Fear of Sudden Stops: Lessons from Australia and Chile

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March 2, 2004

Abstract

Latin American economies are exposed to substantial external vulnerability. Domestic imbalances and terms of trade shocks are often exacerbated by sudden financial distress. In this paper we explore ways of overcoming external vulnerability drawing lessons from a detailed comparison of the response of Chile and Australia to recent external shocks and from Australia's historical experience. We argue that in order to understand sudden stops and the mechanisms to smooth them, it is useful to highlight and then draw a distinction between two dimensions of investors confidence: *country-trust* and *currency-trust*. While these two dimensions are interrelated, there are important distinctions. Lack of country-trust is a more fundamental and serious problem behind sudden stops. But lack of currency-trust may both be a source of country-trust problems as well as weaken a country's ability to deal with sudden stops. We discuss steps to improve along these two dimensions of investors' confidence in the medium run, and policies to reduce the impact of country-trust and currency-trust weaknesses in the short run.

*Respectively: MIT and NBER; IADB; Reserve Bank of Australia. This paper is a revised version of the paper prepared for the *Financial Dedollarization: Policy Options* conference at the Inter-American Development Bank, 1-2 December 2003. The views expressed in this paper are those of the authors and should not be attributed to the IADB, the Reserve Bank or any other institution with which they are affiliated. We thank Guy Debelle, Ilan Goldfajn, Simon Guttmann, Paulo Mauro, Tony Richards and Alejandro Werner for their comments on previous versions of this paper. Erwin Hansen provided excellent research assistance.

1 Introduction

Latin American economies are exposed to substantial external vulnerability. Domestic imbalances and terms of trade shocks are often exacerbated by sudden financial distress. In this paper we explore ways of overcoming external vulnerability, drawing lessons from a detailed comparison of the response of Chile and Australia to recent external shocks and from Australia's historical experience.

Why Australia? While it is much more developed than Latin America, it has several structural features that make it similar to several countries in the region. In the first place, through its history it has been exposed to many external shocks due to large swings in its terms of trade – commodities made up a large share of its exports (over 95% in 1900 and still around 60%). Moreover, Australia has had long episodes of significant external deficits, which have often been at the centre of the policy debate. For example, in May 1986 the then Treasurer (Finance Minister) Paul Keating said that Australia risked becoming a 'Banana Republic' if it did not address it's declining international competitiveness which had led to substantial current account deficits and growing external indebtedness. Despite these similarities, Australia has been much less vulnerable to external shocks.

Why Chile? Because on one hand Chile is arguably the most advanced economy in Latin America in terms of institutional development and macroeconomic stability, and in this sense the closest to Australia. On the other hand, Australia and Chile are a world apart in terms of their response to similar real external shocks. While Australia can rely on access to international capital markets to smooth these shocks, shifts in the supply of external funds often exacerbate the effects of real shocks in Chile. This proximity along one dimension and distance along the capital flows dimension, allows us to isolate those factors that make a significant difference in terms of linkages to international capital markets.

We start Section 2 with a comparison of the very different responses of Australia and Chile to the Asian/Russian crisis, and discuss the role played by capital flows and exchange rate concerns. We conclude that fear of a capital flow reversal appears to be a more significant ingredient in Chile's poor performance than fear of an exchange rate crisis. But we also point out that the absence of a well developed currency-derivative market did exacerbate the capital outflows from the domestic banking system in the face of increased exchange rate uncertainty.

Section 3 summarises our conclusions from this comparison. We highlight the importance of drawing a distinction between two dimensions of investor confidence: *country-trust* and *currency-trust*, and proceed to sketch policy recommendations for a country with limited country-trust and currency-trust. We discuss the importance of developing external insurance mechanisms that are largely independent of local government actions and the idiosyncrasies of the local economy. In doing so, we place the concerns of the "original sin" literature, which highlights the fact that some countries are unable to insure externally by using their own currency, in a broader perspective. The

way around "original sin" is to insure through a different contingency, such as the ones we suggest. It is also clear that the most fundamental problem for these economies is not "original sin" per se, but insufficient country-trust, which is the initial reason for demanding insurance. This section then discusses how the development of a domestic currency-derivative market is key to reducing the role played by domestic banks in exacerbating capital outflows during external shocks. It closes by advocating a rules-based macroeconomic policy, which is also indexed to the contingency used in the external insurance arrangement.

In Section 4 we outline the economic history of Australia over the past century in order to extract lessons on how to build country-trust and currency-trust. For currency-trust we highlight the role of a solid inflation record and clear policy rules, as well as the development of deep domestic bond market with currency as its main risk, followed by the fostering of a local currency derivatives market. For country-trust we stress the importance of a a clean sovereign default history, and the development of a healthy domestic banking sector. Section 5 concludes by extracting lessons for Latin America more broadly, including highly dollarised economies.

2 Similar shocks, different responses: Australia versus Chile 1997-1999

In this section we characterise the different performance of Australia and Chile during the Asian-Russian crisis. While these economies faced similar external real shocks, in the end Australia sailed through these shocks while Chile suffered a severe slowdown. The main factor behind this differential response is the behaviour of capital flows. We characterise the nature of these flows, the key role played by the respective banking systems and derivatives markets, and dismiss a few traditional fear-of-floating explanations. We conclude the section by highlighting the key differences between these two economies in terms of country-trust and currency-trust.

2.1 The Asian/Russian Crisis in Chile and Australia

Chile experienced a substantial slowdown following the deterioration in its terms of trade and external demand (as measured by trading partner GDP growth) that took place in 1998, as shown in Figure 1. Annual growth fell to 3.2% in 1998 and then to -1% in 1999, a full 8% below the average growth rate of the previous 10 years. At the same time, the current account deficit narrowed to 0.5% in 1999, down from an average of 3% over the period 1986-97 and a peak above 5% before the slowdown (Figure 2). Faced with similar external shocks the outcome for Australia was very different. In Australia, higher foreign borrowing financed the temporary drop in income, so that the current account deficit doubled from around 3% of GDP at the beginning of 1997, and growth was actually higher than average in both 1998 and 1999.

Following the negative external shock, the Central Bank of Chile (CBCh) set out to minimise the nominal devaluation and rein in the current account deficit, by implementing a contractionary

monetary policy. As a result, interest rates on loans rose substantially in 1998 – the top panel in Figure 3 shows the jump from pre-shock levels of 8% to above 18% for a period of time and an average of 11% in 1998. At the same time, the CBCh intervened in the foreign exchange market selling international reserves – which fell from US$18 billion in 1997 to close to US$15 billion in 1999. This behaviour is somewhat typical of economies that exhibit "fear-of-floating" – a reluctance to let the exchange rate play the stabilising role suggested by traditional open-economy models (see Haussman, Panizza and Stein (2001), and Calvo and Reinhart (2002)).

The reaction of the Reserve Bank of Australia (RBA) was essentially the opposite of that of the CBCh. Interest rates were cut twice in 1997 and once in 1998, bringing rates down by 1.25% (the target cash rate – the RBA's policy instrument – averaged 5.4% in 1997, 5.0% in 1998 and 4.8% in 1999). In addition, the RBA did not attempt to counteract the substantial depreciation of the Australian dollar.[1] By mid 1998 the effective exchange rate had depreciated by 15% from its level at the beginning of 1997. In contrast, by mid 1998 the nominal effective Chilean peso exchange rate was back at the early 1997 level, having *appreciated* slightly through 1997.[2] In real terms the depreciation (and the contrast) is even more extreme – 15% for the Australian dollar versus a 5% appreciation of the peso over the same period as seen in the bottom panel of Figure 3.

There is no question that the stark difference in the reactions of the respective monetary authorities played a role in the differences in performance of these two economies. But stopping there is shallow analysis. These two authorities were subject to very different pressures. While Australia had only limited concern for a sudden stop, Chile was extremely worried by that possibility. In fact, the sudden stop had already started in Chile at the time of the monetary contraction, and fears for a catastrophe anywhere in emerging markets could be felt from Washington to Santiago.[3] The change in external financing conditions faced by Chile in late 1997 and 1998 is evident in Figure 4, which shows the spread between the returns on Chilean corporate bonds and the rates on US treasury bills. The spread on Chilean bonds rose by more than 50% in 1997 and then by more than 100% in 1998. Moreover, the price of Chilean debt in secondary markets is likely to understate the constraints faced by Chile following the Asian and Russian crisis, as primary markets where essentially closed during this period.

[1] The RBA did intervene on a few occasions, notably mid 1998 when there was seemingly large amounts of speculative activity, but was certainly willing to allow the currency to depreciate.

[2] This uses the IMF effective exchange rates for comparability. The depreciation of the Australian dollar based on the RBA's Trade Weighted Index, which uses different weights, over this period was less than 5%.

[3] Of course, with the benefit of hindsight, it is likely that the response of the Chilean monetary authority was excessive. Moreover, see Caballero and Krishnamurthy (2003) for an argument for why optimal monetary policy is countercyclical even if that does little to reduce the real impact of the sudden stop once this takes place. But the point of this paragraph and section is that the conditions faced by the two central banks were very different, and that the main reason behind this difference is in the actual and expected behaviour of capital flows.

2.2 The Role of Capital Flows

Net capital flows over the period 1998-99 behaved very differently in these two countries. For Australia, net inflows in dollar terms were higher than the average net inflows for the period 1990-96 as seen in Figure 5.[4] For Chile, net inflows dropped by around 5% of GDP in 1998, and remained below average for the rest of our sample.

Although it is the behaviour of net-capital flows that is ultimately important from a macroeconomic perspective, it is useful to analyse gross inflows and outflows to shed light on the factors behind the Chilean net capital flow reversal. Following the Asian-Russian crisis, gross capital inflows into both Chile and Australia increased. As seen in Table 7, in Chile most of the rise in inflows in 1998-99 relative to the previous three years came in the form of FDI. In Australia, on the other hand, there was a large rise in the *other investment* category of the capital account, which is mostly made up of foreign loans. An important part of this is rising bank debt, although the non-financial sector also borrowed directly from abroad. This highlights that the similarity in the behaviour of gross capital inflows to Australia and Chile is misleading: it is likely that Chile had to sell heavily discounted assets to obtain funding, while Australia could borrow at non-fire-sale international rates.

The second and more significant difference between the two economies is the behaviour of gross outflows. While outflows from Australia shrank in 1998-99, in Chile there was a rise in outflows in both of these years. Following the terms of trade shock, Chilean residents shifted their portfolios towards foreign assets. The outflows were particularly large in 1999, amounting for over 15% of GDP.

A substantial part of the net capital outflow from Chile in this period can be explained by the behaviour of two groups of institutional investors: pension fund management companies and banks (especially foreign resident banks). This can be seen in Figure 6, which plots the net international investment position of the Chilean private sector. Pension fund management companies (AFPs) are major players in the Chilean capital market. In 1999, for example, the value of assets in private pension funds was close to 50% of GDP. To put this number in perspective, consider that in the same year equity market capitalisation was 100% of GDP and private bank credit close to 60% of GDP. Pension funds increased the share of foreign assets in their portfolio substantially over the period 1998-99. Starting from levels close to 1% in 1997, Figure 7 shows the share of foreign assets in AFP portfolios rose to above 10% in 1999 – an increase equivalent to 5% of GDP.[5] The rising share of foreign assets coincides with widening legal limits on foreign asset holdings. Because of this, it is hard to determine whether the higher share of foreign assets is the result of lifting binding constraints or the result of changes in the optimum portfolio. If, however, the first explanation

[4] Unlike output and terms of trade we look at deviations from the period 1990-97 because 1990 marks the return of capital inflows to emerging markets.

