

PENSION SYSTEMS IN EMES: IMPLICATIONS FOR CAPITAL FLOWS AND FINANCIAL MARKETS

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1 Introduction and summary

Pension systems can influence capital flows by affecting saving and investment. At the same time, the growth of pension fund assets has implications for the depth of financial markets. This paper seeks to shed light on these effects, by highlighting three relevant aspects:

- *first, the stage in the demographic transition.* Since around the mid-1960s, lower emerging market economy (EME) fertility rates have meant lower dependency ratios, which has tended to boost saving, and also a rise in the working-age population, which has tended to boost investment. The transition has worked out as predicted in some countries but not in others. In particular, in the aftermath of crises (e.g., Asia in the late 1990s), saving and investment have tended to fall, and current account balances to rise. Nevertheless, current account surpluses are expected to fall or turn to deficits as populations age in coming decades. In some countries, this process has already begun.
- *second, pension system design.* National saving could be affected by how pension benefits are financed. Recent reforms have favoured plans based on defined contribution and prefunding, moving away from defined benefit and pay-as-you-go plans. However, with a few exceptions, it is not clear that such pension system reforms have helped increase saving. This could be due to lower precautionary saving, transitional fiscal costs associated with pension reforms, problems with low or declining pension fund coverage, and high costs.
- *third, pension fund asset accumulation and financial deepening.* Rapid growth in pension fund assets appears to be associated with deeper financial markets in a number of EMES. This could also influence capital flows by affecting saving and current account balances, as well as the pattern of gross capital flows.

2 Stages in the demographic transition

The demographic transition in EMES over the past 40 years may be described as follows. In a first stage, which began around the mid-1960s, declining fertility rates¹ resulted in an increase in the working-age population and a decline in the share of the dependent young, with only a gradual increase in the share of the elderly population (Table 1).² The result has been declines in overall dependency ratios (the ratio of dependent young plus elderly to the working-age population) from around the mid-1960s to the present. (Annex, Figure 8). However, this stage of the demographic

* Bank for International Settlements (BIS). The views expressed in this paper are those of the authors and do not necessarily reflect those of the BIS. The authors thank, without implicating, Már Gudmundsson, Philip Turner and William White for valuable comments. Contributions by Pablo García-Luna and Jimmy Shek to this paper are also gratefully acknowledged. This paper first appeared in BIS (2008) and covers the period to about 2007, before the full impact of the crisis was felt in EMES. A final section has been added to highlight some issues associated with the implications of the global financial crisis.

¹ Lee (2003), Figure 2, observes that fertility rates in developing countries began to fall in the 1960s. This reflects factors that raise the opportunity costs of bearing children. Such factors include increased productivity of labour, which raises the value of time for parents, increased investment in children because of higher incomes and higher returns on education (due to longer life spans and greater demand for more skilled workers) and higher rates of urbanisation. Certain developments reduce the value of children, such as government provision of a safety net or the availability of pensions.

² The population forecasts are taken from the United Nations *World Population Prospects*, the most widely used source for population forecasts. The forecasts assume medium fertility.

Table 1

Changes in Population Shares⁽¹⁾
(percent)

Country	1950–65			1965–2010			2010–50		
	Young ⁽²⁾	Working ⁽³⁾	Elderly ⁽⁴⁾	Young ⁽²⁾	Working ⁽³⁾	Elderly ⁽⁴⁾	Young ⁽²⁾	Working ⁽³⁾	Elderly ⁽⁴⁾
China	6.6	–6.1	–0.5	–20.6	15.0	5.5	–4.3	–14.3	18.6
India	4.0	–3.9	–0.1	–10.8	8.1	2.7	–12.5	0.2	12.3
Other Asia ⁽⁵⁾	2.7	–1.9	–0.8	–17.5	12.6	5.0	–9.1	–7.4	16.4
Latin America ⁽⁶⁾	2.8	–3.4	0.6	–16.5	12.2	4.3	–9.6	–5.6	15.3
CEE ⁽⁷⁾	0.9	–2.6	1.8	–14.6	7.2	7.5	–0.5	–15.1	15.6
Other EMEs ⁽⁸⁾	2.9	–3.1	0.2	–13.8	12.1	1.8	–9.4	–2.7	12.1
<i>Memo:</i>									
<i>United States</i>	3.3	–4.3	1.0	–10.2	5.6	4.6	–2.9	–5.9	8.8
<i>Japan</i>	–9.5	7.6	1.9	–12.6	–8.1	20.7	–2.1	–11.6	13.7
<i>Western Europe⁽⁹⁾</i>	1.0	–3.6	2.6	–7.8	1.8	6.0	–0.9	–8.5	9.3

Aggregates are weighted averages based on total population data for 2000.

⁽¹⁾ Population in each age group as a share of total population. ⁽²⁾ Population aged 14 or less. ⁽³⁾ Population aged 15–59.

⁽⁴⁾ Population aged 60 and above. ⁽⁵⁾ Hong Kong SAR, Indonesia, Malaysia, the Philippines, Singapore and Thailand. ⁽⁶⁾ Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela. ⁽⁷⁾ The Czech Republic, Hungary, Poland and Russia. ⁽⁸⁾ Saudi Arabia, South Africa and Turkey. ⁽⁹⁾ France, Germany, Switzerland and the United Kingdom.

Source: United Nations, *World Population Prospects*.

transition is over or will end in the next couple of decades in some EMEs. Many countries are entering a second stage in which child dependency ratios are falling more gradually or have stabilised while elderly dependency ratios are rising more steeply (three right-hand columns in Table 1). As a result, projections up to 2050 indicate that overall dependency ratios will generally tend to rise. The implications of these trends for rates of investment and saving are discussed below.

2.1 Implications for saving, investment and capital flows

To see how the demographic transition would affect capital flows, it is worth recalling that a country's net capital flows, or net financing requirements, depend on the current account balance CAB_t , which in turn reflects the behaviour of saving (Sav_t) and investment (Inv_t). That is:³

$$CAB_t = Sav_t - Inv_t \quad (1)$$

The implications of demographic changes for saving and investment would depend on the stage in the demographic transition. When populations are relatively young, increases in the labour

³ In this paper, current account and investment data are used to estimate national saving.

Table 2

Saving, Investment and Current Account⁽¹⁾

Country	Change from 1980-2006 (percent) ⁽²⁾			Level in 2006 (percent)		
	Saving	Investment	Current Account	Saving	Investment	Current Account
China	19.5	10.1	9.4	54.1	44.6	9.4
India	15.0	14.8	0.2	33.8	34.9	-1.1
Other Asia ⁽³⁾	3.5	-5.3	8.8	30.8	25.6	5.2
Latin America ⁽⁴⁾	0.9	-4.1	5.0	21.9	20.1	1.8
CEE ⁽⁵⁾	2.2	-2.6	4.8	25.9	21.1	4.8
Other EMES ⁽⁶⁾	-11.4	-2.5	-9.0	25.8	21.2	4.7
<i>Memo:</i>						
<i>United States</i>	-7.0	-0.7	-6.2	13.9	20.0	-6.2
<i>Japan</i>	-3.8	-8.7	4.9	28.0	24.1	3.9
<i>Western Europe</i> ⁽⁷⁾	-1.8	-3.8	2.0	20.3	19.0	1.3

⁽¹⁾ As a percentage of GDP. ⁽²⁾ For CEE, change from 1992–2006. ⁽³⁾ Hong Kong SAR, Indonesia, Malaysia, the Philippines, Singapore and Thailand. For this group, saving and investment increased by about 7 percentage points from 1980–96. ⁽⁴⁾ Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela. ⁽⁵⁾ The Czech Republic, Hungary, Poland and Russia. ⁽⁶⁾ Saudi Arabia, South Africa and Turkey. ⁽⁷⁾ France, Germany, Switzerland and the United Kingdom.
Source: IMF, *World Economic Outlook*.

force would tend to raise the marginal product of capital, supporting higher rates of investment spending. At the same time, the falling overall dependency ratios resulting from lower fertility and child dependency would allow households to increase their rates of saving. (This is sometimes described in the literature as the first demographic dividend).⁴ Conversely, when populations are relatively old, the declining labour force would tend to lower rates of investment while the increases in overall dependency associated with ageing populations would tend to lower saving.

To shed some light on these demographic effects, Table 2 summarises trends in saving and investment over the past quarter century, with more details in Annex, Figure 9.

Table 2 covers the period 1981–2006, for which data on saving and investment in EMES are more readily available. As working-age populations tended to increase during this period, investment would have been expected to rise. At the same time, declining overall dependency ratios would tend to increase saving rates. However, Table 2 gives a much more mixed impression. In line with expectations, both saving and investment in China and India increased sharply over the period as overall dependency ratios fell, while declining in Japan where (reflecting a rapidly ageing population) dependency ratios have risen for some time now. However, contrary to expectations, increases in saving in the remaining EMES have generally been modest, and investment ratios have generally declined. One reason is the effect of crises which appear to have persistent effects in

⁴ The ultimate effects on national saving would depend on a variety of other factors. For example, the growth in output associated with higher investment and embedded total factor productivity growth could further increase household saving, corporate and government saving. However, household saving would tend to fall at higher levels of wealth. In line with this, empirical studies find that growth is associated with higher household saving, but higher real per capita income is associated lower household saving. (see, e.g., Loayza *et al.*, 2000 and Bulir and Swiston, 2006).

dampening national saving and investment. In particular, the Asian crisis of 1997-98 obscures the very large increases in investment and saving that occurred in the region until 1996 (see footnote 3 in Table 2). Indeed, Bloom and Williamson (1998) find that increases in investment and saving rates (with the former exceeding the latter) were apparent in East Asia up to the first half of the 1990s as overall dependency ratios fell (Annex, Figure 9). They conclude that the increase in working-age relative to dependent population contributed to East Asia's so-called economic miracle. The effects of earlier crises also appear to have dampened saving and investment growth in Latin America. In the case of the United States, the sharp decline in saving appears in part to reflect perceived increases in wealth associated with rising asset prices, and the emergence of a financing technology (home equity financing) that increased the liquidity of the wealth held by households.

The ambiguity of the results in Table 2 highlights the extent to which factors other than demographics can play an important role in influencing national saving and investment.

As for current accounts, there appears to have been an extended cycle in which a number of EMEs started with current account deficits but more recently – often in the aftermath of crises – have experienced current account surpluses.⁵ Demographics would predict that over time, EME current account surpluses would turn to deficits again. For example, a recent study (IMF, 2004) covering 115 countries found that investment tended to exceed saving on average over the sample period. However, a rise in the share of the working-age population tended to increase the saving to GDP ratio more than it increased the investment ratio (by 0.72 and 0.31 respectively).⁶ A rise in the share of the elderly population tended to reduce the saving ratio more than it reduced the investment ratio (by –0.35 and –0.14 respectively). This implies that the current account balance would tend to rise with a larger share of the working-age population, and fall in response to ageing in the population.⁷

Looking ahead, a question of interest is to what extent ageing is already affecting saving and investment or might do so in the near future. Table 1 (three right-hand columns) indicates that particularly sharp declines in the shares of working-age population and increases in the shares of the elderly are projected for CEE and China. The declines in shares of working-age population and increases in elderly population are roughly comparable to those already observed in Japan. In CEE and China, and some other countries, the projected rise in elderly dependency is comparatively steep (Annex, Figure 8).

This implies that saving and investment might be expected to fall and current accounts tend to deficit in CEE and China sooner than in other countries. However, as discussed earlier, there is considerable uncertainty about the timing of these effects because of the influence of other factors on saving and investment. For example, Singapore's population has been ageing for some time now, and elderly and overall dependency ratios are projected to rise more steeply than in other countries (Annex, Figures 8 and 9). However, while saving and investment ratios have fallen, Singapore's saving remains well above the average for EMEs, while investment ratios are somewhat above average.

