Among the self-financers, China has the lowest degree of access to the banking system with an estimated 42 per cent of the population having access to banking services. All other of these Asian countries have a significant higher degree of access to banking.²⁹ This contrasts sharply with the high investment-to-GDP ratio countries in Latin America: Honduras and Nicaragua show a rather low degree of access to the banking system with 25 and 5 per cent. As has been argued above, it is important that people decide to hold their savings in domestic monetary assets. If they have access to banking, this is much more likely especially in the cases when there is moderate inflation as access to banking might help protect the purchasing power of savings by offering indexed products or some interest payments on savings.

Widening the view towards other countries not in the group of high investment-to-GDP ratios, the combination of different pass-through effects with a higher degree of dollarization, a stronger orientation of wealth owners in their consumption habits towards the United States of America and a different history of over and undervaluation might explain why Latin America and Asia differ substantially in the amount of loans to the private sector the financial sector is making.

Taking the factors for the central bank's constraints of domestic credit financing discussed above into account for explaining the two impressive cases of catch-up-growth in China and Germany, we see thus that China has been in fact in a very favourable position to finance investment by domestic credit creation. First, coming from a socialist state of attempted autarchy, there has been very little foreign debt denominated in foreign currency. Second, with very little consumer goods imported, the income elasticity of import demand was rather low. In addition, domestic households did not deem the exchange rate overly important for the protection of their savings' purchasing power as they mostly consumed domestically produced goods. Finally, China embarked on a sustained growth process from a position of undervaluation, making an appreciation likely and hence making domestic monetary assets attractive. Finally, capital controls have effectively restricted most Chinese households from investing abroad, hence inducing them to hold their savings in domestic monetary assets.

A similar argument can be made for Germany after World War II. With foreign debt set at 14.5 bn German Marks in 1953, less than 10 per cent of GDP, foreign currency debt was low. Legislation in Germany was set in a way that discouraged foreign currency transactions. In addition, the (fixed) exchange rate was set at a level that Germany was quickly accumulating a surplus in foreign trade which soon put upward pressure on the exchange rate. Residents' portfolio investments abroad were significantly limited during the first years of the catch-up process.

While these two cases of course might have been cases with an extremely favourable position for some domestic expansion, to a certain degree a number of developing countries might have the scope for some credit expansion. Moreover, thoughtful structural policies might be able to expand this scope.

²⁹ For details, please refer to table 2.

V. POLICY CONCLUSION: PUSHING BACK DOLLARIZATION AND STRENGTHENING THE FINANCIAL SECTOR

Based on the analysis above, there are a number of policy conclusions for developing countries which want to enable their financial system and central bank to accommodate a domestically financed investment expansion. First, there are a number of microeconomic financial sector issues in which the right policies might expand the ability of banks and the central bank to fulfil their tasks in this process. Second, there are a number of macroeconomic factors the right policy might be able to influence to expand the space for domestic credit expansion.

From a microeconomic point of view, some basics need to be in place for the banking system to work. For example, it is important that property rights are clearly defined and that paperwork necessary to collateralize real assets can easily and cheaply be done. Moreover, it is important that there are clear and reasonably timely procedures in place for the case that a bank needs to foreclose a loan and needs to sell the collateral. Hence, the general rule of law and a working judicial system are important.

In addition, it is of foremost importance to regulate and monitor the financial system in a way that on the one hand it is able to extend with a sustainable pace the credit supply to innovative and potentially profitable companies to conduct investment. Second, in order to induce households to hold their money in domestic monetary assets, regulation and oversight has to guarantee the stability and hence the trust in the financial system. From this point of view, either having an implicit government guarantee for deposits or introducing an explicit deposit insurance would be a good idea. However, as is known from the research on financial development, a deposit insurance creates a moral hazard problem: With depositors knowing that their deposits will be safe, they tend to monitor the banks less. In addition, bankers might chose assets with a higher risk as they try to maximize their return. Consequently, if the introduction of a deposit insurance is not to have negative effects on the medium- and long-term stability of the financial system, it needs to be well regulated and monitored (Cull et al., 2005).

Especially important from the considerations above seem to be prudential rules that prevent banks from investing in risky activities. As poor private households can be expected to be rather risk-averse when it comes to the investment of their savings, the stability and reliability of their bank seems to be much more important for the question of holding domestic deposits than small changes in the real return on such assets. A central necessity here would be the definition and enforcement of capital adequacy standards which guarantee that the bank owner has an incentive not to engage in overly risky activities.