[5] The rising share of foreign assets is not a result of the depreciation of the peso. This is evident from figure 7, which also plots the share of foreign assets adjusting for changes in the dollar/peso exchange rate.

were to be true then a substantial part of Chilean capital outflows would have be the result of unfortunate timing on behalf of the pension regulators.

Where no such regulatory issues are at play is in the behaviour of Chilean banks – the other main group of institutional investors behind the capital outflow. Rather than smoothing the loss of international liquidity brought about by the terms of trade shocks, Chilean banks exacerbated it by joining in the capital flow reversal. Figure 8 plots the evolution of gross foreign assets as a share of total assets for domestic and foreign owned banks. While all banks increased their positions in foreign assets, the shift in foreign banks' portfolio was more pronounced, rising to over 6% in 1999.[6] Note, however, that this was not a permanent shift. By the end of 2002 the share of gross foreign assets in banks' portfolios was close to its initial levels. In contrast, in Australia over the same period there was no jump in the share of foreign assets in banks' total assets. During the late 90s, the share of foreign assets followed the same upward trend that had begun in the early 1990s.

2.3 Exchange rate defense?

Some observers have focused on the exchange rate defense aspect of the contractionary monetary policy followed by the CBCh, noting that it was not until September 1999 that Chile abandoned its exchange rate band (which had been narrowed since the early phases of the external shock) and allowed the peso to float freely against the dollar. As we discussed above, this was not the case for Australia, which did not base its policy response on a defense of the Australian dollar. Why would policy makers in Chile be more concerned than Australia about a depreciation?

2.3.1 Unlikely (conventional) explanations

The first conventional explanation was that the fear that high exchange rate pass-through to prices would render the nominal devaluation ineffective in the medium run, leading only to high (and persistent) inflation. The perceived inflationary risk was aggravated by prevalent indexation practices inherited from previous inflationary episodes. The second concern, was that a devaluation could actually have a negative impact on output because of balance sheet effects arising from un-hedged dollar-liabilities in the private sector. The perception was that inflated liabilities would activate collateral constraints leading to reductions in output and investment.

Let us start with the fear of *high inflation pass-through.* There were concerns that a nominal devaluation would lead to a jump in prices, so at best a brief real depreciation, and in the case of a highly indexed economy like Chile to a period of prolonged inflation. Figure 3 suggests that, *ex-post*, this was not the case, as the real exchange rate did depreciate substantially and inflation did not pick up. In fact, inflation in 1997 was above 6% while average inflation during the period 1998-02 was only 3.7%. In addition, empirical estimates for Chile and Australia suggest similar

[6] See Caballero (2002) for a more extensive discussion of this point.

degrees of pass-through in both economies. For Chile, Garcia and Restrepo (2001) find that pass-through is approximately 0.3 after 8 quarters, and even lower if there is a positive output gap (as happens with a negative terms of trade shock).[7] Long-run pass-through in Australia is estimated to be around 0.3, and close to 0.2 after 8 quarters (Dwyer and Leong, 2001), not substantially lower than in Chile.

What about *dollarisation of liabilities*? This is often cited as a justification for fear of floating in emerging markets. If firms or the government are exposed to significant currency mismatches, then the expansionary Mundell-Flemming effects of a real devaluation will be offset by the negative balance sheet effects of dollar debt.[8] In addition, if foreign debt is denominated in a foreign currency, then a real devaluation will increase the local currency value of required factor payments, aggravating any existing liquidity shocks. On the whole, however, existing data suggest that unlike some neighbouring Latin American economies, currency mismatches (at least in the conventional sense) were not a *severe* problem in Chile. This does not mean that Chile would not benefit from further reducing its level of "original sin". As we discuss in detail below, foreign peso debt would provide Chile with additional insurance in times of liquidity shocks – by transferring resources from foreigners whenever the currency depreciates to accommodate these shocks.

We start by looking at currency mismatches at the aggregate level. Table 1 shows the net international investment position for Chile and Australia at the end of 1997. Total net and gross liabilities are larger relative to GDP in Australia than in Chile. The structure of these liabilities also differs. The stock of FDI is considerably higher in Chile, both as a share of GDP and as a share of total liabilities. Outstanding debt, on the other hand, makes up a smaller share of Chilean net and gross foreign liabilities. In 1997, private gross debt liabilities were 25% of GDP in Chile and 42% in Australia while total gross debt liabilities, were 31% and 51% of GDP respectively. Table 1 also shows that Banks play a larger role in intermediating capital in-flows in Australia than they do in Chile. In Australia, gross foreign liabilities in the banking sector are over 24% of GDP, while in Chile banks foreign liabilities are less than 4% of GDP. Firms in Chile wishing to access international capital must do so directly – either by issuing debt, issuing shares or via FDI – not through the banking sector. More generally, BIS data suggest that in all of Latin America direct borrowing by non-bank sectors from foreign banks is a larger source of financing than bank to bank lending. We return to this issue latter, and explore possible explanations and implications. The main point we want to make at this time, is that Chile's gross external debt was significantly lower than Australia's in 1997.

Statistics on total foreign debt only provide a partial picture of currency mismatch, however, as they ignore both the currency composition of debt and the response of income to exchange rate fluctuations. With this in mind, in Table 2 we build an aggregate measure of currency mismatch for

[7] For example, when there is an exogenous output gap of 2%, pass-through is below 0.115

[8] There is extensive theoretical literature on this issue. See for example Krugman (1999a, 1999b), Aghion, Bachetta and Banerjee (2001) and Cespedes, Chang and Velasco (2001). Empirical results are less abundant and categorical; see Bleakley and Cowan (2003).

Chile, Australia, and for a sample of other Latin American and small open developed economies. Cross country data on the currency composition of total external debt are not available, so it is not possible to construct exact measures of total foreign currency external debt. Instead, we use Eichengreen et al's (2003) measure of "original-sin" as a proxy for the share of foreign debt denominated in foreign currency. To take into consideration differences across countries in openness and the size of the tradable sector – and hence the effect of real exchange rate on income – our measure of mismatch is the ratio between our estimates of foreign currency external debt and total exports. The ratio of foreign currency debt over exports is lower in Chile than in any other country in our sample, and less than half the average of other Latin American economies. Other measures of mismatch reported in Table 2 – such as net debt liabilities and net debt liabilities including international reserves as a fraction of exports and of GDP – all suggest that Chile's aggregate exposure to exchange rate fluctuations – its aggregate currency mismatch – was relatively low on the eve of the Asian-Russian crisis.[9]

However, the degree of aggregate currency exposure is not the full story. The level and distribution of dollar-denominated contracts *within* the economy is also likely to determine the effects of a devaluation on output, and therefore the optimal monetary policy response to a terms of trade shock. As was the case for the aggregate, however, existing evidence suggests that currency mismatches where not a *severe* problem *within* the Chilean economy either. For a start, exposure of the government balance sheets to exchange rate fluctuations was relatively small on the eve of the Asian crisis. According to a recent report by the Chilean Finance Ministry, gross central government debt denominated in dollars, was 13.5% of GDP in 1996.[10] The net exposure of the central government balance sheets to a devaluation was even lower than this, considering that the Chilean government held foreign currency denominated assets worth 5.5% of GDP.

Data from publicly listed firms suggest that private liability dollarisation within the Chilean private sector was not a *severe* problem either. Figure 9 reports average levels of liability-dollarisation for a sample of firms from eight Latin American economies. As can be seen, both the average and median shares of dollar debt in total debt for Chilean firms were amongst the lowest in the region. Whereas the median share of foreign currency debt in total debt of a publicly listed firm in Chile was less that 5%, the median shares in Argentina, Peru and Uruguay were all above 60%. Figure 9 also suggests, that in addition to being relatively low (compared to neighbouring economies), dollar denominated liabilities in Chile where concentrated amongst firms in the tradable sector. This was not the case in Argentina, for example.

To look in more detail at the extent to which firms where "matching" the currency composition of their debt with that of their income, we use firm level data to estimate the determinants of liability dollarisation in Chile. Table 4 reports the results of estimating Equation (1) on a sample

[9] Note, that these measures of mismatch overstate the sensitivity of Australia's indebtedness to currency movements as Australia has a large foreign currency asset position on derivative contracts, as detailed in Section 2.3.2.

[10] Source: "Informe Estadisticas de la Deuda Publlica", Ministerio de Hacienda Chile.

of accounting data from 270 publicly listed firms for December 1997.

$$d_i^* = \alpha_o + \alpha_1 tradable_i + \alpha_2 \left(x/s\right)_i + \alpha_3 size_i + z_i b + \varepsilon_i \quad (1)$$

where for firm i, d_i^* is the ratio of dollar denominated debt to total liabilities, *tradable* is a dummy for firms operating in the agricultural, mining or manufacturing sectors, x/s is the ratio of exports to total sales, firm *size* is measured as $ln(total\ assets)$ and z is a matrix of additional firm controls detailed in the table. The estimated coefficients from this regression confirm that dollar-debt is higher – 7% higher in fact – in the tradable sector, and 13% higher in exporting firms. In addition, the share of dollar debt is higher for larger firms, which are also those less likely to be subject to credit constraints.[11] Given the "matching" that takes place between the currency composition of firm income and the composition of their liabilities, the negative balance sheet effects of a devaluation will be partly offset by rising peso income.[12] Indeed, a recent study by Benavente et al (2003) for Chilean firms over the period 1990-2000 finds that amongst publicly listed firms, those holding dollar debt do not invest significantly less than their "peso-indebted" counterparts in periods following a devaluation.

Firm level data collected from Bloomberg also allow us to carry out some comparisons of liability dollarisation in Chile and Australia. Direct data on liability dollarisation are not available for both economies, so instead we *derive* a measure of currency mismatch from the exchange rate losses reported by firms in their income statements. Exchange rate losses are reported using the following expression

$$\frac{fx\ loss_{it}}{a_{it}} = \frac{(d_{it}^* - a_{it}^*)}{a_{it}} \Delta e_t = m_{it} \Delta e_t$$

where d_{it}^* is dollar debt in local currency, a_{it}^* are dollar denominated assets, a_{it} are total assets and Δe_t is the nominal depreciation. This allows us to construct m_{it}, a measure of currency mismatch, using firm level data on $\frac{fx\ loss_{it}}{a_{it}}$ and aggregate data on depreciations. As seen in Table 4 we find similar average values of m_{it} for listed firms in Australia and Chile. Note, however, that this measure does not take account of off-balance sheet hedging of foreign currency liabilities. We would expect such hedging to be of greater significance for Australia because of the larger currency derivative markets and the substantial asset position in foreign-currency denominated derivative contracts outlined in Section 2.3.2. What is evident in the raw data, however, is that in both countries currency mismatch (as measured by m_{it}) is higher for firms in the tradable sector – suggesting that firms in Australia also match the currency income of their net foreign liabilities to that of their income stream.

In conclusion, neither pass-through nor dollarisation of liabilities are strong reasons to support

[11] Similar results are found by Bleakley and Cowan (2003), and Cowan (2002).

[12] For comparison purposes we carry out a similar set of regressions for Argentina. We find that the currency "matching" that we see in Chile does not take place in Argentina. Not only is average dollar-debt considerably higher in Argentinean firms, but it is distributed equally between tradable and non-tradable sectors.

the view that the main concern of the CBCh was or should have been the stabilisation of the exchange rate *per-se*.