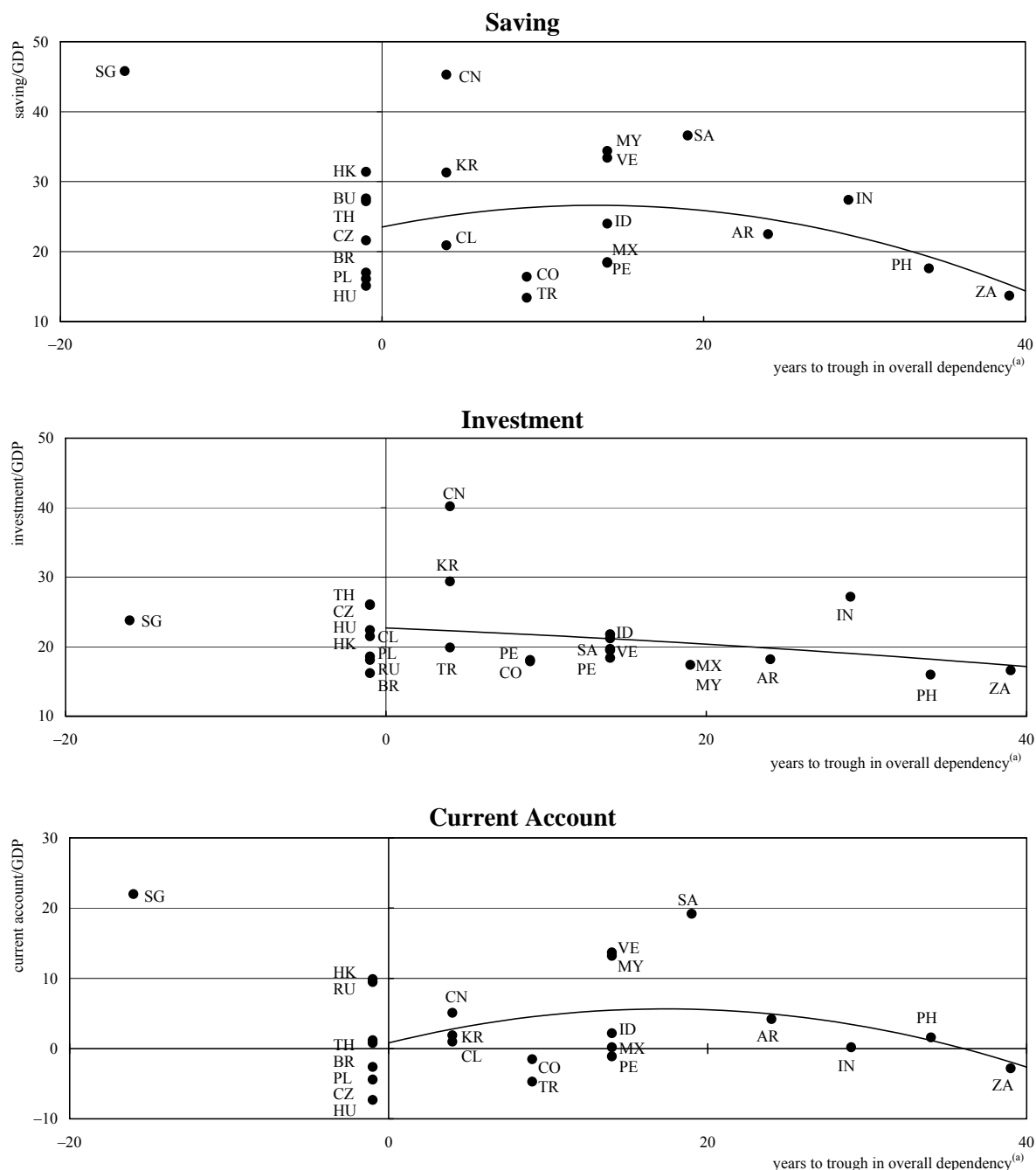
⁵ In the aftermath of the Asian crisis, these surpluses reflected declines in investment that exceeded declines in national saving. See Moreno (2007).

⁶ IMF (2004), Table 3.1, page 143, estimates that in a panel of 115 countries over the period 1960-2000 a rise in the share of the working-age population was associated with an increase in real GDP per capita, while a rise in the share of the elderly population was associated with a decline.

⁷ Additional perspective is provided by a study by Bulir and Swiston (2006), Table 2, who estimate the effects of changes in overall dependency ratios on private saving in a cross-section analysis of 44 developed and emerging market economies. They find that in this decade, a 1 point increase in the overall dependency ratio is associated with a 0.3 percentage point decline in the ratio of private saving to GDP. The association is higher (0.63) in industrial countries, and has risen compared to the 1990s (see also Loayza *et al.*, 2000). Furthermore, Asian economies are found to save more than is predicted in the model, and until the end of the 1990s, Latin American countries tended to save less than predicted. These regressions explain between two thirds and three fourths of the cross-country variance of the private saving rate.

Figure 1

Saving, Investment, Current Account and Years to Trough in Dependency Ratios
(average of 2002-08, percent)



AR=Argentina; BR=Brazil; CL=Chile; CN=China; CO=Colombia; CZ=Czech Republic; HK=Hong Kong SAR; HU=Hungary; ID=Indonesia; IN=India; KR=Korea; MX=Mexico; MY=Malaysia; PE=Peru; PH=Philippines; PL=Poland; RU=Russia; SA=Saudi Arabia; SG=Singapore (not included in the regression, but the data points are shown in the figure); TH=Thailand; TR=Turkey; VE=Venezuela; ZA=South Africa.

^(a) Where 2008=year 0. Overall dependency ratio is defined as the population less than 15 years of age plus population 80 years or older divided by the population of 15-59 years-olds.

Source: IMF and United Nations.

Additional perspective can be gained from Figure 1, which relates saving, investment and current account balances to the years to trough in overall dependency in a small cross-section of EMEs. In each Figure, countries on the right side of the x-axis are younger, implying higher overall dependency ratios (because of high child dependency). Moving left on the x-axis towards zero, overall dependency ratios are low (reflecting higher working-age populations and lower child dependency ratios). Dependency ratios then rise again in response to a rising share of elderly population and lower share of working-age populations. Focusing first on saving (left-hand panel), we would expect a non-linear relationship in which saving is low in countries where the population is young (right side of the axis), tends to rise towards the middle of the Figure and then declines when approaching the zero point of the x-axis or past it. A quadratic regression line broadly reveals such a relationship in saving and in the current account. (The regression line for investment turns out to be linear). Again, caution is needed in interpreting these results because of wide dispersion in the data. In particular, Singapore is a significant outlier with an older population and very high rates of saving.⁸

3 Pension system design

A key challenge faced by pension authorities is to generate enough resources to meet pension liabilities given a desired level of coverage and replacement income while minimising the burden on the working-age population. In this connection, there has been much discussion of how to fund pension benefits, and specifically on the extent to which countries should rely on income transfers or (alternatively) accumulated assets to finance retirement spending. National practices appear to vary considerably. Drawing on research by the National Transfers Account project, Lee and Mason (2007) estimate that reliance on assets has been comparatively high in Thailand and the United States, and comparatively low in Japan and Taiwan, China (Figure 2).⁹

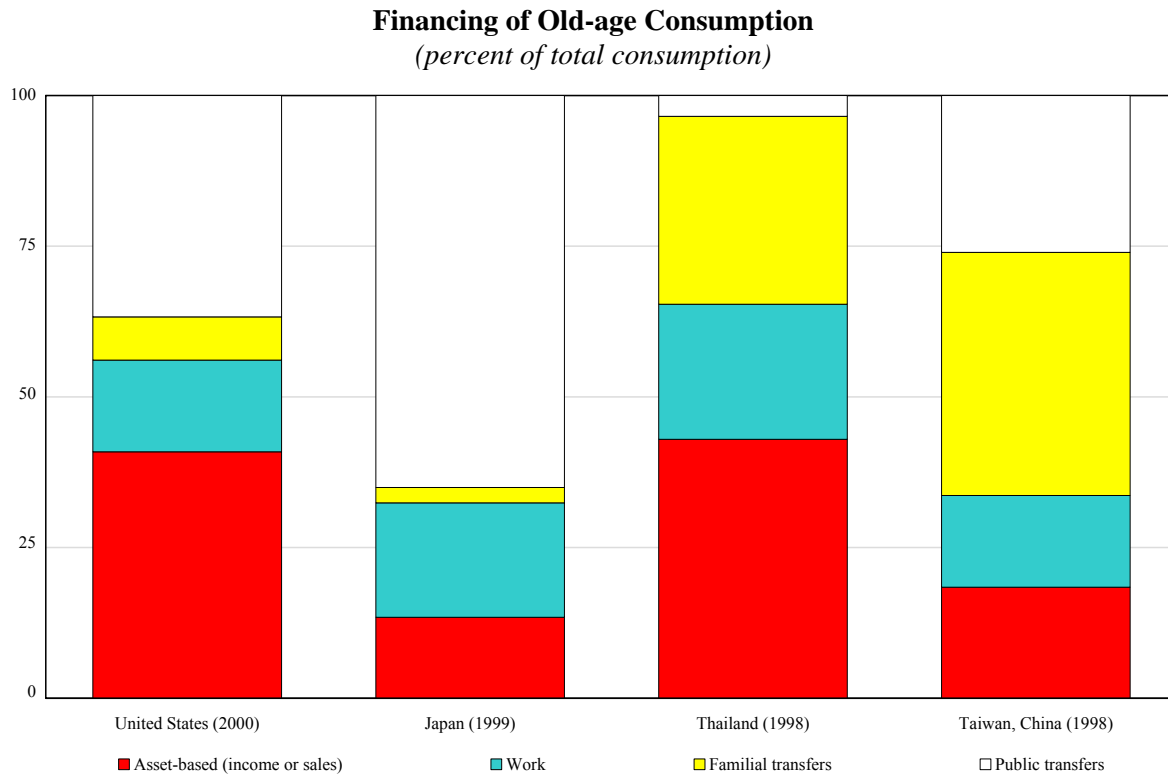
Some of these differences could reflect different institutional arrangements for financing old-age consumption, including differences in pension design and coverage. Traditionally, pension systems have relied on defined benefit (ie guaranteed incomes) pay-as-you-go systems, in which taxes on workers fund the pension incomes of the elderly. However, these systems tended to create very large implicit pension debts that, since they were not fully funded, raised concerns about the adequacy of replacement incomes and potential fiscal burdens. In particular, unfunded systems in which payments have to be implemented via transfers from the working-age population (e.g., traditional pay-as-you-go systems) raised concerns about increasing burdens on a declining pool of workers. Projected declines in the share of workers and increases in the share of elderly dependents in the population (Table 1, three right-hand columns) imply increases in elderly and overall dependency ratios. The issue is of particular interest in countries where populations are ageing more rapidly (e.g., CEE, Korea and China).

The potential financing problems that can arise in more traditional pension systems are illustrated by the experience of Korea, where the pension system is a *partially funded defined benefit* system managed by the government.¹⁰ Holzmann *et al.* (2004) note that reserves accumulated through the public pension system were low compared to the estimated implicit pension debt (IPD), respectively 10 and 47 per cent of GDP, 10 years after the scheme was introduced. It was estimated that the fund would be completely exhausted within the first half of

⁸ Singapore is such an outlier that it was not included in the regression analysis. However, all other countries shown in the figure were included in the regression.

⁹ At the same time, however, there appears to be significant reliance on familial transfers in Thailand and Taiwan.

¹⁰ However, in 2007, the National Pension Service (NPS) mandated several investment banks (Morgan Stanley, Credit Suisse) to manage part of its assets. See Song Jung-a, "S Korea turns to global banks on pensions", *Financial Times*, 25 July 2007.

Figure 2

We thank Ronald Lee for permission to use this figure.
Source: Lee and Mason (2007).

the 21st century.¹¹ One difficulty is that payment promises in a defined benefit plan do not depend on a pension system's performance or ability to accumulate assets. Another difficulty pertains to incentives to save under these arrangements discussed below.