Considering the fact that credit for consumptive purposes or housing construction can be expected to yield much less macroeconomic benefits than loans to the corporate sector, one should also think about regulating the banking sector in a way that its credit creation remains biased to the corporate sector. One possibility would be to introduce higher capital requirements for mortgage or consumer credits. Especially countries that have not yet liberalized the market for private mortgages and consumer credit should be extremely careful doing so quickly as this might lead to an especially strong credit creation in this sector.

As has been argued above, foreign borrowing by banks and other financial institutions increases the vulnerability of the financial sector to exchange rate fluctuations and hence limits the scope of the central bank to allow some depreciation in the credit-investment process. Hence, legal restrictions on the financial systems' borrowing from abroad in foreign currency could also make sense and expand the scope for domestic financing. An alternative

could be to allow borrowing in foreign currency only to finance activities of companies which will earn foreign currency (i.e. in the export sector).

On the macroeconomic side, one of the most important factors is to prevent dollarization in all of its forms. First, if an economy is officially dollarized, the central bank loses its ability to expand the supply of base money in order to accommodate the credit process. Hence, governments which want to preserve this policy space should avoid official dollarization. A similar argument holds for a currency board: As such a currency regime also restricts the ability to accommodate credit expansion, it should also be avoided.

However, even if the economy is not officially dollarized, unofficial dollarization of transactions or the dollarization of financial assets and liabilities in the financial sector or the existence of foreign debt denominated in foreign currency in the corporate, household or government sector can severely limit the scope of monetary policy. For the question of dollarization short of introduction a foreign currency as legal tender, most research hints that it is related to inflation: A large body of literature shows that expected depreciations following high inflation can explain to a certain extent a process of dollarization.³⁰ Moreover, recent literature hints that there is a hysteresis or ratchet effect in dollarization:³¹ If economic agents have once started to use foreign currency for domestic transactions or in deposit and loan contract, this process seems to a certain extent to be not self-reversing.³² Hence, macroeconomic policy should try to limit bouts of inflation and large depreciations. As large depreciations sometimes are needed if there has been a large overvaluation before, this would call for a management of the exchange rate to limit large swings in the exchange rate. Moreover, as far as the limits of a large depreciation on domestic inflation are concerned, the fact that an inflationary bout may have permanent effects strengthen the argument for non-orthodox means of inflation control such as income policies.³³

In addition, there might be some argument for legally restraining the use of foreign currency. In the regressions run by De Nicoló et al. (2005), countries with restrictions on the domestic use of foreign currency show a significant lower degree of dollarization. However, for countries with high inflation, legal restrictions for the use of foreign currency in general come with the side-effect of a reduced financial depth. Hence, as De Nicoló et al. (2005: 1718) put it: “The road to reducing dollarization and its risks should be based on a two-lane approach that both discourages the use of the dollar and enhances the attractiveness of the local currency as a medium of intermediation and medium of exchange”. Thus, a combination of a sound macroeconomic environment with reasonably low and stable rates of inflation and restrictions on domestic holdings of foreign currency might help to keep dollarization low and at the same time allow for credit creation in the domestic banking system.

For the question of debt denominated in foreign currency, the research on “original sin” also gives some hints which policies can be used in order to limit the exposure. Again, there is some evidence that high past inflation increases the degree of original sin (Hausmann and Panizza, 2003), so that the conclusions from above might also be valid for preventing the foreign debt denomination in foreign currency. Second, original sin seems to be strongly correlated with the size of an economy. The larger an economy, the less original sin can generally be observed. Hausmann and Panizza (2003) argue that the larger a currency relative

³⁰ See i.e. Clements and Schwartz (1993) or Agénor and Kahn (1996) or De Nicoló et al. (2005).

³¹ See i.e. Sturzenegger (1997), Uribe (1997) or Kamin and Ericsson (2003).

³² The literature uses the term of “irreversible”. However, this term is rather misleading as there are certain cases in which dollarization has successfully been reverted. For example, in Argentina, legislation in the financial crisis brought the share of dollarized deposits in the banking sector down from 73.6 per cent in 2001 to less than 4 per cent in 2004 (data from Levy Yeyati 2005).