2.3.2 A role for the exchange rate: banks and derivatives

There was, however, one clear reason to defend the exchange rate in Chile and not in Australia: the protection of banks against a depreciation in an environment with limited currency-hedging options.

As we discussed in the preceding section, Australian banks have played an important role in intermediating capital inflows. However, exchange rate risk is not passed on to the domestic borrowers – as has often been the case in emerging markets – nor it is taken on by banks themselves. Instead, banks hedge their net foreign currency liabilities using foreign currency derivatives. This is an important point: in Australia, a developed derivatives market allows exchange rate risk to be separated from loan decisions (credit risk). Small firms, likely to be more dependent on bank credit and more vulnerable to currency mismatches, can therefore access international capital markets through loans in Australian dollars from the banking sector.

What about Chilean banks? We showed above that on the eve of the Asian crisis banks in Chile were not intermediating foreign capital, and that they did not start doing so during the crisis. We also showed that following the external shocks in 1997, banks contributed to capital outflows by increasing their holdings of foreign assets. Importantly, Chilean banks did not have the means to effectively unload the (explicit or implicit) exchange rate risk. Thus, it is conceivable that exchange rate uncertainty was partly responsible for their role in capital outflows. The previous situation was exacerbated for foreign resident banks whose measures of performance may be more directly linked to foreign currency. It is also conceivable that the CBCh was concerned with this potential link.

This takes us to the differences in the development of derivatives markets in the two countries. Australia has a highly developed currency derivative market, which is discussed in Section 4.2.4. A recent survey conducted by the Bank of International Settlements (BIS, 2002), sumarised in Table 5, shows that total derivative turnover – a measure of derivative market coverage and liquidity – is substantially larger in Australia than Chile. Indeed, turnover in market and over-the-counter currency derivatives as a per cent of GDP is more that one order of magnitude larger in Australia than it is in Chile. Derivative turnover with non financial agents is also substantially higher in Australia. This measure of turnover, nets out intra-dealer turnover and therefore provides a better measure of actual transactions carried out by firms wishing to cover exchange rate positions. The same BIS survey also shows that more Australian dollar trading takes place off-shore, which is suggestive of larger net holdings by foreigners.[13]

To see how currency derivatives markets in Australia and Chile compare to a broader sample of

[13] Close to 2/3 of turnover in Australian is cross-border. None of Chile's turnover is cross-border (BIS, 2002).

countries Table 5 summarises turnover data from all countries reported in the BIS survey in 2001. These data suggest that the derivatives market in Australia is large even by developed economy standards. What about Chile? Relative to GDP, trade and capital flows, total turnover in Chile is higher than in the other Latin American economies included in the survey, but lower than other emerging markets. This is true using Chilean data for 2001, or using derivatives data for Chile from 1998 (the survey year closest to the Asian/Russian crisis). Where Chile fares relatively "better" is in terms of derivative turnover with non-financial agents.

Do these numbers imply that Chile has an underdeveloped derivatives markets? To answer this question we run a very simple cross country regression in which we relate the data from the BIS survey to cross country variables that capture the degree of financial development, openness and overall level of development. Specifically we estimate

$$Fx = \alpha_0 + \alpha_1 y + \alpha_2 trade + \alpha_3 fdev + \alpha_4 emu + \mu, \tag{2}$$

on the sample of countries included in the 2001 BIS survey. In this specification Fx is currency derivative turnover in 2001 scaled by nominal GDP, y is per capita income on a PPP basis for the period 1996-00 (World Bank), $trade$ is the ratio of exports + imports over GDP and $fdev$ is the ratio of private bank lending to nominal GDP (a measure of financial development). Figure 10 plots the fitted values of turnover from this regression against observed turnover, and reports the estimated coefficients. As expected, turnover is positively correlated with openness, income per capita and financial development. The estimated coefficient on the *emu* dummy, which indicates countries that have adopted the Euro, is negative as expected, although not significant at conventional confidence intervals. More interestingly, turnover in Chile is not significantly below the predicted value. Australia, on the other hand, has a larger derivative turnover than predicted. It is interesting that South Africa and Poland, outliers in this regression, are also outliers in the Eichengreen et al (2003) measure of original sin.[14]

These results – while tentative in that they do not account for endogeneity of the right hand side variables – suggest that the level of development of the Chilean derivative markets is broadly consistent with its overall level of development, openness and financial development. One should not expect, therefore, that a very rapid growth of Chile's currency derivatives market will take place, absent a deliberate set of policies aimed at boosting these markets.

We turn now to understanding how the Australian private sector uses the derivatives market to hedge currency risk. First of all, according to a recent Australian Bureau of Statistics/RBA survey (ABS, 2001 and RBA, 2002), derivatives have a large impact on the overall foreign currency

[14] In addition to the variables reported here we also estimated Equation (2) using a series of additional measures of exchange rate volatility. We failed to find any significant correlation, beyond that reported for the *emu* dummy, even using very "generous" confidence intervals. The measures we used where: dummy variables for de-jure fixed exchange regimes in 2001 or median regimes over the last 5 or 10 years;a dummy variable for de-facto fixed regimes (from Levy-Yeyati 2003), dummy variable for commodity currencies (from Cashin et al 2002); share of commodities in exports; and observed exchange rate variance over different periods.

exposure of Australia. While Australian resident enterprises had a net liability position in foreign currency debt of A$164 billion they also had a net A$85 billion asset position in foreign-currency denominated derivative contracts, implying that approximately half of the foreign currency debt position is hedged.[15] Unfortunately, it is not possible to trace who ultimately holds the other side of the net hedging position of the Australian government and private sector (i.e. who has taken on the Australian dollar currency risk through derivatives). What we can say is that since the domestic financial system in Australia is denominated solely in Australian dollars, it is not the case that Australian households are effectively holding the other side to these positions, leaving foreign residents as the remaining candidates. The high share of off-shore turnover in total turnover, seen in Table 6, also points in this direction.

Within broad sectors, the same study shows that foreign currency exposure was largest (relative to total net foreign liabilities) in the non-financial private sector and in the government. Banks have a relatively small exposure considering the size of their foreign exchange liabilities. Note also that banks are by far the largest holders of gross and net positions in foreign currency derivative contracts in Australia.

Thus it would seem that the currency derivatives market in Australia plays two key roles. First, it allows banks to decouple credit from exchange rate risk. In doing so it plays an important part in the intermediation of capital inflows by the banking sector, allowing a broader range of Australian firms access to international capital markets. Second, it provides a mechanism for external insurance against events that depreciate the Australian dollar by effectively reducing total foreign borrowing indexed to foreign currencies. We will return to these two aspects below.

3 Taking Stock and Short Run Recommendations

Why do countries like Australia and Chile respond so differently to similar shocks? And what can the Chile's of the world do to react more like Australia does? We split our answer to these questions in two parts. In this section we explain the role of country-trust and currency-trust in recent shocks and, taking these as given, discuss policy options open to countries like Chile. In the following section we look more closely at the experience of Australia over the 20th century, to extract lessons on how to build country-trust and currency-trust that may be relevant for emerging market economies.

3.1 Why so different?

There are at least three ingredients that helped Australia and not Chile during the recent episode: (i) Australia had no concern (at least in relative terms) with capital flow reversals; (ii) Australia

[15] Note that this measure of foreign currency "exposure" ignores the elasticity of export revenue to exchange rate fluctuations and substantial foreign equity asset holdings of A$228 billion. Indeed accounting for foreign equity assets, in 2001 Australia has a net foreign currency asset position of A$149 billion

could count on *ex-ante* external hedging indexed to exchange rate fluctuations; and (iii) Australian banks had access to a deep currency derivatives market to insulate themselves (and their borrowers) from exchange rate fluctuations. We discuss these in turn.

3.1.1 No fear of sudden stop

The first ingredient is due to country-trust. In Chile there was widespread fear of a capital flow reversal. That is, it was feared that net capital outflows may lead to a balance of payments crisis which would turn out to be much more costly in net present value terms than the contraction brought about by high interest rates. Contractionary monetary policy was seen as a way of reducing the need for external financing (by reducing domestic absorption) and the extent of the capital flow reversal (by sending a pragmatic signal to investors). This mentality went beyond the actions of the CBCh since resident banks and other private agents also were taking aggressive precautionary measures. While the fear of a sudden stop may have been a consideration for Australia at the time, the degree of concern was surely much lower.

Given Chile's inflation target credibility, it could probably have let the exchange rate float more freely than it did during the Asian and Russian crises. It is also possible that a significant part of the adjustment of the AFPs was a once and for all portfolio adjustment to an unfortunately timed relaxation of their constraint on external investment. But there is little hope that all sudden stops and the fears associated to their anticipation will go away any time soon. Copper continues to be Chile's "bellwether" for foreign investors and also the latter are primarily specialists subject to a variety of shocks. Recent research on "institutional" determinants of contagion confirms this view, by linking financial contagion to characteristics of *developed* economy markets and investors. A country like Chile may be "contaminated" by a crisis event in another emerging market economy if they both belong to a particular asset class (Rigobon 2001), borrow from the same banks (Van Rijckeghmen and Weder 2000) or share a set of overexposed mutual funds (Broner and Gelos 2003). While Chile may have come a long way in overcoming other aspects of its financial fragility, it seems unlikely that it will be able to insulate itself *completely* from shocks to its external supply of funds in the near future simply because of "specialists" and "neighbourhood" effects.

3.1.2 Exchange rate based insurance and "original sin"

The second ingredient is due to both country-trust and currency-trust. Foreigners are willing to hold assets denominated in Australian currency. That is, they are willing to participate in an implicit insurance arrangement with Australia, such that resources are automatically transferred to Australia when a terms of trade shock is accommodated with a depreciation.

Note that this – and only this – is what is behind the "original sin" literature. While important, it should be apparent that this is not the only ingredient behind external crises in emerging markets. In fact, it is not even likely to be the main ingredient in most cases. Australia did not develop

currency-trust until the mid 80s, or at least did not use it before then as an insurance arrangement since it did not have a floating currency.[16] The proportion of Australian-dollar denominated government debt held by foreigners was less than 1% in 1980. Foreigners holding Australian local currency debt is a phenomenon that starts in the 1980s.

Furthermore, Chile needs external insurance more than Australia does, precisely because shocks to the supply of external funds are more powerful than the direct terms of trade shocks. That is, "original sin" is a more serious problem for Chile than for Australia. But, importantly, "original sin" is not the primitive problem (that is, the problem behind the need for substantial insurance); the problem is a lack of country-trust.

3.1.3 Decoupling of risks

The third ingredient – currency hedging for banks – is based on currency-trust. Banks are highly leveraged institutions that, at best, are well prepared to manage idiosyncratic credit risk but not exchange-rate volatility risk (or other aggregate risks). Faced with a supply of funds in a foreign currency, a bank has three options. The first is to lend in the local currency, and take on exchange rate risk directly. The second is to pass on the exchange rate risk to its borrowers, and by doing so take on the credit risk of borrowers with a currency mismatch. The third is to off-load exchange rate risk on other investors. Such investors could be domestic investors that are less-leveraged than banks, or foreign investors willing to take on local currency risk. If the banking sector is unable to off-load the exchange rate risk without taking on credit risk, then external shocks that raise the volatility of the exchange rate lead either to a withdrawal of the banks from local lending or to an increase in financial fragility.