Recent pension legislation (e.g., in Latin America) has instead sought to encourage wealth accumulation via personal saving to fund retirement consumption. In particular, there has been more emphasis on defined contribution, rather than defined benefit, which reduces the implicit pension debt. For example, Chile's pension system (introduced in 1981) is a *fully funded defined contribution* system of mandatory individual accounts managed by private pension fund administrators (AFPs). In the 1990s, eight emerging market economies implemented pension reforms similar to Chile's.¹²

In assessing the extent to which pension reforms of this latter type could reduce the burden on the working-age population, it is worth noting that in a closed economy, consumption by the old would always involve some transfer of resources away from the young. In a pay-as-you-go system, the transfer would involve the payment of taxes (e.g., for social security, as in the United States). In

¹¹ The precise estimated dates vary: by 2031 according to Moon (2002) and by 2047 according to the Ministry of Health and Welfare (Bateman, 2007).

¹² These are Peru (1993), Argentina and Colombia (1994), Uruguay (1995), Mexico and Bolivia (1997), El Salvador (1998) and Poland (1999). In contrast, Brazil has not adopted individual accounts and recently introduced a notional defined contribution system, which links contributions to benefits, but the contributions are not placed in individually funded accounts (Matijascic and Kay, 2008).

a fully funded system with private accounts (e.g., as in Latin America) the transfer would involve the payment of rent, interest income or dividends to, or purchases of assets from, retirees. Nevertheless, a fully funded defined contribution system can still reduce the burden on the working-age population if over time it increases saving and the stock of capital of the economy. Higher capital/labour ratios would raise worker productivity, making it easier to sustain any given level of elderly consumption out of current income. In an open economy, burdens on the working-age population could also be reduced via the accumulation of foreign assets, which can result from additional saving, or the diversification of pension fund portfolios (see below). This would reduce claims on domestically produced goods and services at the time of retirement (compared to the case of pay-as-you-go financing or domestic investment only).

Reformed pension systems could increase the incentive to save and reduce evasion because pension contributions are not transfers to others but are savings explicitly accruing to the individual.¹³ However, the impact on saving rates of pension reforms similar to those adopted in Chile does not appear to be large.¹⁴ Saving ratios in countries listed earlier as having adopted these reforms have generally not increased markedly over time (Annex, Figure 9). In Poland, for example, sharp increases in saving rates pre-date the 1999 pension reforms, and national saving rates have by and large drifted downwards since the reforms were adopted. In Latin America, saving rates are still comparatively low, and increases in some cases have only offset earlier declines.¹⁵ An exception is Chile, where national saving rates have risen since the adoption of pension reforms in the 1980s.

Several factors may have limited the impact of pension reforms on national saving:

- *lack of financial literacy.* Pension reforms will not increase saving if contributors are not aware of the possible returns from saving. Some recent survey data from Chile suggests that many pension contributors (up to around 60 per cent) probably lack such awareness as they cannot provide estimates of the balances on their pension accounts. It also appears that contributors with lower awareness have smaller balances (Arenas de Mesa *et al.*, 2008);
- *reduced precautionary saving.* Precautionary household saving outside the pension system may have been reduced to the extent to which fully funded defined contribution plans are seen as more credible than defined benefit plans that are not fully funded. This effect may be accentuated if pension funds also contribute to financial deepening (see below). The impact on overall saving would then be small and could even be negative. In a number of countries, there has also been a decline in private saving offsetting increases in government saving. Indeed, Bulir and Swiston (2006) find that the private saving offset to public saving has increased considerably in this decade; a 1 point rise in the ratio of public saving to GDP is offset by a 0.9 point decline in private saving (up from 0.4 to 0.6 in the 1990s). This may reflect lower precautionary saving, due not only to pension reforms but also to more credible macroeconomic policies;
- *transitional costs.* While pension reforms have increased assets to cover implicit pension debts, explicit recognition of such debts has resulted in larger fiscal deficits over a relatively extended transition period. Roldos (2007) notes that “the loss of contributions to individual accounts and

¹³ Indeed, in Korea, the contributions tend to be low due to a relatively large self-employed sector, where plan participants tend to underreport their income. A less developed infrastructure for enforcement and collection also plays a role. Reforms adopted in 2007 seek to improve the sustainability of the system by gradually reducing the income replacement rate from 60 to 50 per cent in 2008 and then to 40 per cent by 2028.

¹⁴ The same could be said for current accounts. In Figure 1, the largest surpluses appear to be in countries that are export-oriented (*i.e.*, Singapore and Malaysia) or are commodity exporters (e.g., Venezuela). The extent to which mandatory contributions to provident funds might help explain the large current account surpluses in Singapore and Malaysia remains to be determined.

¹⁵ OECD (2007) reaches a similar conclusion. It also notes that empirical work on the impact of pension reforms on national saving is not conclusive.

the payment of recognition bonds to those who moved to the new partially or fully funded systems added in some cases more than 10 percentage points of GDP to public debt ratios". It may also be noted that in some cases, such as Peru, reforms were implemented in such a way that workers had an incentive to stay with the traditional pay-as-you-go system, although this was later modified (Carranza and Morón, 2008);

- *declining pension coverage of workers.* OECD (2007, Box 2.1, pp 69-70) estimates that the weighted average of coverage for the Latin American region fell from 63 per cent before the pension reforms to 26 per cent in 2006 (however, the initial coverage could be an overestimate). In particular, while membership in pension funds has increased as a proportion of the registered workforce, the share of members who actually contribute has fallen in every country.¹⁶ Research is needed to uncover the reasons, but an important factor appears to be whether a pension plan is mandatory, or the default is set to automatic enrolment (Beshears *et al.*, 2008). Given that pension plan contributions are mandatory in a number of EMES, a large informal sector may also play a role. High administrative costs of pension systems (see next item) may also be partly responsible;¹⁷
- *high administrative costs.* Reforms that have forced workers to channel savings to fund their own retirement through private financial institutions have resulted in high fees.¹⁸ Costs in these systems average 1 to 2 per cent in the long run, which can have the effect of lowering future pensions 20-30 per cent. Against this it has been argued that that high operating costs largely reflect marketing expenditures in retail-oriented pension fund systems and institutional reforms could reduce them (James *et al.*, 2001). It is also argued that government-run pension systems deliver much lower returns than private systems.¹⁹

4 Asset accumulation and financial deepening

4.1 Pension funds: asset growth and composition

Experience suggests that pension funds can contribute to financial sector deepening. As pension fund assets grow, they can help diversify the investor base and provide stable demand for fixed income securities as well as for new financial instruments (e.g., high-yield bonds, mortgage-backed securities (MBS), and foreign exchange and interest rate derivatives). The process is potentially symbiotic, as this in turn supports pension fund growth by increasing the availability of longer-maturity assets for pension fund investments.

Since 2000, pension fund assets have grown rapidly in a number of EMES. As shown in Figure 3, as a percentage of GDP these assets have risen by more than 8 percentage points in Chile, Colombia, Peru and Poland. (In contrast, partly reflecting their initially greater size, pension fund assets have grown only moderately in Singapore and declined in Malaysia over the same period). However, there is still ample scope for further growth, as pension fund assets are generally still small in EMES. In 2006, eight out of 13 EMES shown in Figure 7 had assets of less than 20 per cent of GDP. Among EMES, only in Chile, Singapore and Malaysia did pension fund assets exceed 50 per cent of GDP. Although this is comparable in size to some developed economies, it is still small compared to the 100 per cent of GDP recorded in the United States.

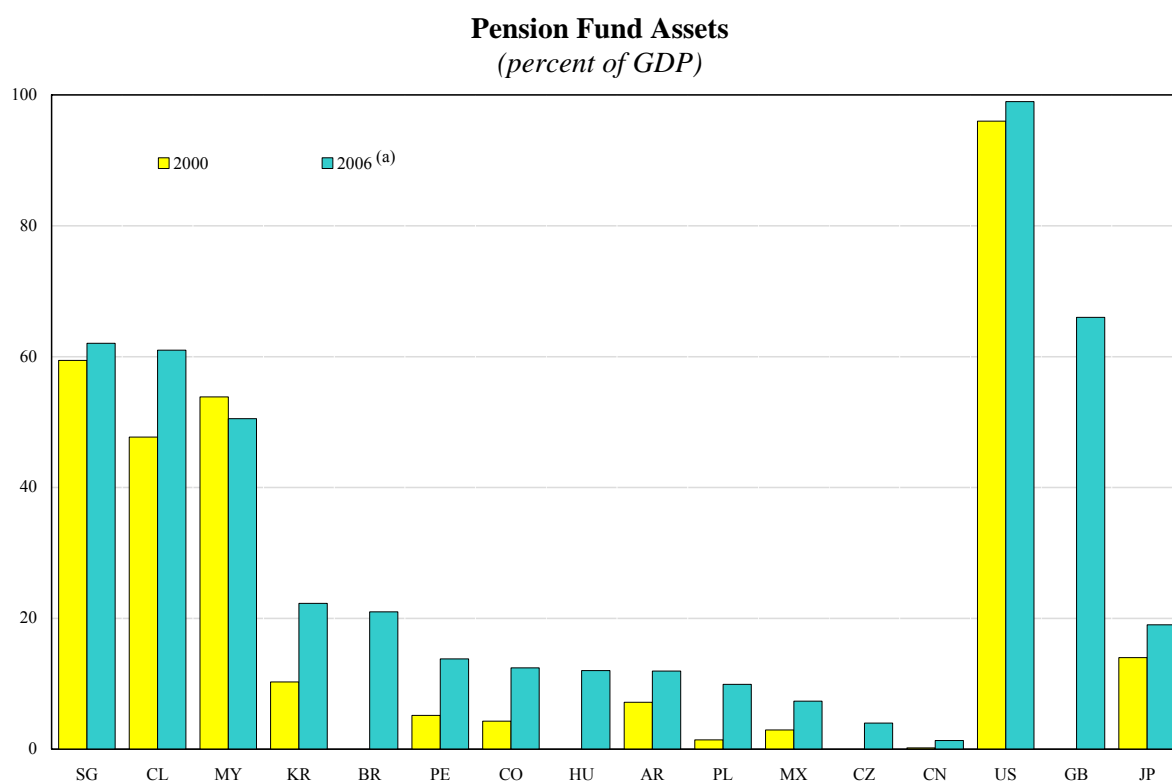
¹⁶ The percentage of registered workers who contribute ranges from 11 per cent in Peru to 31 per cent in Mexico and 58 per cent in Chile.

¹⁷ In line with some of these developments, the success of recent (three-pillar) pension systems in achieving their social goals is being questioned, notably in Chile (Kay and Sinha, 2008). Efforts to address this could have effects on saving and investment as well.

¹⁸ For a more severe critique, see Kotlikoff (2006).

¹⁹ See James (2004) and Roldos (2007).

Figure 3



AR=Argentina; BR=Brazil; CL=Chile; CN=China; CO=Colombia; CZ=Czech Republic; GB=United Kingdom; HU=Hungary; JP=Japan; KR=Korea; MX=Mexico; MY=Malaysia; PE=Peru; PL=Poland; SG=Singapore; US=United States.

(a) Or latest available.

Source: OECD, Association of Pension Fund Administrators; national data.

4.2 Composition of pension fund portfolios

The impact of pension fund accumulation on the domestic financial sector depends in part on the composition of pension fund portfolios. The following aspects may be highlighted.

First, the share of assets held in financial institutions has tended to decline in a number of EMEs (see Chan *et al.*, 2006 for Latin America). This may reflect less reliance on bank deposits as investments, which could enhance demand for other financial instruments and financial deepening. However, in some countries, bank deposits remain significant. According to OECD statistics, in 2005 the share of cash and deposits in total pension fund assets in Thailand, Brazil and Indonesia was 40, 44 and 71 per cent respectively.