³³ See Flassbeck et al. (2005) for a description on how these policies have been successfully used in China after the depreciation in the mid-1990s.

to world financial markets, the less possibility has an investor who wants to diversify her portfolio to do so without including that currency into the portfolio. This conclusion also hints at the possibility to increase the scope for domestic credit expansion by strengthening monetary and financial regional cooperation.³⁴ If regional monetary and financial integration agreements manage to stabilize the intra-regional exchange rates, this might decrease the shocks to domestic inflation and increase the liquidity value of domestic monetary assets. In addition, if assets of the region become closer substitutes in the eyes of global investors thanks to more stable exchange rates, regional monetary integration might have the effect that it makes the region's currency together more attractive for inclusion into the investors' portfolio and hence reduce original sin.

Finally, a slight undervaluation position seems to be advisable given the arguments above: As long as there is the expectation of some future appreciation of the domestic currency, holding domestic currency is more attractive than holding foreign assets at the same interest rate. Hence, if a country has the ability to use monetary policy, capital controls, exchange rate policies and income policies to secure a position of (some) undervaluation, this setting can be expected to expand the scope for domestic credit creation and investment finance.

VI. CONCLUSION

This paper has argued that developing countries neither need capital imports nor have to lower consumption of their citizens to make resources available for investment to attain a high investment-to-GDP ratio. Instead, if some preconditions are met, a developing country can use its financial system and its central bank to use credit creation to increase investment. This investment then leads to increased absolute aggregate savings which *ex post* can finance the investment conducted.

While this is not the only way to achieve rapid capital accumulation and hence economic growth, empirically it seems to be preferable to a strategy of importing capital for a higher investment growth. Not only do recent empirical findings in the literature (Prasad et al., 2007) hint that capital imports may come with harmful side-effects. Relying on domestic resource mobilization also has the advantage that it shields developing countries from the danger of sudden stops in capital flows, a phenomenon which has been regularly observed in the past.

While there might be a number of preconditions for a domestically financed sustained credit-investment process, the most important seems to be to prevent any type of dollarization. To this end, it is advisable for developing countries to prevent bouts of high inflation and sustain some position of undervaluation.

³⁴ See UNCTAD (2007) for more thoughts on regional monetary and financial cooperation. See also Fritz and Mühlich (2006) for a discussion of South-South monetary integration.

ANNEX

A changing deposits into cash

Cash and deposits can be seen as very close substitutes from the point of view of a household. As can be easily shown, for the credit-investment process described in section III, it does not make much difference whether a household decides to hold its wealth in cash or bank deposits as long as the central bank is free to print cash (that means it must not be constrained by a dollarized economy or a currency board arrangement. Figure A.1 shows what happens if the household decides to hold the money earned in the credit-investment process in cash instead of deposits. In this case, the household would go to the bank and demand its deposit to be converted to cash. The bank would go to the central bank and convert its reserves into cash. Finally, it would pay the cash to the household while cancelling its deposit (accounting record 4). The balance sheet of the commercial bank has shortened while deposits in the central bank's and the households' balance sheets are substituted for cash. As can easily be seen, this process does not change the net wealth of any of the actors and leaves the result of an increased capital stock by credit financing intact.

Figure A.1

CHANGING DEPOSITS INTO CASH

Firm				Household			
<i>Assets</i>		<i>Liabilities</i>		<i>Assets</i>		<i>Liabilities</i>	
[1] Deposit at bank	+100	[1] Bank Loan	+100	[3] Deposit at bank	+100	[3] Household wealth	+100
[3] Deposit at bank	-100			[4] Deposit at bank	-100		
[3] Capital good	+100			[4] Cash	+100		
Financial Institution				Central Bank			
<i>Assets</i>		<i>Liabilities</i>		<i>Assets</i>		<i>Liabilities</i>	
[1] Loan to firm	+100	[1] Deposit from firm	+100	[2] Loan to bank	+100	[2] Reserves	+100
[2] Reserves at central bank	+100	[2] Loan from central bank	+100			[4] Reserves	-100
[4] Reserves at central bank	-100	[3] Deposit from firm	-100			[4] Cash in circulation	+100
[4] Cash	+100	[3] Deposit from household	+100				
[4] Cash	-100	[4] Deposit from household	-100				

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