In the case of Australian banks, all of domestic savings are in Australian dollars, so that banks only have to deal with currency mismatches when borrowing from abroad. In addition, the deep Australian currency derivatives market allows banks to decouple their lending activity from exchange rate risk. Australian banks borrow from abroad in foreign currency but lend in Australian dollars to domestic firms. They then cover their net "dollar" liability position with currency derivatives. In Australia, currency-trust is also combined with country-trust as foreigners take some of this exchange rate risk.

Deposits in the Chilean banking system are also denominated in domestic currency, so that as is the case of Australia, Chilean banks only have to deal with currency risk when borrowing from abroad. Unlike their Australian counterparts, however, Chilean banks do not have a liquid derivatives markets in which to buy exchange rate coverage. The result has been that Chilean banks, unable to easily unload exchange rate risk, refrain from intermediating foreign funds. In

[16] Strictly, currency-trust could play an important insurance role even under a fixed parity since it could allow agents to modify out-of-equilibria scenarios and therefore prevent some perverse outcomes. However, this still would require that there is extensive contracting with foreigners in local currency, which was not the case in Australia before the 1980s (see Section 4.2.3).

addition, external shocks that raise the volatility of the exchange rate lead to a natural withdrawal of the banks from local lending.

The case of highly dollarised banking systems, such as Argentina or Peru, provides a more dramatic example of the difficulties for banks of not being able to decouple exchange rate risk from credit risk. Banks in these economies are hard pressed to find even domestic agents willing to take on currency risk. As a result of this (and prudential regulation limiting accounting mismatches) they end up passing on the exchange rate risk to their lenders. Clearly the first step for these economies must be to understand and address the factors that drive the decision of domestic investors to save almost exclusively in US dollars.

Note also that some countries may chose to fix the exchange rate precisely to eliminate the exchange rate risk for key investors, such as banks, when there is no other mechanism to remove this risk. Argentina's strategy during the 1990s could be thought of in these terms. Dollarised economies effectively operate in this fashion as well. Of course, this brings about other costs, including the possibility that domestic positions become even more mismatched in the process, thereby increasing the fragility of the economy. Except for extreme circumstances, fixing the exchange rate is unlikely to be the most efficient mechanism to unbundle (micro) credit and aggregate shocks risks.

3.2 What can be done given weak country-trust and currency-trust?

Even in the best of circumstances, improvement in country-trust and currency-trust can only be gradual. What is the best way to proceed in the meantime? In this section we discuss three sets of policies aimed at ameliorating the effects of low levels of country-trust and currency-trust. The first two of these seek to develop markets for contingent instruments that reduce the cost of external and internal insurance. The third – contingent macroeconomic policy – seeks to improve the private sector incentives to take adequate precautions against external crises, i.e. to purchase this insurance.

3.2.1 External insurance

"Original sinners" have no currency-trust with foreigners, hence they cannot use exchange rate fluctuations as an insurance mechanism. Unfortunately, these countries need external insurance even more than countries such as Australia since terms of trade shocks are leveraged many times by the sudden stops associated with their weak country-trust.

This means that these economies should look for external contingent contracts that are not dependent on domestic policy actions, or even on understanding the workings of the particular country, but are highly correlated with sudden stops and external shocks. Good examples of these variables are the price of copper for Chile, the price of oil and an index of US activity for Mexico, the high-yield spread in the US for most emerging markets, and so on.[17]

[17] See Caballero (2003) and Caballero and Panageas (2003).

Importantly, such instruments would provide the needed insurance regardless of the exchange rate system and degree of fear of floating. External insurance is effectively separated from the exchange rate, thus breaking the connection between low currency-trust and limited external insurance.

3.2.2 Domestic Insurance

In order to prevent banks, especially foreign-owned (local) banks, from cutting back on their lending in the face of exchange rate risk, they need a mechanism which will allow them to decouple their lending activity from explicit or implicit exchange rate risk. Even if a country has limited external currency-trust, it is often the case that there is an opportunity to efficiently redistribute currency risk amongst domestic agents. For example, domestic households are willing to absorb some of the exchange rate risk since much of their consumption and expenses are in nontradable goods. Thus, it is important to develop the domestic currency derivatives markets to help domestic agents offset their opposing currency hedging needs and to enable banks to offload this risk onto willing residents. In time, given the right conditions, foreigners will begin to participate in this market and absorb more exchange rate risk. Interestingly, as we will describe in Section 4.2.4, a key first step for developing these markets seems to be to develop a domestic currency bond market. It also appears that this can be done quicker with public bonds than with private bonds.

Of course, in economies where there is limited domestic currency-trust, such as in the heavily dollarised economies, there is limited scope for such developments. In effect, dollarisation of domestic liabilities is an extreme form of the absence of a market to transfer the differential risks associated to exchange rate fluctuations.

3.2.3 Contingent Macroeconomic Policy

As we will discuss in the next section, clear and credible macroeconomic policies are key in the long term process of building both country-trust and currency-trust. Having clear and realistic rules and transparent policy making facilitates such a goal.

In addition to adopting standard good practices on inflation targeting and structural fiscal mechanisms, authorities in emerging markets ought to analyse the interaction between these practices and the sudden stop mechanism. For example, Caballero and Krishnamurthy (2003, 2004) show how indexing inflation targeting and foreign exchange interventions to the same contingencies that are behind the external insurance discussed above, can be used to improve the private sector incentives to take adequate precautions against external crises.

In a nutshell, the idea is to avoid providing – or generating the perception of – *free* exchange rate insurance to the private sector. The free insurance may come directly from the government or from potential lenders through low expected returns due to the illiquidity of domestic markets during crises. A countercyclical monetary policy, while limited in terms of its aggregate demand

impact, can help alleviate the incentive problems caused by free insurance and the optimal injection of international reserves during external crises.

Of course, economies that lack domestic currency-trust cannot afford to use monetary policy, and its impact on exchange rates, as an incentive mechanism. Such countries may have to resort to taxing short term capital inflows and impose tight liquidity ratios on foreign borrowing. These are costly measures that ought to be imputed as yet another cost of lacking monetary credibility.

4 Building country-trust and currency-trust: Lessons from Australia

4.1 Overview

This section describes how Australia has, in the period since its independence in 1901, gradually developed currency-trust and country-trust. Section 4.2 outlines the development of currency-trust through a clean inflation history, and the exchange rate not being unduly influenced by the government. It also highlights the roles that the emergence of a government bond market and later currency derivative market have played in transferring currency risk. Section 4.3 then considers the development of Australia's country-trust – the history of defaults and development of key institutions.

When the six Australian colonies federated as the Commonwealth of Australia in 1901 permanent European settlement had been established for only a fraction over 110 years and the total population was just 3.8 million. The economy was heavily dependent on commodities, with the main exports being wool (42%), minerals (26%), wheat (6%) and meat (7%). The economy was relatively open, with exports accounting for around 20% of GDP, although over half of exports were to the UK. With the strong growth of wool production from 1860-90 and the large discoveries of gold in the 1850s Australia was already a relatively rich country.[18] Governments had begun to play a bigger role in the colonial economies following the gold rush with revenue raised from land sales, tariffs and debt issued in London used to finance large public works programs, though government expenditure was still just 10% of GDP. Federation gave the Commonwealth government control of macroeconomic regulation and management and external issues while the states remained responsible for the provision of services and a large part of social spending.

The dependence on commodity exports has meant that Australia has had many large swings in the terms of trade over the century, as shown in Figure 11. On numerous occasions the terms of trade has doubled or halved, transmitting large shocks to the real economy. Notable examples include the 1920s and the Korean War boom. The terms of trade doubled in the early 1920s leading to sustained high growth in the early part of the decade. But the subsequent reversal in

[18] At the turn of the century GDP per capita was around 90% of the levels in the US and the UK. Prior to the severe 1890s recession in Australia GDP per capita was around 40% greater than the US (Maddison, 2003).

commodity prices and the terms of trade over the latter part of the 1920s is credited with triggering the Great Depression in Australia. A second example of the sensitivity of the economy to external shocks comes shortly after World War II. Commodity export prices shot up with the outbreak of the Korean war – notably wool (with a five fold price increase from May 1949 to March 1951) and metals. The surge in demand precipitated a dramatic pick up in inflation with the resulting restrictive policies combining with a sharp reversal in the terms of trade to precipitate a short-lived recession.

Terms of trade shocks have been substantially smaller since the Korean War boom, though mineral booms and busts in the early 1970s and 1980s have still been a large part of the cyclicality of output growth. The decline in the volatility of the terms of trade is in part attributable to growing diversity of exports, even within commodities.

The century since Federation have seen dramatic changes in the structure of the Australian economy. Agriculture has declined from being one-quarter of total output to around 3% now. Following the gold rushes, mining declined in importance over the first half of the century, from 10% to 2% of GDP by 1950, but has since grown to be around 5% now. Despite these changes, commodities still constitute approximately 60% of exports, though these are now quite highly diversified, in contrast to the dominance of wool and gold in exports during the early part of the century. Manufacturing grew strongly over the first half of the century so that by around 1950 its share in GDP was similar to other developed economies. Up to the 1970s and 1980s the Australian manufacturing sector was probably more heavily protected than any rich country other than New Zealand. However with few exceptions, trade reform has largely removed this protective barrier. The other salient feature of the Australian economy has been the gradual shift in economic relations away from Europe, and the UK in particular, toward the US and, more recently, Asia. At the time of Federation 70% of Australia's trade was with the UK, now it is around 5%. Meanwhile trade with Asia has increased from around 10% of total just after WWII to over half now.

4.2 Development of currency-trust

4.2.1 Inflation Outcomes

Inflation performance clearly plays a large role in developing currency-trust. Controlling inflation has generally been a fairly high priority of Australian government policy, with centralised wages, a pegged exchange rate, restrictive fiscal and monetary policies, and even tariff policy, all used at various times. The result of this focus is that Australia has had moderate inflation for most of its history with inflation over the century averaging 4%, and rarely greater than 10%, as seen in Figure 12. Indeed in the 102 years since Federation Australian inflation has only exceeded 20% in one year. In contrast inflation in Chile has been greater than 20% in approximately one-in-two years over this period.

Australia's inflation history in the first half of the century was uneventful, with moderate,

though relatively volatile, inflation. There were short bursts of sustained inflation following the end of WWI and during WWII but neither episode lasted more than a few years. Likewise there were sustained price falls for several years through the depression, but this too was soon reversed.

The first episode of significant inflationary pressure followed WWII. Significant pent-up demand for consumption goods following war-time rationing led to a rapid acceleration in inflation after the war to be just under 10% by the end of the decade. The sharp pick-up in export earnings from the Korean war boom precipitated a sharp spike in inflation in 1950-51, peaking at 25%. Other factors were also at play in rising inflation, including an increase in the legislated minimum wage, the relaxation of price controls, and the effective depreciation resulting from the devaluation of sterling in September 1949. However, the collapse in commodity prices was as rapid as the rise, resulting in the terms of trade falling almost 40% the following year. The sharp reduction in export quantities, and even greater in values, combined with tightened fiscal policy in late 1951 contributed to a short recession in 1953 with inflation returning to single digit rates.