Second, the portfolio composition of pension fund assets in some EMEs, Latin America in particular, is highly weighted towards government bonds. Indeed, as reported by Chan *et al.*, (2006), in the majority of Latin American countries they sampled pension funds held more than half of their portfolios in government debt (in Mexico and El Salvador it was more than four fifths). Of particular interest is that in five Latin American countries (Argentina, Bolivia, El Salvador, Peru and Uruguay) pension fund assets became more concentrated in government debt between 1999 and 2005. By way of comparison, the share of pension fund assets invested in bonds (both public and private) in the United States and Japan tended to fall (between 1995 and 2005, from 26 to 19 per cent and from 46 to 30 per cent, respectively; see Committee on the Global Financial System, 2007).

Table 3

Restrictions on Portfolio Composition and Actual Asset Composition
(percent of total assets, 2006 or 2007)

Country	Domestic Equities		Foreign Assets	
	Maximum Limits	Actual Composition	Maximum Limits	Actual Composition
India				
Korea	12	11	20	9
Singapore	PPR	0	PPR	...
Argentina	50	13	20	10
Chile	39	17	30	32
Colombia	30	15	20	14
Mexico	15	0.4	20	8
Peru	35	42	10.5	8
Hungary	50	8	30	5
Poland	40	32	5	2
<i>Memo:</i>				
<i>United States</i>	<i>PPR</i>	<i>41</i>	<i>PPR</i>	
<i>United Kingdom</i>	<i>PPR</i>	<i>40</i>	<i>PPR</i>	
<i>Japan</i>	<i>30</i>		<i>30</i>	

PPR = "prudent person rule".

Source: Poirson (2007); OECD, *Global Pension Statistics*; OECD (2008), *Latin American Economic Outlook*; Korea National Pension Service.

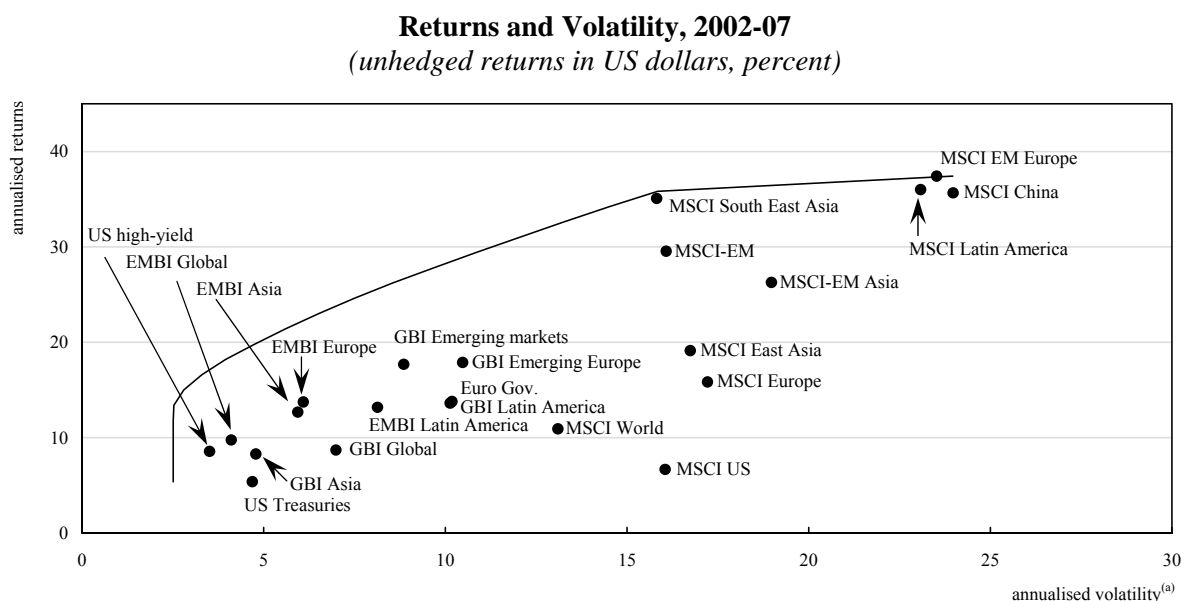
Third, some pension funds (e.g., Korea or Mexico, Table 3) tend to allocate a relatively small amount of their portfolios to equities, even if relatively young populations (e.g., in India) suggest that there is scope for increasing allocation to equities.²⁰ By way of comparison, in the United States, 41 and 24 per cent of pension fund assets are invested in equities and mutual funds, respectively. Fourth, with some exceptions (e.g., Chile), the allocation to foreign assets by EME pension funds also tends to be small.

The lack of diversification in pension fund portfolios is in a number of cases the result of restrictions on pension fund investments in equities and foreign assets (Table 3). A major reason for these restrictions is that expanding pension fund portfolios to include assets with returns exhibiting very high volatility (domestic equities and foreign assets) is believed to create an unacceptable risk of losses that could impoverish pension fund participants.

There are two arguments for liberalising restrictions on pension fund investments, both of which have to do with the gains from diversification. First, liberalisation can reduce concentration in a portfolio and consequently lower the risk of very large losses. This can be particularly

²⁰ Some research suggests that it would be optimal to have portfolios that are more heavily skewed towards equities in economies where populations are younger (Gollier, 2005). However, this is a contentious issue.

Figure 4



The line represents the efficient portfolio frontier. EM= Emerging Markets; EMBI=Emerging Markets Bond Index; GBI= Government Bond Index; MSCI=Morgan Stanley Capital International.

^(a) Standard deviation of returns, calculated using daily percentage changes in the return index.

Source: JPMorgan Chase; Merrill Lynch; Datastream.

important in emerging market economies which, in the past, have been vulnerable to sharp downturns or even financial crises. For example, a pension fund investing in domestic bank deposits avoids market and liquidity risk but retains counterparty risk to the domestic banking system. This risk can be reduced (at the cost of assuming some exchange rate risk) by adding foreign assets to its portfolio.

Second, liberalisation increases the set of investable instruments and potential gains from diversification. The recent performance of a variety of financial instruments suggests that these gains can be very large. For example, in this decade domestic Latin American government securities (GBI-Latin America) earned a shade over 10 per cent annualised return (in US dollars) with an annualised volatility of 10 per cent (Figure 4). However, roughly triple those returns could have been earned by investing in Latin American equities, at the cost of more than doubling volatility.

Returns can be improved not only by diversifying into equities (at home or abroad), but also by diversifying into foreign bonds. For example, adding domestic bonds from other regions to an investment portfolio could be associated with increased returns with less than proportional increases in volatility; indeed, the GBI-EM index has higher returns and lower volatility than the GBI-Latin America index. This reflects diversification benefits resulting from combining assets in a portfolio whose returns have low or negative correlations (see below).

Berstein and Chumacero (2005) provide more precise estimates of the gains from easing specific restrictions on pension fund asset allocations in Chile. Their analysis suggests that by mid-2002, in the absence of the specific pension fund restrictions applied in Chile, pension fund assets could have been higher by between 10 per cent (for a quadratic preference or an efficient value-at-risk portfolio) and 30 per cent (for a minimum variance portfolio) without increasing the volatility of returns (see their Figure 3). Put differently, for a minimum variance portfolio, with the same volatility of returns, returns to the unrestricted portfolio averaged 0.85 per cent a month,

compared to 0.67 per cent per month for the restricted portfolio.²¹ This is because the unrestricted optimal portfolio implied a larger allocation to foreign bonds and equities (about a $\frac{1}{3}$ share for the minimum variance model) than would have been the case for the restricted portfolio. Thus, for the minimum variance model, the probability of hitting the investment limit for foreign fixed income and equity instruments was estimated at about 62 and 90 per cent, respectively.

4.2.1 How much would pension funds invest abroad?

While steps are being taken to liberalise pension fund investments abroad in a number of EMES, it is not clear how much pension funds will increase their investments abroad in response. On the one hand, in the case of Chile, or other EMES, the returns from moving to an optimum share of foreign assets (and corresponding gross outflows channelled via pension funds) could be even higher than suggested by Bernstein and Chumacero's (2005) estimates. In their analysis, they only consider developed country fixed and variable income instruments as alternatives to domestic assets,²² while recent experience suggests that EME pension funds could earn even higher-risk adjusted returns by investing in assets issued in other EMES. As can be seen in Figure 4, a number of regional (EMBI, GBI and MSCI) indices dominate their developed country counterparts in terms of risk-adjusted returns. Against these advantages is the possibility that EMES might be more vulnerable to crises, so that a pension fund that is very concerned about the risk of large losses might be less inclined to invest in EME instruments.

Much depends on the diversification benefits provided by EME instruments on average and during episodes of financial stress. As can be seen in Figure 5, equities are not fully correlated across regions over a longer period (2001-07). This highlights the opportunities for diversification benefits from EME pension fund investments in both developed market and other emerging market equities. However, an important concern is that correlations in cross-country equity returns tend to rise during episodes of financial stress. Nevertheless, EM pension funds may be in a better position to manage the risks of diversification (than, say, EM banks) because pension fund liabilities tend to be longer-term. Also, bond investments do not appear to raise such concerns, as correlations in some cases have actually fallen during episodes of financial stress.

On the other hand, diversification could be limited by a number of factors.²³ Even in the absence of restrictions, there is evidence that investors prefer to invest in their own domestic markets (home bias). This is reflected in the fact that pension fund investment abroad is below the ceiling in a number of countries (Table 3).²⁴ An important reason is that developing monitoring and management capacity to invest abroad is *costly*, particularly for pension funds in EMES having

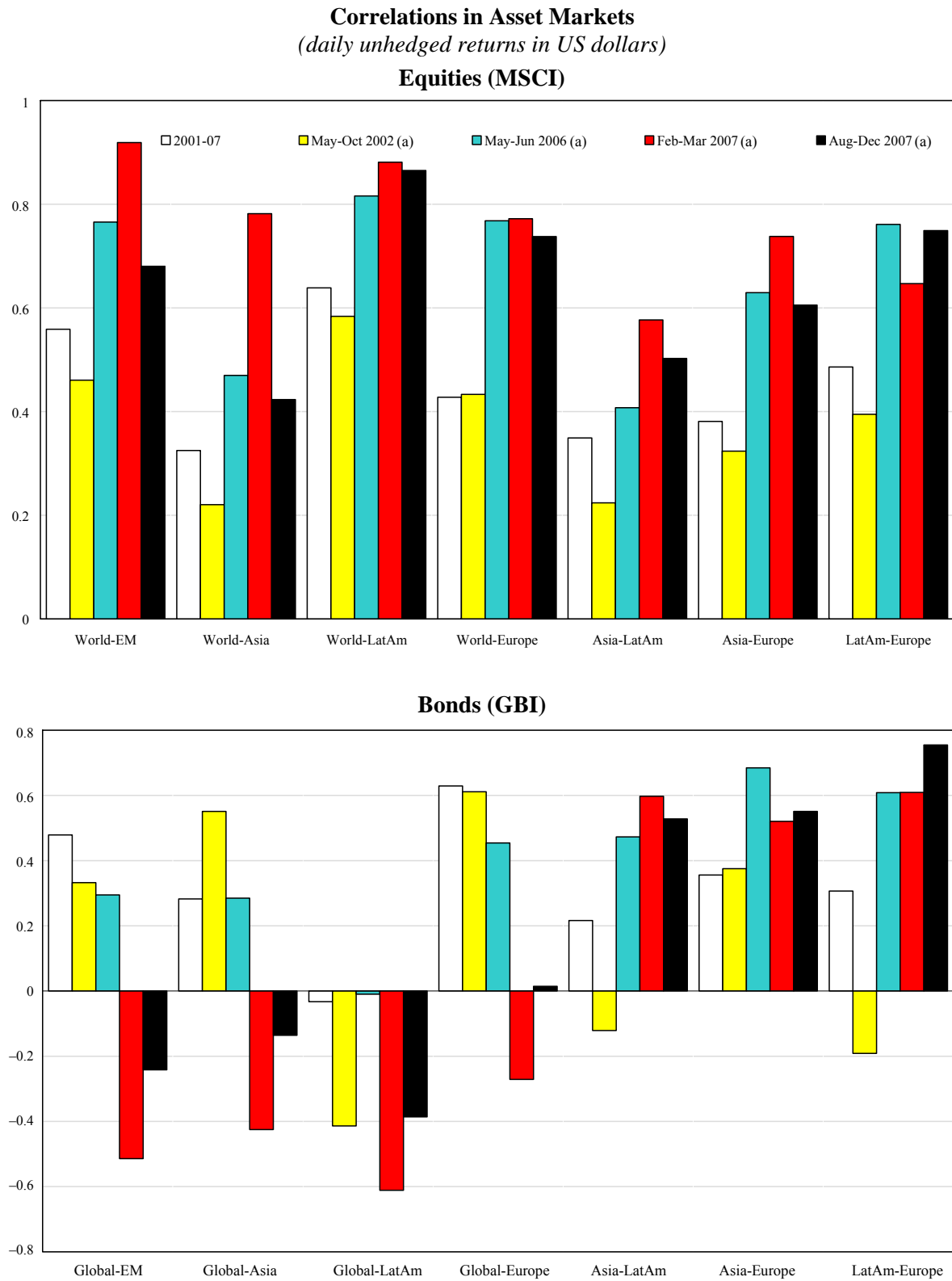
²¹ The authors estimate the restricted portfolio by (where applicable) calibrating parameters in the objective function so as to replicate the *ex post* pension fund portfolio returns and volatilities. The unrestricted portfolio is selected so that in each period it is exposed to the same volatility as the restricted portfolio. The return corresponding to that volatility is then estimated. These results vary somewhat with differing assumptions about transaction costs, but the basic conclusions hold; see Bernstein and Chumacero (2005), Table 3.