With unit labor costs rising, inflation was climbing before the first OPEC oil shock. Inflation increased further with the oil shocks, as in the rest of the OECD, to levels only seen in the Korean War boom. Through much of the 1970s monetary and fiscal policies were contractionary in an attempt to control inflation. Pagan (1987) describes policy as taking an "inflation first" focus based on the belief that growth could only resume once inflation was controlled. Policy was only mildly successful in reducing inflation with it remaining stuck around the 8-10% rate. Through the 1980s the "Prices and Incomes Accord" (described in Section 4.2.2) became the key policy aimed at reducing inflation. There was some decline in inflation, which Hughes (1997) attributes to the Accord, though Carmichael (1990) suggests it was less successful in reducing inflation than hoped. In any case there wasn't a large fall in headline inflation until the early 1990s recession. Since the early 1990s the inflation rate has averaged around $2\frac{1}{2}\%$, the middle of the inflation target adopted by the RBA in 1993.

4.2.2 Inflation Policies

Next we consider the nature of the monetary framework over the century which delivered these moderate inflation outcomes and enabled Australia to gradually develop currency-trust. The monetary regime in Australia over its first 100 years can be roughly divided into quarters. For the first three-quarters of the century Australia had a fixed exchange rate, though for the first quarter this was a consequence of the banking system rather than official policy. In the middle part of the century, and particularly in the third quarter, while the exchange rate was fixed, some independence of monetary policy was possible due to the existence of capital controls. In the final quarter of the century the exchange rate became more flexible and consequently monetary policy more independent.

Until 1910 Australian currency was issued by private trading banks and one state, though sterling also circulated. The Treasury then took over the responsibility for the issuance of currency

up until 1920 when it was transferred to the Note Board and then to the Commonwealth Bank, the precursor to the Reserve Bank of Australia, in 1924. The government's need for funds during WWI led the Treasury to a quadrupling of the money supply over the course of the war. A consequence of this short burst of rapid money growth was that the powerful and conservative banking sector became vehemently opposed to the government having the ability to print money. Indeed it was the private banks who effectively determined Australia's exchange rate policy up until 1931. The banks strongly believed that parity of the Australian pound with sterling was a fundamental part of a sound banking system. As a result their lending policies in Australia were dictated by the balance of their funds in London and their ability to exchange funds at parity. While somewhat clumsy, this system was effective up until 1929 with the exchange rate never deviating more than 5% from parity (Schedvin, 1970).

With a balance of payments crisis building through 1929 and 1930 as Australia's exports and capital inflow slowed, but import demand did not, pressure began to mount on the unofficial peg. An outside exchange market developed and through 1930 the banks chased the outside exchange rate with the Australian pound depreciating in small steps. In January 1931 the pretense of maintaining parity finally broke with a new exchange rate set of A£1.3 per sterling. Later that month the Commonwealth Bank, the government owned trading bank, took control of the exchange rate and set the official exchange rate at A£1.25. Over the next thirty years the Commonwealth Bank progressively gained more central banking powers, while continuing to operate as a trading bank, until a separate central bank, the Reserve Bank of Australia, was established in 1959.

The Australian currency was decimalised in 1966, with one Australian pound converting to two Australian dollars. One year later the peg to the pound sterling was adjusted for the first time in 36 years. In December 1971 the peg was switched to the US dollar when the pound sterling depreciated, recognising the diminished importance of the UK for Australia. In September 1974 the peg was switched to a trade weighted basket of currencies, while in November 1976 it became a more flexible crawling peg subject to daily adjustment. From 1976 monetary policy was directed by the publication of projections for M3. This framework was replaced in 1985 by a flexible 'checklist approach' to the formulation of monetary policy.[19]

In 1983 sharp capital inflows precipitated the float of the Australian dollar. Shortly afterward in 1985 it depreciated sharply due to a steep fall in the terms of trade and declining financial market confidence. While the RBA has intervened in the foreign exchange market at various times over the period of the floating exchange rate this has been to smooth changes rather than target particular values for the exchange rate. Indeed the Australian dollar is considered to be in the group of cleanly floating currencies. An important implication of this clean float is that investors can be comfortable that the authorities will not deliberately pass currency risk onto foreign investors. Indeed the exogeneity of currency risk is demonstrated by the close correlation the Australian

[19] The checklist consisted of inflation, the nominal exchange rate, interest rates, the balance of payments, monetary aggregates and general state of the economy.

dollar has had with commodity prices over the floating era (Chen and Rogoff, 2003). The Reserve Bank of Australia adopted inflation targeting in 1993 (2-3% on average over the course of the cycle) and formalised this policy in an agreement with the government in 1996.

Australia had a centralised wages system for much of its century century of independence which has frequently played a large role in controlling inflation and so the development of currency-trust. While wage setting was done by an independent arbitration court, not directly by the government, wages policy has nonetheless often been focused on controlling inflation outcomes and boosting economic performance. Wages were indexed in several episodes, though indexation never contributed to high inflation becoming entrenched as it has in some other countries. Indeed the concern that indexation could lead to high inflation led to the modification or abolition of indexation on several occasions.

The centralised wage setting, based around a basic wage for unskilled labor, grew in prominence after 1907 to become the dominant form of wage setting by 1930. The basic wage was notionally indexed from 1922 (there had been some indexation from 1912) but at various times the basic wage was adjusted to reflect economic conditions rather than the cost of living. Indexation was dropped in 1953, immediately after the Korean war inflation spike. Indexation was reintroduced from 1975 to 1981 though it was neither full nor automatic, with partial and 'plateau' indexation often used (so that higher paid workers received less than price increases). Again, in this high inflation period, indexation was used to reduce real wages.

The election of the Labor Government in 1983 led to an "Prices and Incomes Accord" between the government, unions and employers, bringing the concept of a basic wage back, and the use of wages policy to control inflation, back to the fore. Full indexation to the CPI was used for two years, from September 1983. However, following the depreciation in early 1985, from September 1985 to March 1987, indexation was only partial, with inflation discounted by 2% so that the depreciation wouldn't lead to a price-wage spiral.

4.2.3 The Government Debt Market

Development of currency-trust also requires that foreign investors can take on local currency risk on terms with which they are comfortable. Typically this will mean taking on the simplest form of local-currency risk – that is absent of default risk and other forms of risk. In this section we discuss the development of the Government bond market, which if it is free of default risk provides pure currency risk and so seems to play a crucial role in getting foreigners to hold the local currency.

The issuance of government debt had began in earnest in the last quarter of the 19th century, prior to Federation, as the colonial governments undertook greater spending on public infrastructure. Mauro, Sussman and Yafeh (2000) show that from 1875 to 1905 there was a greater than five-fold increase in the value of Australian government bonds trading in London, with the share of Australian bonds of total government bonds increasing from 1.4% to 5.6%. By Federation the Australian states already had outstanding debt equal to their combined GDP. The Commonwealth

government did not issue debt until 1911, and apart from substantial issuance in the two World Wars, the Commonwealth did not have big increases in indebtedness. The states remained responsible for the majority of Australian government debt, though their debt relative to GDP has tended to decline since Federation.

At the turn of the century just 15% of the states' outstanding debt had been issued into the domestic market, with the other 85% issued in London (in sterling). (Figure 14 plots the size and composition of state and Commonwealth debt.) The colonies had easy access to the London capital markets and were able to borrow on favorable terms with low interest rates and long maturities.[20] The favorable terms in the London market, and the small supply of domestic savings, led the governments to favor issuing debt abroad. From early on the Australian governments were able to issue long-dated debt. In 1913 their fixed-maturity debt had an average maturity of just under 18 years, while 6% of debt had been issued as perpetuities.

Up until the mid 1920s all foreign government borrowing had been done in the London market. After a small loan raised by Queensland, New South Wales and the Commonwealth made the first major forays into the New York market between 1925-28, when access to the London market was restricted. Thereafter, abstracting from periods when one or the other market was closed, the Commonwealth and states drew on both sources of international funds.

The first sharp increase in Australian government indebtedness after Federation occurred in WWI, as seen in Figure 14. The Commonwealth government, which is responsible for defense, ran large fiscal deficits to cover war costs (total government deficits averaged 12% of GDP during WWI). While the government increased tax and monetarised part of the deficit, it also issued substantial new debt. With the ability to raise the large funds required in the London market severely restricted much of the new debt was issued in the domestic market (and so in domestic currency).[21] By the end of WWI almost half of the overseas debt represented credits advanced by the UK government for military supplies bought in Europe. While public and private investment declined, presumably due to reallocation of resources to the war effort and uncertainty, the increase in domestic interest rates on government debt suggests there was some crowding out by government borrowing.[22] Total government debt had increased to almost 125% of GDP by the end of the war. The Commonwealth government also began to issue more debt abroad, taking advantage of the lower interest rates and longer maturity available in London than in Australia, leading to an increase in the proportion of Commonwealth debt domiciled abroad.

While the states did attempt to issue debt through the Depression, to pay for public works

[20] This was extended by the British *Colonial Stock Act of 1900* which enabled many trust funds to purchase Dominion bonds, giving the Dominions an advantage over many domestic borrowers.

[21] The Commonwealth government acted as broker for the states during the war to increase their chances of raising loans in the London market.

[22] Separate domestic and foreign interest rates on government debt are not available for this period but the rise in interest rates on Commonwealth debt relative to state debt, at the time the Commonwealth was issuing large amounts of debt domestically suggests this is the case. Retail interest rates increase only slightly though these were very sticky in the early banking system.

and social expenditure, for much of this period the markets were closed so there was little increase in nominal debt outstanding. Rather, most of the increase in the ratio of debt to GDP seen in Figure 14 is the result of the 30% decline in nominal GDP.

Again in WWII the Commonwealth government issued large amounts of debt to pay for the war. With international capital markets once again all but closed the government had to turn to the domestic market. Unlike the experience of WWI, domestic private saving dramatically increased to accommodate the increased borrowing. Indeed given uncertainty and the large scale redirection of resources to the war it is not surprising to see that both public and private investment declined. However, interest rates on domestic government debt declined over the course of the war suggesting crowding out was not responsible for the decline in private investment.[23] Once again, after the war the Commonwealth government turned to the international market for its financing, leading to a decline in the proportion of Commonwealth debt issued domestically.

As seen in Figure 14, the state governments progressively issued more debt in the domestic market over the course of the century so that by the late 1970s almost all of their debt was issued domestically. This transition from debt issued abroad in foreign currencies to debt issued domestically in the Australian currency was remarkably smooth with little disturbance from the large fiscal shocks. This suggests a domestic bond market was progressively developing and the states taking advantage of the cheaper domestic funding costs as the market grew in size.[24] Indeed the fact that interest rates on domestic government debt tended to be lower than those on foreign debt suggests that, apart from the benefits of longer maturity available abroad, governments tended to borrow abroad because of the small size of the domestic market.

In the second half of the century the ratio of government debt to GDP declined fairly steadily (Figure 14). Slightly smaller government deficits contributed to the decline, but the strong economic growth was by far the major factor. There was an increase in government foreign debt in the late 1970s and 1980s. It is apparently over the 1980s that foreigners first begin to hold Australian dollar denominated debt.[25] Many commentators, including Stebbing (1994), have attributed this to the financial deregulation starting in the late 1970s which reduced the captive market for government debt and made yields market determined, resulting in increases in Australian bond yields. While Australia had been a heavy borrower from international capital markets throughout the century it had done so in international currencies, mainly sterling and US dollars. Domestic-currency debt (issued in the domestic market) had always been held by domestic residents. In 1980 less than 1% of domestic debt was held by foreign residents. However, over the late 80s and early 90s the proportion of Commonwealth debt held by non-residents rose, even as the government rebalanced

[23] Interest rates on domestic government debt declined by almost a one percentage point over the war while the rate of interest on foreign debt was relatively stable.

[24] An alternative interpretation is offered by Bordo at al (2003). They argue that the development of the domestic market for government bonds accelerated in those period in which international markets where closed.

[25] Through the second half of the 1980s there was some concern over Australia's growing indebtedness, leading to the downgrading of Australian government debt from AAA, though it never got below Aa2/AA.

its issuance to Australian dollar denominated debt. Indeed since the mid 1990s around one-third of Commonwealth debt has been held by foreigners, even though all outstanding debt is denominated in Australian dollars. Toward the end of the 1990s Australian debt was upgraded and over the past year has regained its AAA rating.

4.2.4 The development of currency derivative markets

Another key to establishing currency-trust is that domestic agents are able to spread foreign currency risk to those most able to bear it. The existence of a currency derivative market enables this transfer of currency risk. It also provides an additional avenue for foreign investors to take on pure local-currency risk. Indeed foreign investment in the bond market and foreign holdings of derivative exposures require the same willingness of the foreign investors to hold domestic currency risk. In this sense, the capability to develop credible money and bond markets would seem to be a prerequisite for an active derivatives market

From 1939 the Commonwealth Bank, with the private banks acting as its agents, provided forward cover to domestic residents engaging in international trade. This market remained small until the breakdown of Bretton Woods in 1971. Over the course of the 1970s demand for currency hedging in Australia grew with increased exchange rate volatility. But the official market was restrictive, it could only be used by domestic residents within 7 days of incurring a currency need from international trade, and so there was residual demand for currency hedging markets from capital flows as well as for speculation and arbitrage.

In 1972 a proposal was put forward to trade foreign currency futures on the Sydney Futures Exchange (SFE). It was argued that Australia already had the expertise and developed clearing house facilities for currency futures as the precursor to the SFE, the Greasy Wool Futures Exchange, had started in 1960. However, failure to gain government approval delayed the listing of currency futures until 1980.[26] The currency futures were cash-settled, the first anywhere in the world, so as to be compatible with foreign exchange controls. Not needing the same formal approval, a broker based hedging market, which brought together two companies with opposite future currency needs, started in the early 1970s but took off in 1975. Toward the end of the 1970s the banks became more involved in this market.

With the float of the Australian dollar in December 1983 the RBA stopped providing forward cover facilities to the banks. Having developed experience through the 1970s, the domestic trading banks began to provide a forward market in their own right. While most currency derivatives are short-dated instruments, the existence of a well developed Australian dollar yield curve would have facilitated the pricing of long-dated instruments. Banking deregulation in 1984 precipitated the gradual amalgamation of the forward market and hedging market. With continuing financial deregulation and increased financial sophistication the currency derivative markets grew steadily

[26] Only the US dollar contract lasted any length of time, before being delisted in the early 1990s.

through the 1980s, and by 1991 the turnover in Australian dollar swaps exceeded that in the spot market. Through the 1990s the currency derivative markets have continued to prosper, as seen in Figure 15, though the pick-up in swaps toward the end of the 1990s is exaggerated somewhat by the RBA's use of swaps to conduct open market operations in the face of declining liquidity in government securities markets. While there are no time series data on foreign participation in Australian dollar currency derivative markets, anecdotal evidence suggests the participation of foreigners in this market followed shortly after their participation in the government debt market. As with other currencies, the OTC derivative market for the Australian dollar is several orders of magnitude larger than the exchange traded futures market.[27]

4.3 Development of country-trust

4.3.1 Default History

A large part of developing country-trust is a history of demonstrating the commitment to repayment of debt, especially foreign debt. In this regard Australia has a long history of developing this trust with no experiences of default by the Federal or State governments. But this record was not achieved easily. Notably in the Great Depression Australia was heavily indebted and was subject to large shocks. Indeed, Australia was one of few countries heavily indebted at the outset of the Depression that did not subsequently default. We outline this experience to demonstrate the commitment required to develop country-trust.

Debt servicing costs began to rise in the late 1920s with the growing debt and slowing economy and exports. In recognition that Australia's ability to repay was declining, by 1929 New York was no longer lending to Australia and loans from London had a substantially shorter maturity. The Loan Council, which was formed in 1923 in order to oversee debt issuance to reduce competition between the Commonwealth and states for domestic funds, had brought closer coordination of policy and provided a forum for the collective acknowledgement of the governments' dire situation.[28] An implication of the formalisation of the Loan Council later in the 1920s was that government debt was amalgamated so that the states debt was explicitly guaranteed by the Commonwealth. Over the course of late 1929 and 1930 the debate as to an appropriate course of action for policy grew.

Premier Lang of the state of New South Wales (NSW) proposed renegotiation of external debt, notably that the interest on war debt be halved to the rate charged to Britain by the US, and the abandonment of the gold standard. His plan was rejected by the state premiers, while the proposal of Treasurer (Finance Minister) Theodore which effectively called for an increase in the money supply was vetoed by the government-owned but semi-independent Commonwealth Bank on the grounds that it would be inflationary. After substantial deliberation, the "Premiers' Plan" was

[27] In 1998 the turnover in forwards (swaps) was 3 (20) times larger than the turnover in Australian dollar futures contract trading on the largest currency futures exchange, the Chicago Mercantile Exchange.

[28] There was little competition between the governments in the London market as they all used the same underwriting firm which ensured the timing of their issues was well spread.

signed in 1931, partly on the advice of a Bank of England official, cutting government expenditure by 20%, increasing taxes and duties, cutting domestic bank interest rates and interest paid on existing domestic, but crucially not foreign, debt. The conversion of domestic government debt to lower interest rates was voluntary but hugely successful with a large propaganda campaign leading to 97% of borrowers taking up the new loans with interest rates reduced by $22\frac{1}{2}$% and longer maturities.[29] The Premiers' Plan was significantly contractionary but as Schedvin (1970) notes such drastic action was felt necessary to avoid default on government debt.

Default was seen to be a real possibility and the largest state, NSW, didn't meet interest payments on overseas debt from April to June 1931. However, the Commonwealth government and Commonwealth Bank were keen to protect the rating of Australian governments as a borrower and because of the centralised structure of the Loan Council made the interest payments on behalf of NSW. Since the Australian government system involves greater revenue raising at the federal level, and expenditure at the state level, the Commonwealth government was able to withhold revenue from the state to compensate for the missed interest payments. Largely because of this episode, Premier Lang was dismissed in 1932 by the state Governor.

4.3.2 Development of the Banking Sector

The stability of the financial system plays a key role in country-trust and banks are at the centre of this. Banks, modelled on English banks, were first set up in the Australian colonies in the 1820s. But it was not until the second half of the 1800s and the gold rush years that the banking system became truly established. The end of a speculative boom in the early 1890s brought about the collapse of 40 non-bank financial institutions and caused 13 of the 22 banks to suspend payments.[30] Schedvin (1970) argues that this experience shaped the banks' conservatism thereafter. Despite the banking crisis of the 1890s the financial system was highly developed at Federation. The assets of the banks were already 70% of GDP, while those of all financial institutions were 107% of GDP. On these measures Australia was not far behind the US and UK, and well ahead of Latin American countries.[31]

The banking crisis also led to the dramatic growth of savings banks (from one-tenth of total deposits in 1890 to almost half by 1945) to encourage saving. Many of these were founded by the governments and so were perceived to be safer. The savings banks held the majority of their assets as government securities (61% in 1914 up to 76% in 1945) and so provided a captive source of funds for governments.

There was little regulation of the banking system prior to WWII when the central bank began dictating overdraft rates, and later statutory reserve deposit ratios and liquid asset ratios. From

[29] There had been discussion of a 25% tax for loans that did not convert and there was an implicit threat to impose such a tax if most debt did not convert. The 3% of "dissenters" ended up having their debt compulsorily converted.

[30] Only one did not reopen, though most had to restructure, often issuing shares in place of deposits.

[31] Another indicator of the development of the financial sector is that M3 was around 60% of GDP.

the end of the war up until financial deregulation in the 1980s an increasing proportion of financial intermediation was conducted outside of the regulated banking sector. However the total size of financial sector was relatively stable over the 80 years after Federation.[32] Banking deregulation started in ernest in 1984 with the granting of licenses to 16 foreign banks. Since then financial deregulation led to the rapid expansion of the financial sector with total assets to GDP more than doubling over twenty years.

5 Concluding Remarks: Lessons for the Region at Large

In this paper we have compared the experiences of Australia and Chile during the Asian-Russian crisis and described different aspects of Australia's economic history since its independence. We do so in order to extract lessons on how to improve the resilience of Latin America to external shocks. Chile is a good starting point because it has already resolved most other forms of instability, and hence it allows us to isolate the external problem more cleanly. It is then possible to discuss how additional constraints, such as extensive dollarisation or very weak monetary credibility modify or limit the set of policies available.

Let us start by summarising the lessons for economies that do not have severe monetary credibility problems with residents. In building country-trust, the experience of Australia reinforces the obvious: a country will be trusted if it has a long history of sound institutions and non-opportunistic behaviour. In the case of Australia, much of that trust was built from having experienced several substantial external shocks without defaulting. It surely must have felt hard at the time, and populist options – such as that of Premier Lang during the great depression – must have been tempting. But Australia did not behave myopically, and the rewards could not be clearer today, especially when compared with Argentina, a country with similar potential at the beginning of the 20th century, but with much of it destroyed over time by its repeated lack of wisdom during trying times. Another central pilar in Australia's external trust appears to be a very solid and conservative banking system, which learned the lessons of the banking crises at the end of the 19th century. These banks play a key role today in intermediating external resources into Australia, particularly when external conditions deteriorate.

Building currency-trust is also mostly a matter of common sense. It requires a good history of inflation, and clear monetary and exchange rate rules. While inflation has been under control for most of Australia's history, recently the exchange rate policy has contributed significantly to the external holding of Australian dollar denominated instruments (a trend that contrary to conventional wisdom, is only very recent as well). As discussed in Section 4.2.2, today currency movements in Australia have a large exogenous component related to movements in commodity prices and to the terms of trade. Therefore, not only is currency risk "exogenous" to Australian policy makers, but it is also highly correlated with the price of commodities, which is a widely

[32] Over this period assets of financial institutions fluctuated between 80 and 100% of GDP.

marketed risk. In contrast, Cashin, Cespedes and Sahay (2002) fail to find a significant correlation between a similar index of commodity prices and the real exchange rate in Chile (at least over the 1980-2001 period). This is surprising, given that if anything commodities make up an even larger share of Chile's exports.[33] One explanation for the lack of correlation in Chile lies in domestic policies. For a large part of the sample the exchange rate was not allowed to float freely. In the early 80s it was fixed. Latter on, a system of exchange rate bands was put in place. The narrowing and widening of exchange rate bands during the turmoils of the end of the 1990s is a final example of intervention. This implies that Chilean peso risk has a larger "endogenous" component than Australian dollar risk – and as such is subject to the usual concerns about moral hazard, time inconsistency, and so on. This makes it easier for Australians to find willing external buyers of Australian dollar risk. Not only is the risk "exogenous" to Australian policy makers, but it is also highly correlated with the price of commodities, for which substantial futures markets exist. In a sense, the problem, is not that the Chilean peso has been a commodity currency – but the opposite – that commodities have played a relatively small part in peso-fluctuations. Chile has began moving in the Australian direction in recent years.