²² They assume that there are four types of assets: domestic fixed, domestic variable, foreign fixed and foreign variable income (as proxied for, respectively, by promissory notes of the Central Bank of Chile of eight-year maturity, an index of all Chilean variable return instruments, an index based on all US indices, and the Dow Jones Industrial Average).

²³ Limited diversification of pension portfolios has also been observed in countries with higher incomes per capita. Gudmundsson (2001) describes stages in which pension funds in Iceland first invested in domestic bonds, lending directly to members (for housing), and then increased the share of foreign assets and equity in their portfolios over a short period of time (from low single digits to 19-26 per cent between the mid-1990s and 2000), resulting in large increases in returns on assets. In part, this reflected liberalisation, but also awareness by pension fund managers of the need to increase returns.

²⁴ Actual limits could also turn out to be below the ceiling because the ceiling applies to each fund individually and there are significant penalties for breaching the ceiling (e.g., forced sales). Under those conditions, fund managers would want to stay well below the ceiling to avoid breaches because fluctuations in market prices and mark to market accounting can push restricted asset holdings above the ceiling without any trade taking place.

Figure 5



^(a) Period of increased global market volatility.
Source: Datastream; JPMorgan Chase.

little experience with investments in global financial markets. For example, as pension fund liabilities are denominated in domestic currency pension funds need to develop the capacity to manage currency risks;²⁵ There is also limited availability of instruments to hedge risks, including those arising from currency or interest rate fluctuations.²⁶

There is growing awareness of the need to provide such hedging instruments. For example, in India market participants are now allowed to use foreign exchange forwards, swaps and options. While this is usually only against “crystallised foreign currency exposures”, the range of hedging tools available is now to be expanded (Mohan, 2007). However, it is still not clear to what extent pension funds would engage in hedging even were the appropriate instruments to be made available, because hedging would be costly. An additional concern is whether pension funds could contribute to increased volatility of capital flows (Vargas and Varela, 2008), which could reduce risk-adjusted returns or raise broader risk management concerns.

4.3 Deeper financial markets

As pension fund assets have grown, *emerging securities markets have deepened in recent years*. Domestic debt markets, which are largest in Asia, South Africa and Turkey, have generally grown in this decade. However, they have not grown in central Europe (Figure 6 and Annex, Figure 10). There has also been a tendency for stock market capitalisation to rise in EMES in this decade, reflecting steep increases in equity prices.

However, financial markets in EMES are still not as deep as in developed countries. This is broadly reflected in (i) still low ratios of market capitalisation in securities to GDP; (ii) high ratios of bank deposits to GDP; (iii) lack of liquidity in securities markets; and (iv) low reliance on securities markets for financing.

Low ratio of securities to GDP. As illustrated in Figure 6, the ratio of debt securities to GDP ranged from less than 30 per cent for CEE to 60 per cent or higher in Asia and Latin America. (Annex, Figure 10 provides country details). However, this ratio was around 200 per cent in the United States and Japan (Annex, Figure 11). With the recent run-up in EME equity prices, stock market capitalisation ratios are more comparable with the 100 and 150 per cent observed in Japan and the United States respectively, although they remain at a comparatively low 50 per cent in Latin America.

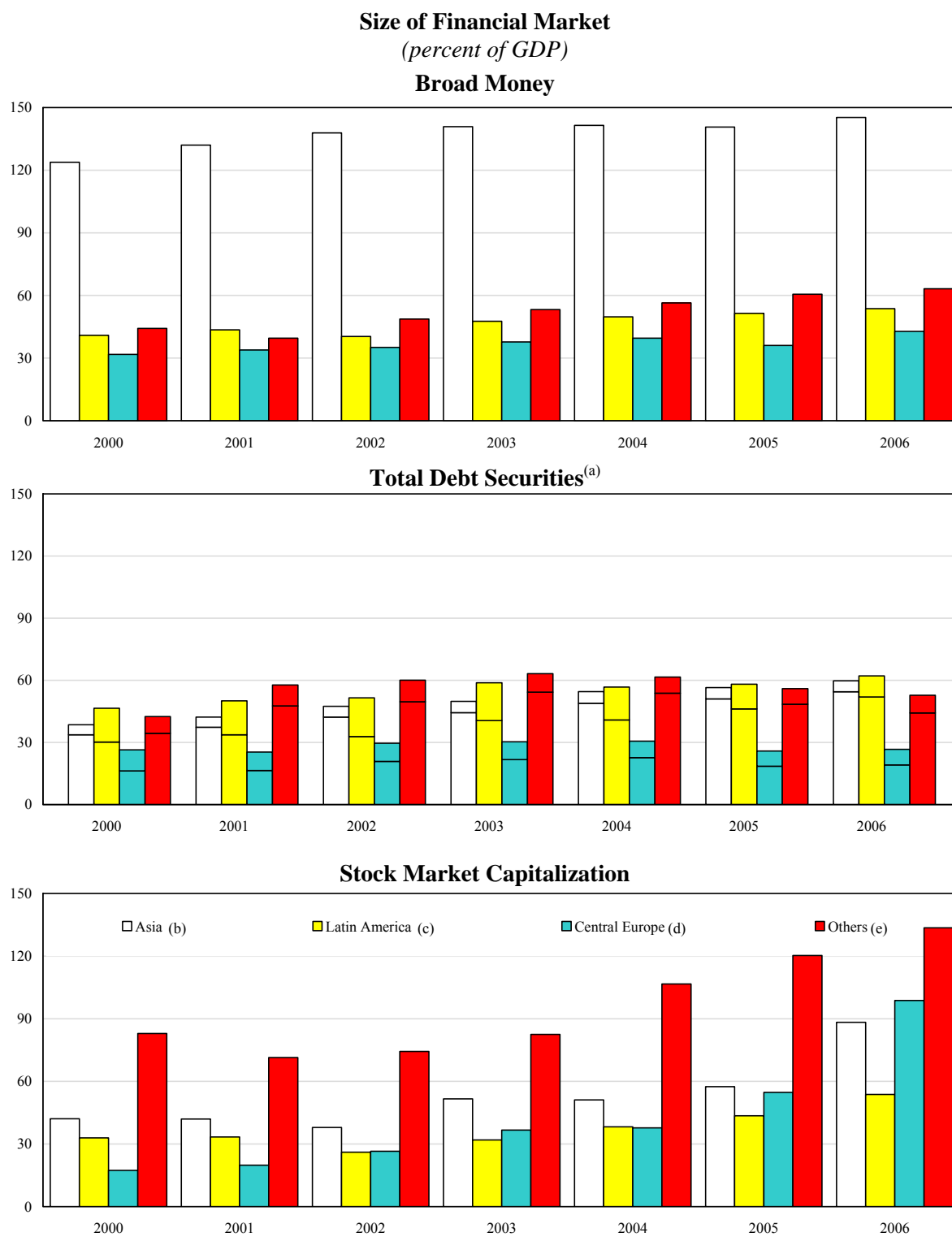
Relatively high bank deposits. M2/GDP has recently averaged around 140 per cent in Asian EMES and 45-60 per cent in other EMES. Bank deposits are thus relatively more important in EMES than in the US, where the M2/GDP ratio averaged 50 per cent. However, M2/GDP ratios are about as high in Japan (nearly 150 per cent) as they are in Asian EMES.²⁷

²⁵ With regard to monitoring investments abroad, pension funds could draw on the risk management capacity of global financial institutions by investing in vehicles such as mutual funds.

²⁶ See Moreno (2006), Table A6 and Mohan (2007).

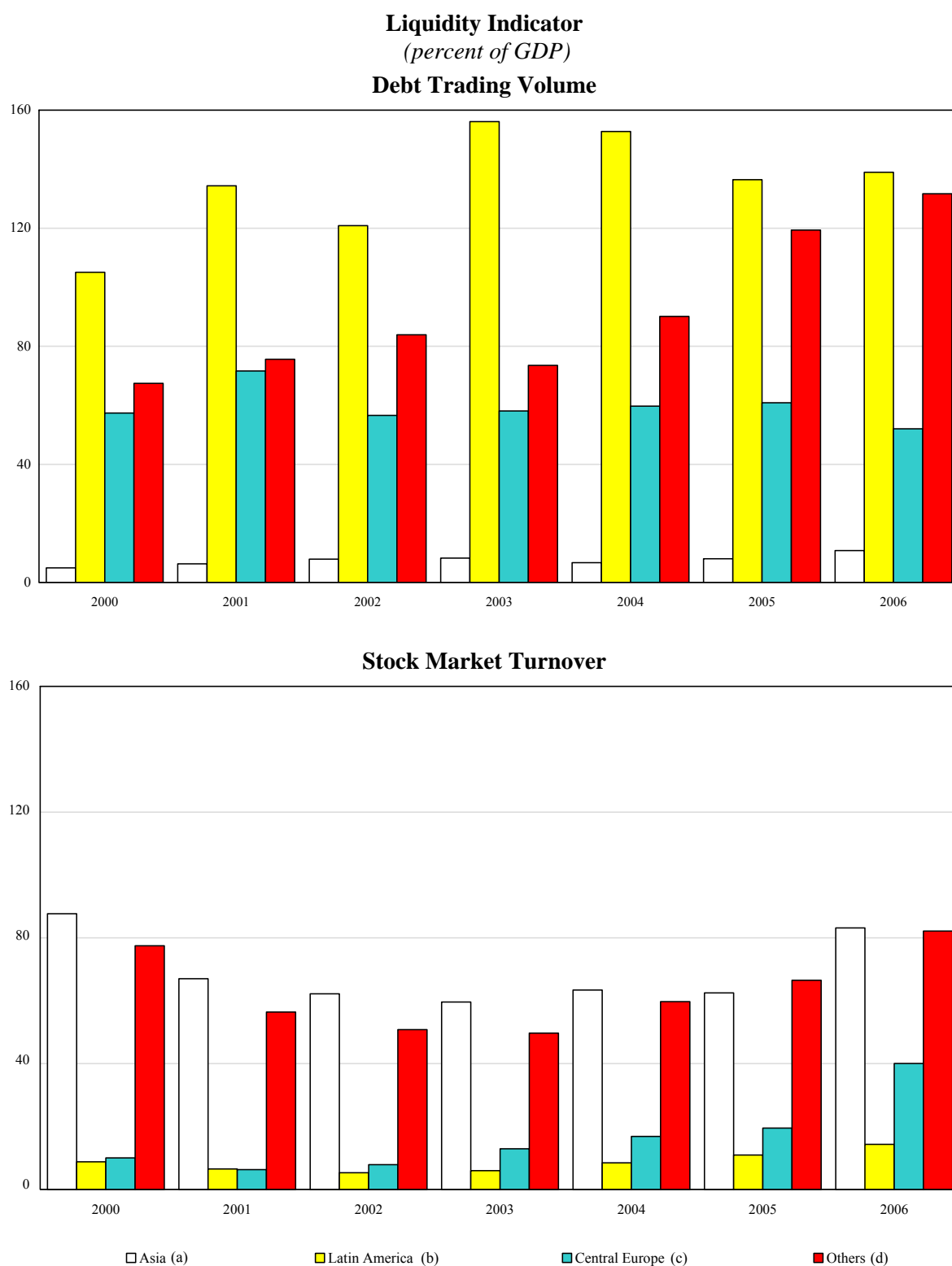
²⁷ One implication is that in countries where pension funds hold a significant proportion of bank assets, bank interest rate liberalisation could significantly increase pension fund returns, particularly where rising inflation is a concern. Bank interest rates have been liberalised in many EMES, although restrictions are still relevant in certain countries, like China or India. See Mohanty and Turner (2008, Tables 11 and 12) for information on the liberalisation of bank interest rates between 1997 and 2006. In some cases, pension funds could help promote interest rate liberalisation. In the case of India, pension funds could help eliminate distortions in interest rates caused by existing arrangements to support small savers (Mohan, 2007). To compensate for the lack of a social security system, the government gives small savers access to saving instruments (administered through post offices and commercial banks) that benefit from tax incentives and favourable interest rates set by the government. However, to attract deposits, banks competing with these small saving schemes tend to set rates on long-term deposits at levels higher than those which would have been obtained under competitive market conditions. This has been seen as contributing to downward stickiness of lending rates (with implications for the effectiveness of monetary policy). Improvements in the social safety net (including pensions) could address this issue. (A proposed interim solution is to benchmark these administered interest rates to market determined rates).

Figure 6



^(a) Covers domestic (lower portion of bars) and international (upper portion of bars) debt securities. ^(b) China, Hong Kong SAR, India, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan (China) and Thailand. ^(c) Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela. ^(d) Czech Republic, Hungary, Poland and Russia. ^(e) South Africa and Turkey.
Source: IMF; Standard & Poor's, BIS.

Figure 7



(a) China, India, Indonesia, Korea, Malaysia, Philippines, Taiwan (China) and Thailand. (b) Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela. (c) Czech Republic, Hungary, Poland and Russia. (d) South Africa and Turkey.
Source: IMF; EMTA; Standard & Poor's.

Low liquidity. The rate of turnover in financial instruments tends to be lower in EMEs than in developed markets. This can present problems for risk management (and eventual wealth accumulation), by making it difficult for investors to change their positions. As can be seen in Figure 7, debt trading volume as a percentage of GDP ranged from a low of around 10 per cent of GDP in Asia to a high of around 150 per cent in Latin America. By way of comparison, the corresponding ratios for Japan and the US were respectively about 500 per cent and nearly 2000 per cent. As for equity markets, turnover tends to be lower in Latin America (around 10 per cent of GDP) and around 80 per cent in Asia and “other”. By way of comparison, the corresponding turnover ratios for Japan and the United States are 150 and 280 per cent respectively (Annex, Figure 12).

Limited reliance on equities for financing. To illustrate, in China stock market capitalisation as a percentage of GDP is quite high (90 per cent), but flow of funds data indicate that between 2003 and 2005 equities accounted for only about 4 per cent of total increases in liabilities, with bank loans and bond financing accounting for much larger shares (61 and 35 per cent respectively). The reasons why higher share prices do not lead to more share issuance warrant further examination.

4.4 *Role of pension funds in financial deepening*

The developments highlighted above suggest that further pension fund development could contribute to the deepening of financial markets. One indication is that the correlation between financial deepening and pension fund growth is comparatively strong in a number of EMEs. As shown in Table 4, stock market capitalisation is positively correlated with pension fund asset growth in Korea, Argentina, Chile, Colombia, Peru and Poland. In contrast, the correlation is negative in Malaysia and Singapore. As for domestic debt securities, the correlation is positive (in either levels or changes) in most EMEs listed.

The results in Table 4 are broadly in line with Roldos (2007) and OECD (2007), who note that institutional investment (including by pension funds) has been associated with increases in market capitalisation of stocks and bonds. This relationship is particularly apparent in Chile. In line with this, the share of pension funds in government debt markets in a set of Latin American countries rose from 18 per cent in 1998 to 29 per cent in 2005 (Roldos, 2007, Table 4). Pension fund demand is also believed to have helped stimulate the development of new financial instruments. There is also evidence of lengthening maturities in fixed income markets in Chile and Mexico, and institutional investors, including pension funds, are believed to have played an important role in this. Research also suggests that the growth of institutional investors such as pension funds can lower the cost of capital and encourage the creation of new financial instruments (Walker and Lefort, 2002). A pension fund portfolio reallocation to equities could thus boost investment and growth as well as returns for pension fund investors. The importance of this effect would depend in part on the extent to which firms rely on equity for their financing (which as noted earlier, can be relatively little in some EMEs).²⁸

4.5 *Implications for saving and capital flows*

The implications of greater financial depth for capital flows are uncertain, but some research suggests it could affect capital flows by lowering precautionary saving and current account

²⁸ On the other hand, some commentary suggests that the relationship between pension asset growth and market capitalisation has been weak in some countries over certain periods. Possible explanations include inadequate regulatory and financial infrastructure and a lack of a critical mass in pension fund assets under management.

Table 4

Correlations with Pension Fund Assets/GDP^(a)

Country	Time Period		Stock Market Capitalisation/GDP		Outstanding Domestic Debt Securities/GDP	
			Ratio	Change in Ratio	Ratio	Change in Ratio
China	2000	2006	0.27	0.04	0.81	-0.60
Korea	1990	2006	0.76	0.41	0.92	0.40
Malaysia	2000	2006	-0.38	-0.09	-0.28	0.65
Singapore	2000	2006	-0.20	-0.65	0.82	0.61
Argentina	1995	2006	0.48	0.34	0.94	0.85
Brazil			n.a.	n.a.	n.a.	n.a.
Chile	1982	2006	0.68	0.79	0.30	0.71
Colombia	1995	2006	0.72	0.38	0.98	0.74
Mexico	1998	2006	0.39	-0.23	0.96	0.54
Peru	1994	2006	0.72	0.44	0.90	0.20
Czech Republic			n.a.	n.a.	n.a.	n.a.
Hungary			n.a.	n.a.	n.a.	n.a.
Poland	2000	2006	0.86	0.33	0.96	0.91
<i>United States</i>	<i>2001</i>	<i>2006</i>	<i>0.96</i>	<i>0.94</i>	<i>0.59</i>	<i>0.11</i>
<i>Japan</i>	<i>2001</i>	<i>2006</i>	<i>0.98</i>	<i>0.86</i>	<i>0.64</i>	<i>-0.58</i>

^(a) Based on annual data covering the time period shown.

Source: OECD; FIAP; S&P Emerging Markets Database; national data; BIS.

balances. A recent study by Chinn and Ito (2007) finds that a larger financial sector could lower current account balances under certain conditions.²⁹ This is an issue of interest in a number of EMES, notably China.

The effects of pension fund portfolio liberalisation on net or gross capital flows are also uncertain. However, the experience of Chile since 1998, reported by Desormeaux *et al.* (2008), suggests that pension fund investments abroad can have a large impact on gross outflows. This impression is reinforced by evidence they cite that an increase of 10 per cent in foreign investment limits on Chilean pension funds is associated with an accumulated depreciation of 2 per cent of the Chilean peso against the US dollar (see Cowan *et al.*, 2008). To illustrate orders of magnitude, at the limit of 30 per cent that prevailed until recently, Chilean pension fund assets invested abroad would be equivalent to nearly 20 per cent of Chilean GDP. Pending legislation contemplates significant easing of these limits which could mean large cumulative gross outflows over time in the pension fund sector. By way of comparison, foreign reserves to GDP in Latin America averaged about 10 per cent in 2006 (13 per cent in Chile) and 35 per cent in Asia.

²⁹ The conditions are that the economy be less open (ie restrictions on capital flows) and the legal system be less developed (not in the top decile).

An issue of interest is whether outflows channelled via pension funds could help offset large gross capital inflows, thus reducing the incentives for foreign exchange market intervention and reserve accumulation in some countries. While they are not perfect substitutes for foreign reserves, pension fund accumulation of foreign assets could provide a channel for intermediating capital inflows abroad, thus providing some of the benefits that have been sought from foreign exchange market intervention and foreign reserve accumulation without the associated disadvantages. In particular, as pension fund foreign asset accumulation would be financed by domestic saving, it does not raise the issues typically associated with the financing of foreign reserve accumulation, such as the possible loss of monetary control or the carrying costs associated with sterilisation of intervention in foreign exchange markets.

5 Postscript: The impact of the global financial crisis

As noted earlier, some research suggests that it would be optimal to have portfolios that are more heavily skewed towards equities in economies where populations are younger. One reason is that returns on equity investments tend to outperform returns on fixed income investments over the medium to long-term. However, this proposition is being tested by the sharp deterioration in the performance of equity investments resulting from the crisis that broke out in the second half of 2007. Annualised returns on equities fell from a range of around 5 to 35 per cent (depending on the index) for 2002-07 (shown earlier in Figure 4) to about -1 to 20 per cent for 2002-09 (not shown),³⁰ while volatility over these periods increased from about 10-25 per cent to around 20-30 per cent. By comparison, the decline in the range of annualised returns for bonds was much more moderate; falling from around 5-20 per cent to 5-15 per cent, with volatility rising from 3-10 per cent to 5-15 per cent. These differences are reflected in pension fund performance of some EMEs. For example, returns in pension funds holding a large proportion of equities in both Chile and Hong Kong experienced large losses. Looking ahead, a question of interest is how long it will take for returns on equity investments to recover as the global financial system emerges from this crisis. At this writing, equity returns had improved significantly in 2009, reducing very large losses on equity investments that had been recorded earlier.

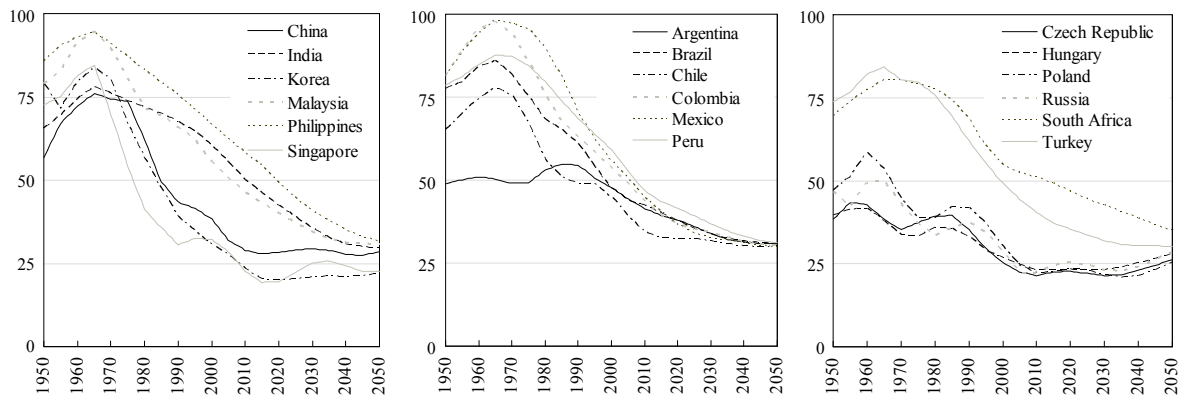
³⁰ This reflects the fact that for 2008-09 (negative) returns on various equity indices shown in Figure 4 ranged from -20 to -40 per cent.