It also appears that in addition to sound and clear macroeconomic policies, foreign investors need to be given a liquid market in which to take on currency risk with only limited exposure to other risks, such as credit risk. Countries with sound public finances can do this by developing a domestic public bond market in domestic currency (which could be indexed to the CPI, such as with Chile's Unidad de Fomento).[34] Initially, these bonds will have high premia and the country must be willing to pay that cost. It is also likely that initially most of the holding will be done by domestic institutions which are less concerned with currency risk. Over time, and if everything falls into place, the country will develop currency-trust, foreigners will hold a larger share of these bonds, and the currency premia will fall to "reasonable" levels.

It is only a step from the adoption of sound monetary and exchange policies, and the development of a good set of benchmark bonds, to the development of a currency-derivatives market. Initially, such development may end up reducing foreign exposure to currency risk since foreigners may chose to increase their participation in the local bond market but unload the currency risk. This is only a transitory cost which is likely to be more than offset by the increased participation of foreigners in domestic financial markets and, most importantly, by allowing domestic banks to eliminate explicit or implicit currency-mismatch risk from their books. This should remove a key factor behind the destabilising role played by banks during external shocks in Latin America.

In the meantime, while these institutions and markets are developed, there are several measures that can be undertaken to reduce external vulnerability. In particular, external insurance can be designed such that it is indexed to contingencies that, while highly correlated with external shocks,

[33] For the period 1990-99, for example the commodities included in the index amount to 58% of total exports in Chile and 54% in Australia.

[34] Note that the external insurance required is against shocks that depreciate the real exchange rate, not inflationary shocks per-se. This is the reason UF instruments would work as well.

are not caused by the country directly. This form of insurance is certainly less complete than that which is obtained from indexing it to domestic GDP or currency, but this is the cost of not having sufficient currency-trust and country-trust, not a matter of capricious design. At early stages, the choice is between significant but incomplete insurance indexed to external contingencies, versus minuscule complete insurance. Over time, as trust is built, the mix of external insurance can be gradually shifted toward contingencies that include some endogenous factors, such as GDP and local currency.

Similarly, macroeconomic policy should not only be made as predictable (in the sense of a contingent rule or procedure) and transparent as possible, but also it should be used to align private incentives with the aggregate risks that private decisions generate. Such objectives can be achieved, for example, by indexing macroeconomic policies to the same contingencies used to build external insurance. In particular, international reserves injections during external crises (perhaps resulting from the central bank gains obtained from the external insurance) should be sterilised in order to prevent the free insurance aspect of a strong exchange rate defense.

Most of these recipes also apply to dollarised economies, or economies where lack of monetary credibility with residents is widespread. Although in such cases there is no hope of using monetary policy to provide adequate private incentives, or develop extensive derivative markets. These aspects of the plan need to be substituted in the transition by costlier measures such as taxes on certain capital inflows and large international liquidity ratio requirements for domestic banks. Similarly, the development of a domestic debt market in local currency is likely to be too expensive to develop quickly, without being preceded by a clear effort to develop institutions and implement a sound and credible macroeconomic policy program. Once these are implemented, there is no ready substitute for the passage of time. On the other hand, these economies have all the more reason to accelerate the development of external insurance mechanisms as described above, which may even be developed and fostered in domestic markets to improve the allocation of risks among residents.

References

ABS (Australian Bureau of Statistics) (2001), *Measuring Australia's Foreign Currency Exposure*, Balance of Payments and International Investment Position, 5302.0.

Aghion, P., Bacchetta, P. & Banerjee, A. (2001), 'Currency Crises and Monetary Policy in an Economy with Credit Constraints', *European Economic Review* **45**, 1121–50.

Benavente, J. M., Johnson, C. & Morande, F. (2003), 'Debt composition and balance-sheet effects of exchange rate: a firm level analysis for Chile', *Forthcoming in Emerging Markets Review* .

BIS (Bank of International Settlements) (2002), *Triennial Central Bank Survey: Foreign exchange and derivatives market activity in 2001*, BIS, Basle.

Bleakley, H. & Cowan, K. (2002), Corporate Dollar Debt and Depreciations: Much Ado About Nothing?, Working Paper 02-05, Federal Reserve Bank of Boston.

Bordo, M. D., Meissner, C. & Redish, A. (2003), How "original sin" was overcome: the evolution of external debt denominated in domestic currencies in the United States and the British dominions 1800-2000, Working Paper 9841, NBER.

Broner, F. & Gelos, G. (2003), Testing the Portofolio Channel of Contagion: The Role of Risk Aversion. Mimeo Universitat Pompeu-Fabra.

Butlin, M. (1977), A Preliminary Annual Database 1900/01 to 1973/74, Research Discussion Paper 7701, Reserve Bank of Australia.

Caballero, R. (2002), Coping with Chile's External Vulnerability: A Financial Problem, *in* N. Loayza & R. Soto, eds, 'Economic Growth: Sources, Trends and Cycles', Banco Central de Chile, Santiago, Chile, pp. 377–416.

Caballero, R. & Krishnamurthy, A. (2003), 'Excessive Dollar Debt: Financial Development and Underinsurance', *Journal of Finance* **58**(2), 867–894.

Caballero, R. & Krishnamurthy, A. (2004), Inflation Targeting and Sudden Stops. Forthcoming, *in* B. Bernanke & M. Woodford, eds, 'Inflation Targeting'.

Caballero, R. & Panageas, S. (2003), Hedging sudden stops and precautionary recessions: A quantitative framework. Mimeo MIT.

Calvo, G. & Reinhart, C. (2002), 'Fear of Floating', *The Quarterly Journal of Economics* **67**, 379–408.

Carmichael, J. (1990), Inflation: Performance and Policy, *in* S. Grenville, ed., 'The Australian Macroeconomy in the 1980s', Reserve Bank of Australia, Sydney, pp. 288–342.

Cashin, P., Cespedes, L. & Sahay, R. (2002), Keynes, Cocoa and Copper: In Search of Commodity Currencies, Working Paper 02/223, International Monetary Fund.

Cespedes, L., Chang, R. & Velasco, A. (2000), Balance Sheets and Exchange Rate Policy, Working Paper 7840, NBER.

Chen, Y.-C. & Rogoff, K. (2003), 'Commodity Currencies', *Journal of International Economics* **60**(1), 133–160.

Cowan, K. (2002), Firm Level Determinants of Dollar Debt, PhD thesis, MIT.

Cowan, K. & Kamil, H. (2004), A New Database on Firm Liability Dollarization in Latin America. Mimeo IADB.

De Nicolo, G., Honohan, P. & Ize, A. (2003), Dollarization of the Bankig System: Good or Bad?, Working Paper 03/146, IMF.

Dwyer, J. & Leong, K. (2001), Changes in the Determinants of Inflation in Australia, Research Discussion Paper 2001-02, Reserve Bank of Australia.

Eichengreen, B., Haussman, R. & Panizza, U. (2003), Currency Mismatches, Debt Intolerance and Original Sin: Why they are not the same and why it matters, Working Paper 10036, NBER.

Garcia, C. J. & Restrepo, J. E. (2001), Price Inflation and Exchange Rate Pass-Through in Chile, Working Paper 128, Central Bank of Chile.

Hausmann, R., Panizza, U. & Stein, E. (2001), 'Why do Countries Float the Way they Float?', *Journal of Development Economics* **66**, 387–414.

Hughes, B. (1997), Discussion to The Evolution of Monetary Policy: From Money Targets to Inflation, *in* G. Debelle, ed., 'Unemployment and the Australian Labour Market', Reserve Bank of Australia, Sydney, pp. 159–165.

Krugman, P. (1999*a*), Analytical Afterthoughts of the Asian Crisis. At http://web.mit.edu/krugman/www.

Krugman, P. (1999*b*), 'Balance Sheets, the Transfer Problem and Financial Crisis', *International Tax and Pulic Finance* **6**(4), 459–72.

Levy-Yeyati, E., Sturzenegger, F. & Reggio, I. (2003), On the Endogeneity of Exchange Rate Regimes. Mimeo UCLA.

Maddison, A. (2003), *The World Economy: Historical Statistics*, OECD, Paris.

Mauro, P., Sussman, N. & Yafeh, Y. (2000), Emerging market spreads: Then versus now, Working Paper 00/190, International Monetary Fund.

Pagan, A. (1987), The end of the long boom, *in* R. Maddock & I. McLean, eds, 'The Australian Economy in the Long Run', Cambridge University Press, Cambridge, pp. 106–130.

Reserve Bank of Australia (RBA) (2002), Australia's foreign currency exposure and hedging practices, Bulletin, Reserve Bank of Australia.

Rigobon, R. (2001), The Curse of Non-Investment Grade Countries, Working Paper 8636, NBER.

Schedvin, C. B. (1970), *Australia and the Great Depression*, Sydney University Press, Sydney.

Stebbing, P. (1994), Secondary markets, paper presented at Debt Instruments Market Development in Small Open Developing Economies, 'South Pacific Central Bankers' Seminar', Suva, 24 to 28 October.

Vamplew, W. (1987), *Australians: a historical library: Volume 10: Australians: historical statistics*, Fairfax, Syme and Weldon Associates, Broadway, NSW.

Van Rijckeghemn, C. & Weder, B. (2000), Spillovers Through Banking Centers: A Panel Data Analysis, Working Paper 00/88, IMF.

World Bank (1999), *Global Investment Finance 1999, Chapter 3*, World Bank, Washington.