Annex

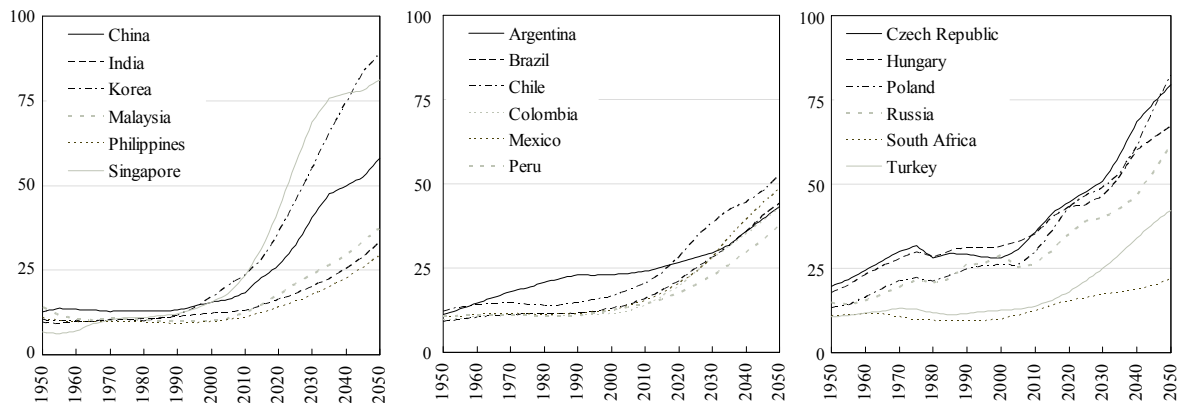
Figure 8

Dependency Ratios by Country (percent)

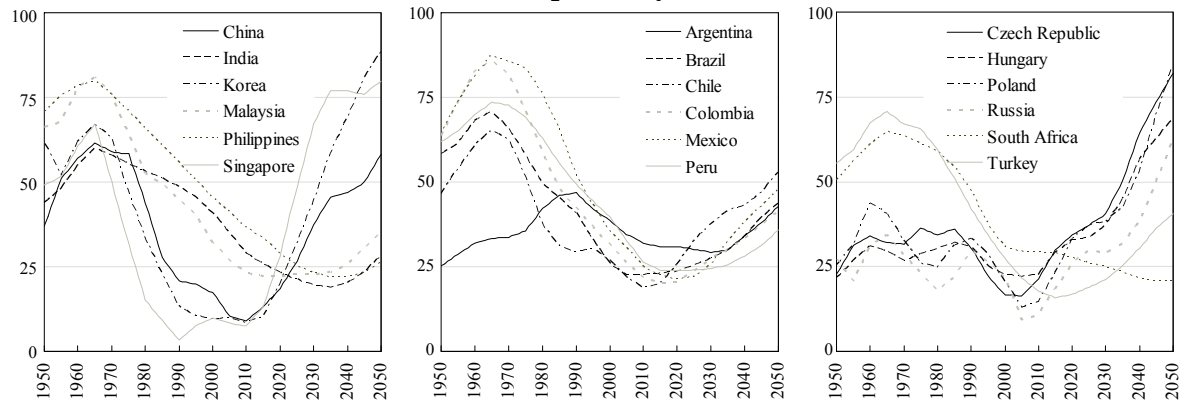
Child Dependency Ratios^(a)



Elderly Dependency Ratios^(b)



Overall Dependency Ratios^(c)



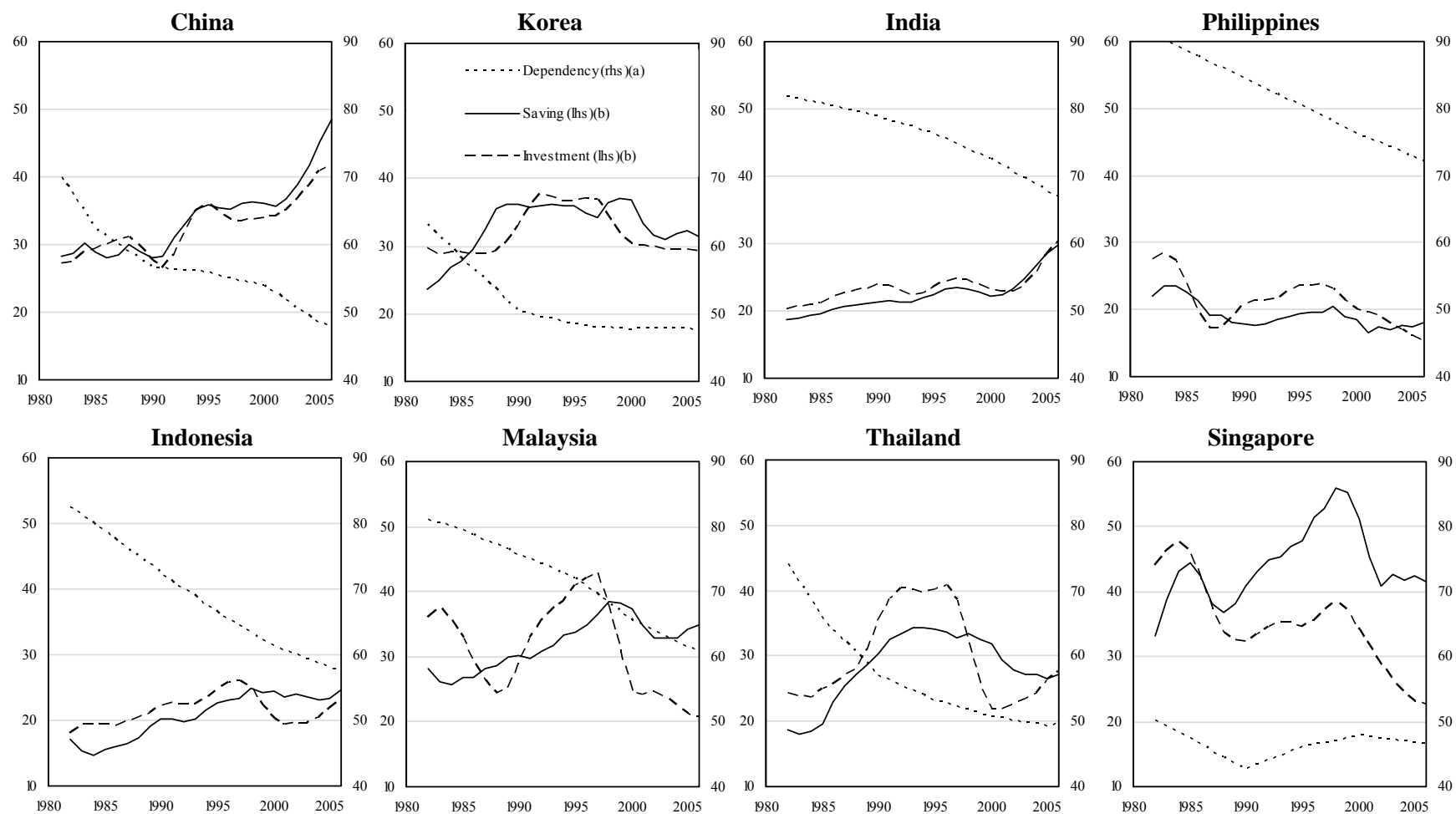
^(a) Population less than 15 years of age / population 15-59 years old. ^(b) Population 60 years or older / population 15-59 years old.

^(c) Population less than 15 years of age plus population 60 years or older / population 15-59 years old.

Source: IMF; United Nations, *World Population Prospects*.

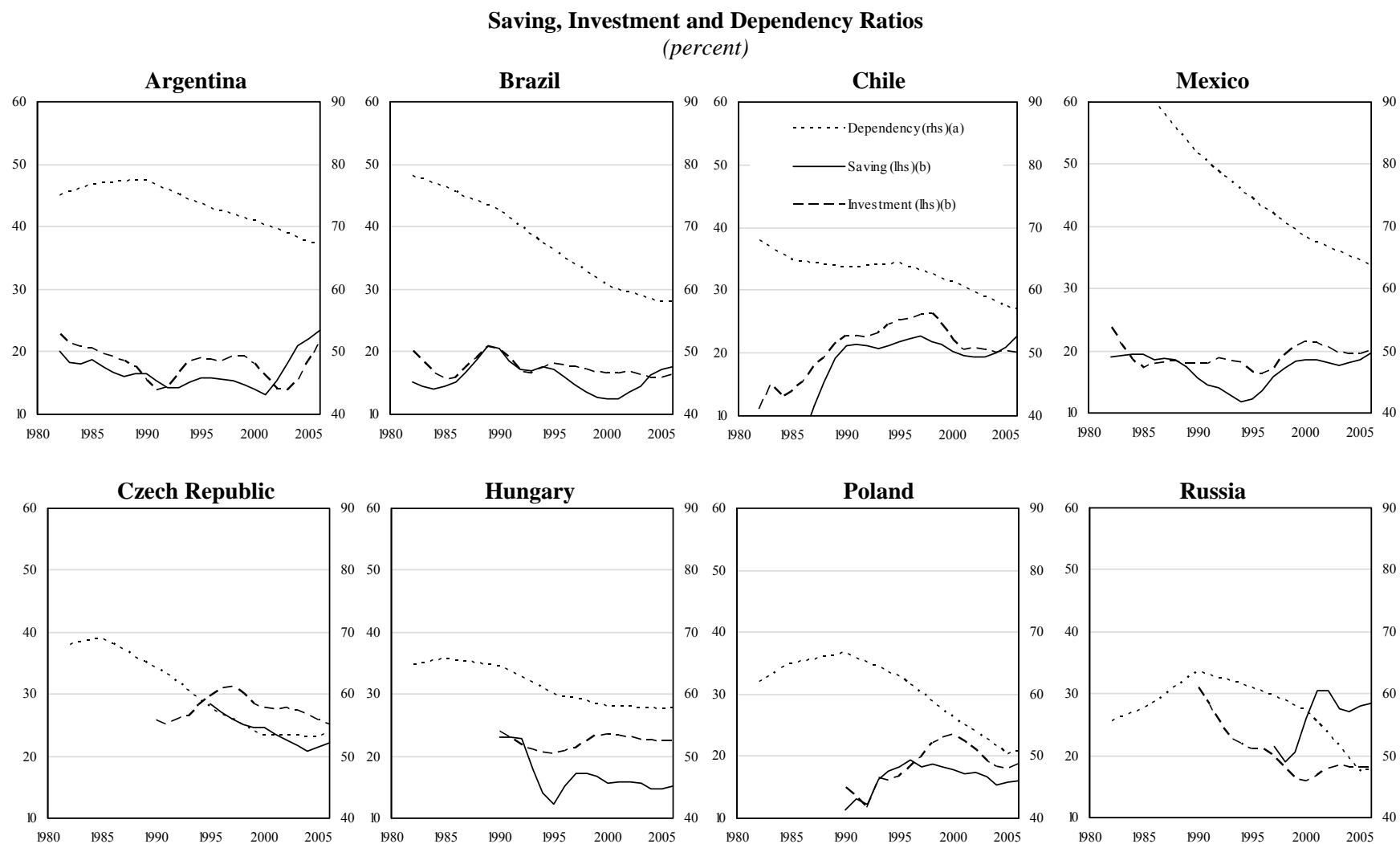
Figure 9

Saving, Investment and Dependency Ratios (percent)



^(a) Population less than 15 years of age plus population 60 years or older / population 15-59 years old. ^(b) Relative to GDP, three-year moving averages.
Source: IMF; United Nations, *World Population Prospects*.

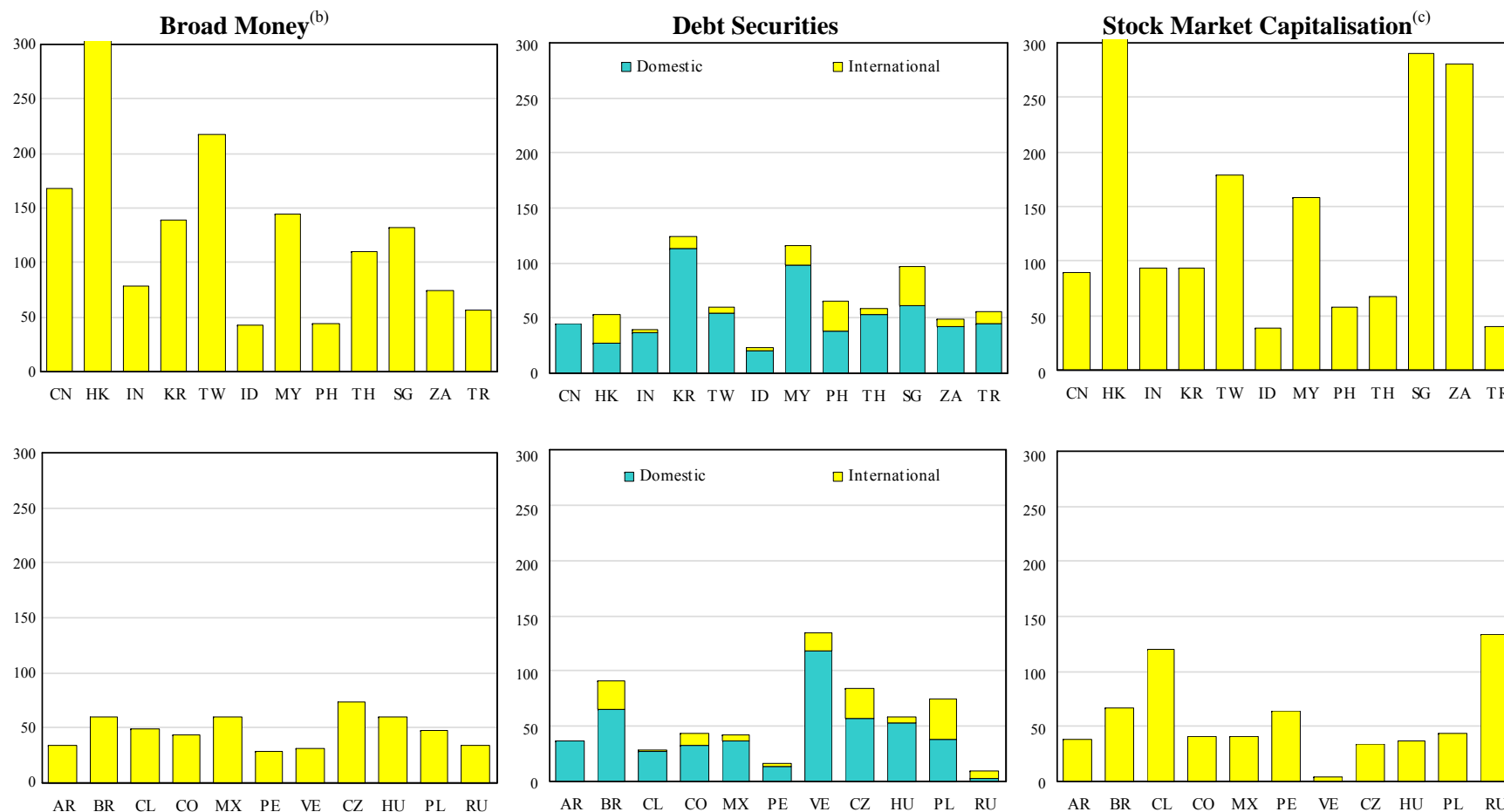
Figure 9 (continued)



^(a) Population less than 15 years of age plus population 60 years or older / population 15-59 years old. ^(b) Relative to GDP, three-year moving averages.
Source: IMF; United Nations, *World Population Prospects*.

Figure 10

Size of Financial Market^(a)
(percent of GDP)

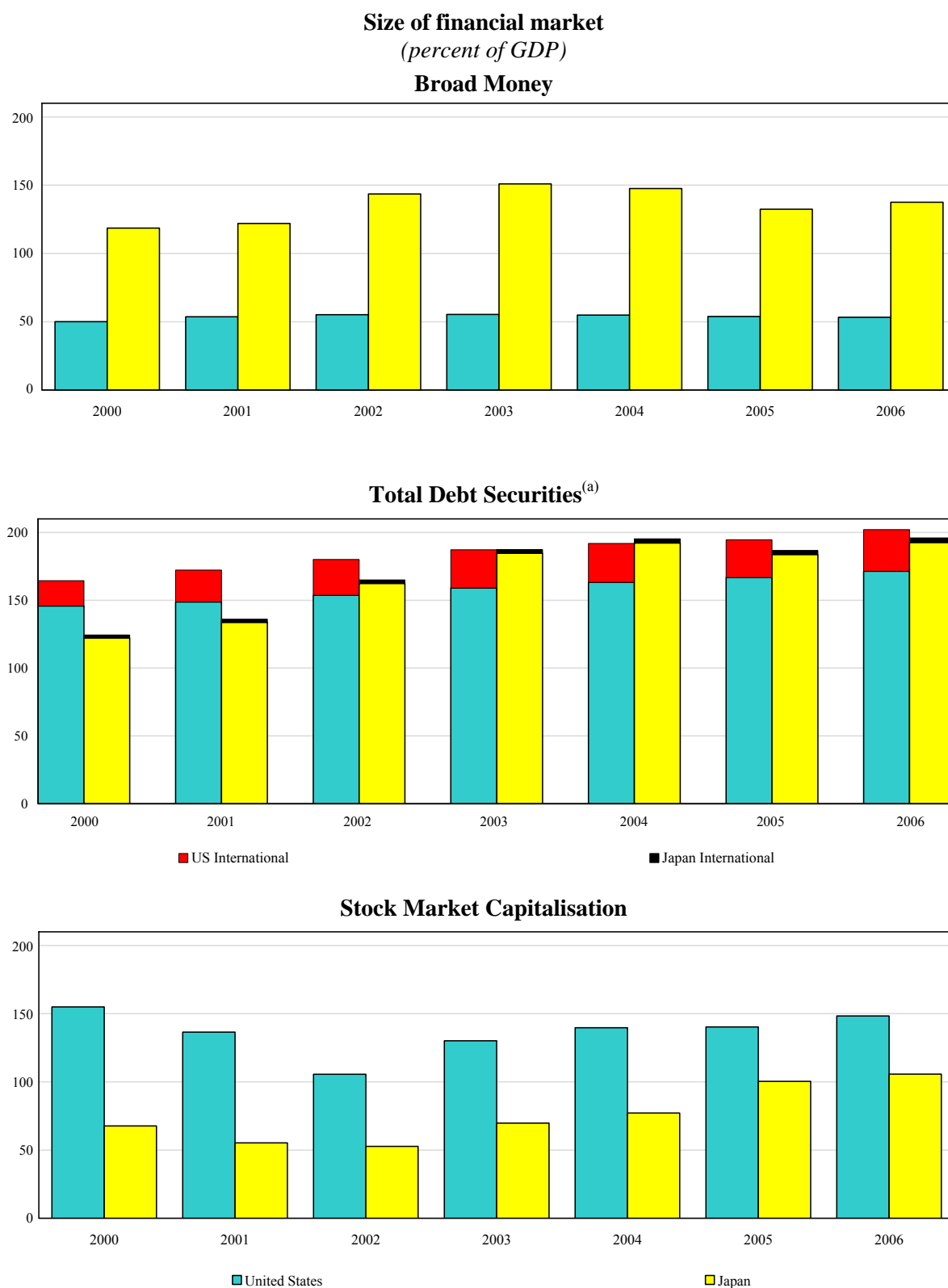


AR=Argentina; BR=Brazil; CL=Chile; CN=China; CO=Colombia; CZ=Czech Republic; HK=Hong Kong SAR; HU=Hungary; ID=Indonesia; IN=India; KR=Korea; MX=Mexico; MY=Malaysia; PE=Peru; PH=Philippines; PL=Poland; RU=Russia; SG=Singapore; TH=Thailand; TR=Turkey; TW=Taiwan (China); VE=Venezuela; ZA=South Africa.

^(a) End-2006 figures. ^(b) 345% for Hong Kong SAR. ^(c) 904% for Hong Kong SAR.

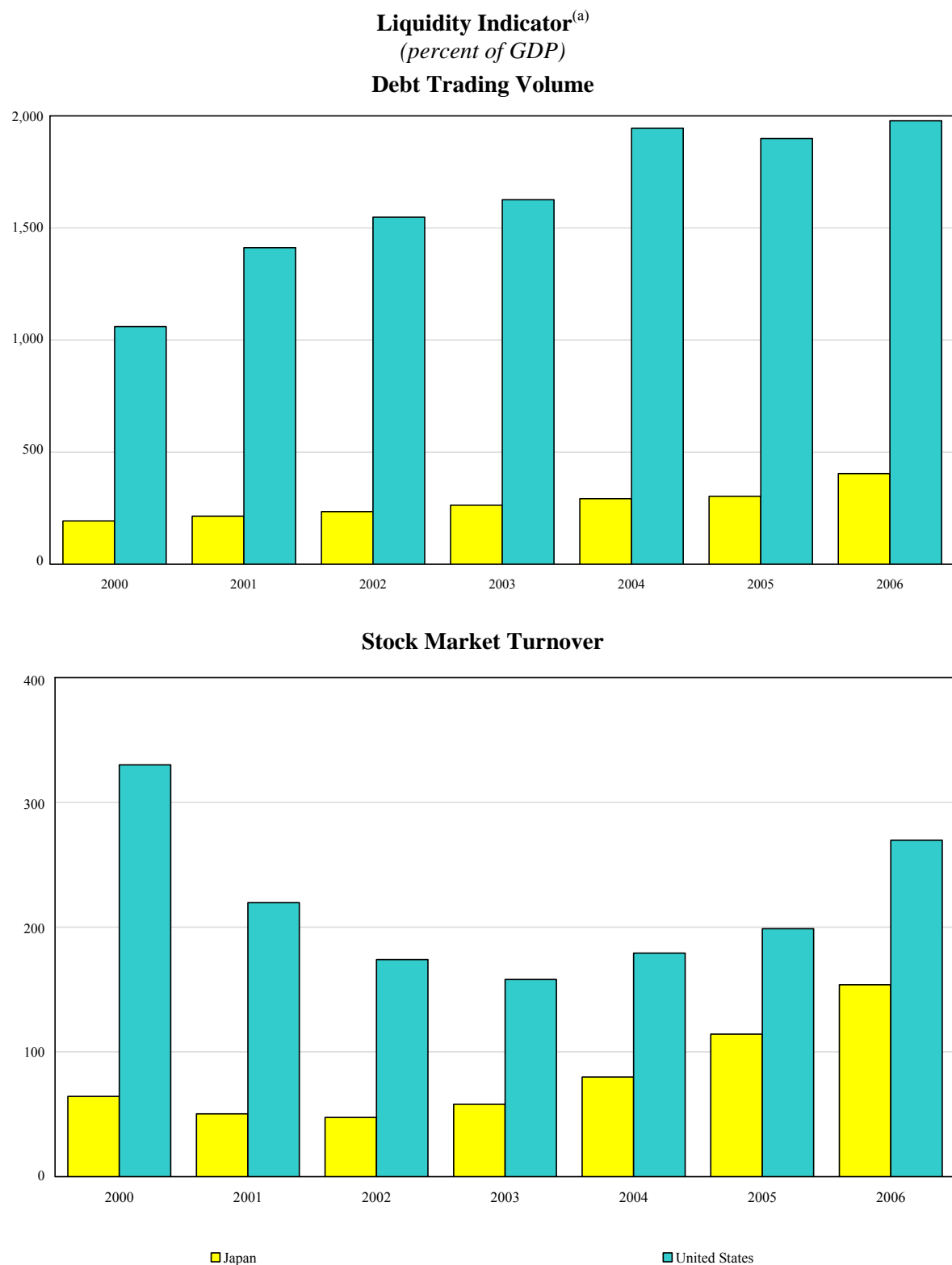
Source: IMF; Standard & Poor's; BIS.

Figure 11



(a) Covers domestic and international debt securities.
Source: IMF; World Federation of Exchanges; BIS.

Figure 12



^(a) Estimates of the annual value of secondary transactions in equities and bonds.
Source: National data.

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