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Figure 1: External Shocks

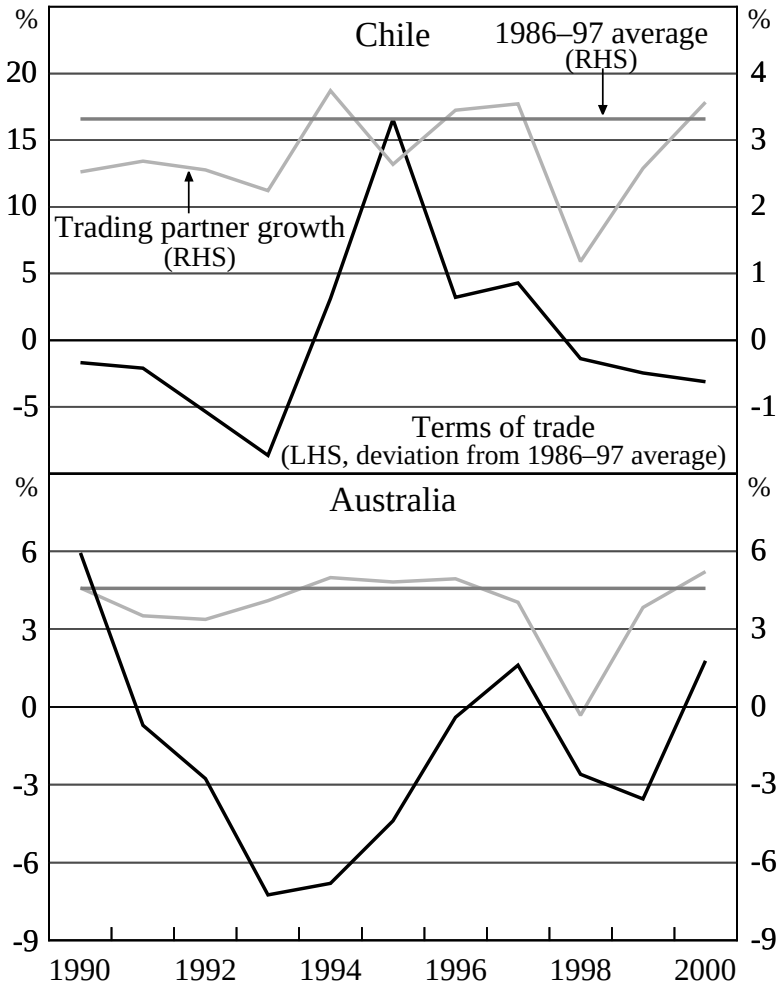

Figure 2: GDP and Current Account Deficit

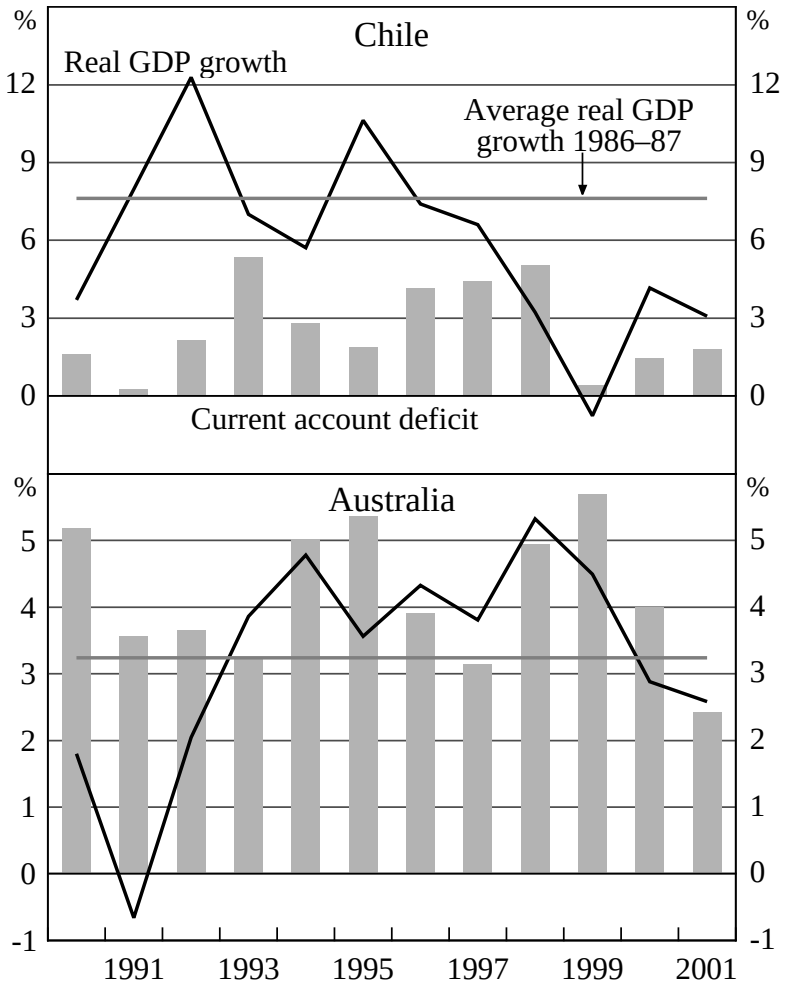

Figure 3: Interest Rates and the Real Effective Exchange Rate 1990-02

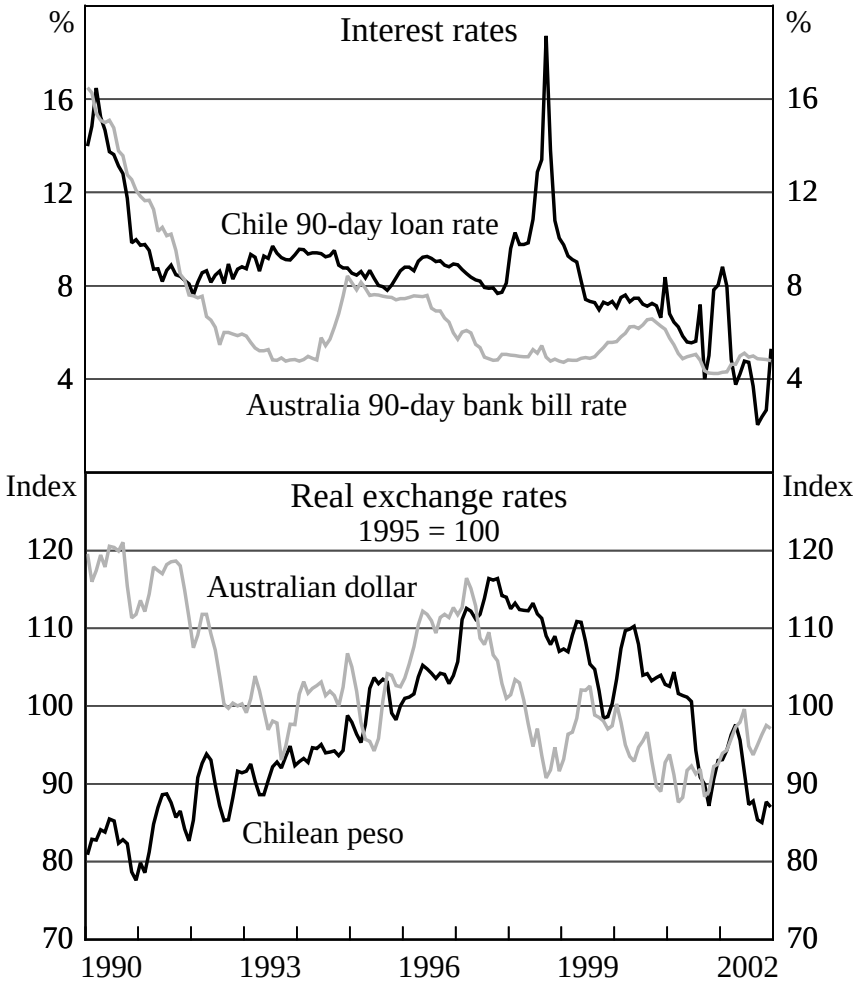

Figure 4: Chilean corporate risk premium
Spread over T.Bills (basis points)

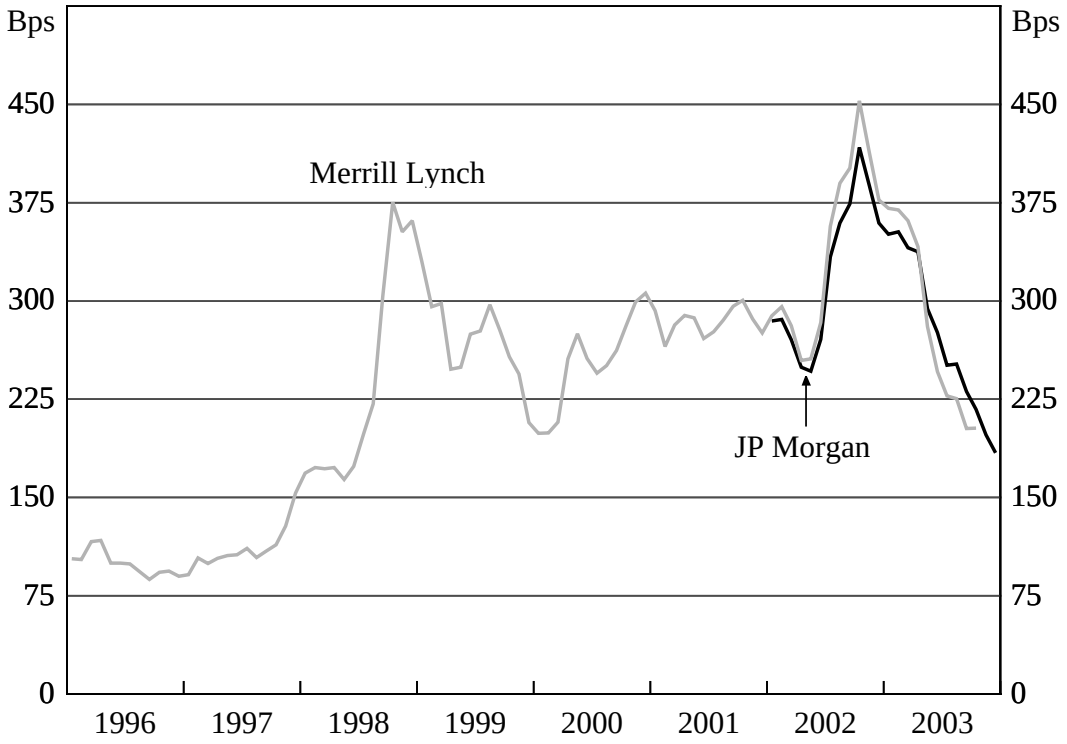

Figure 5: Capital flows

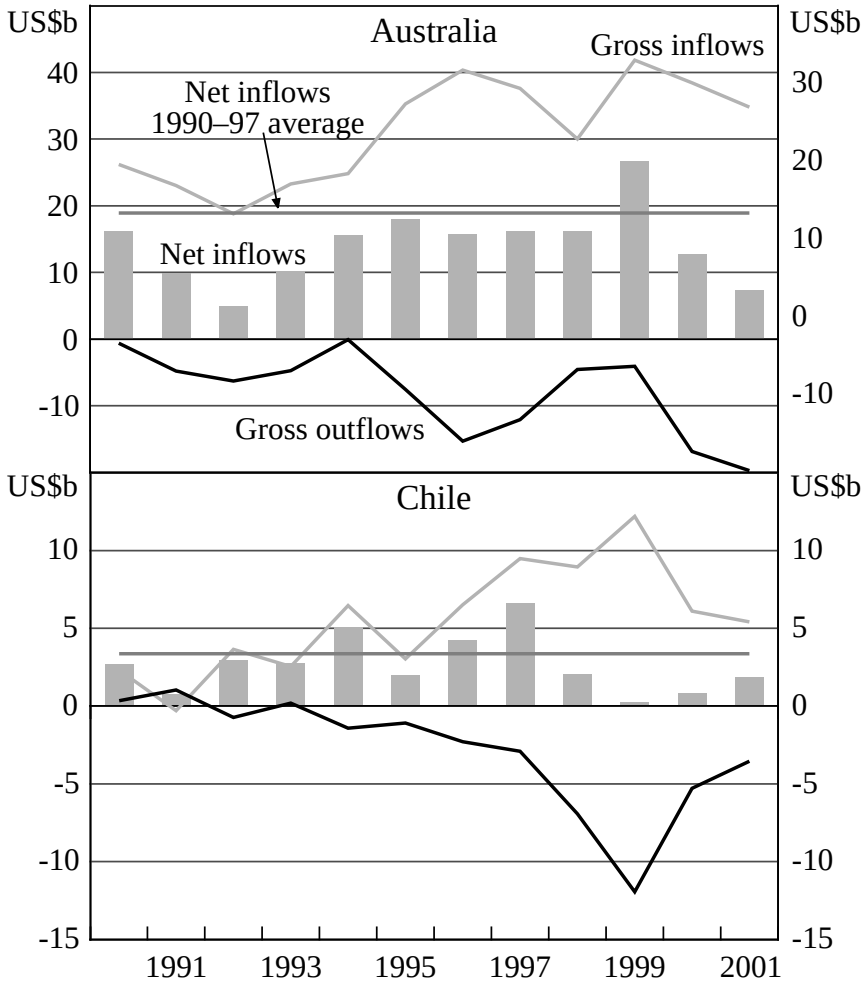

Figure 6: Net International Investment Position Chilean Private Sector

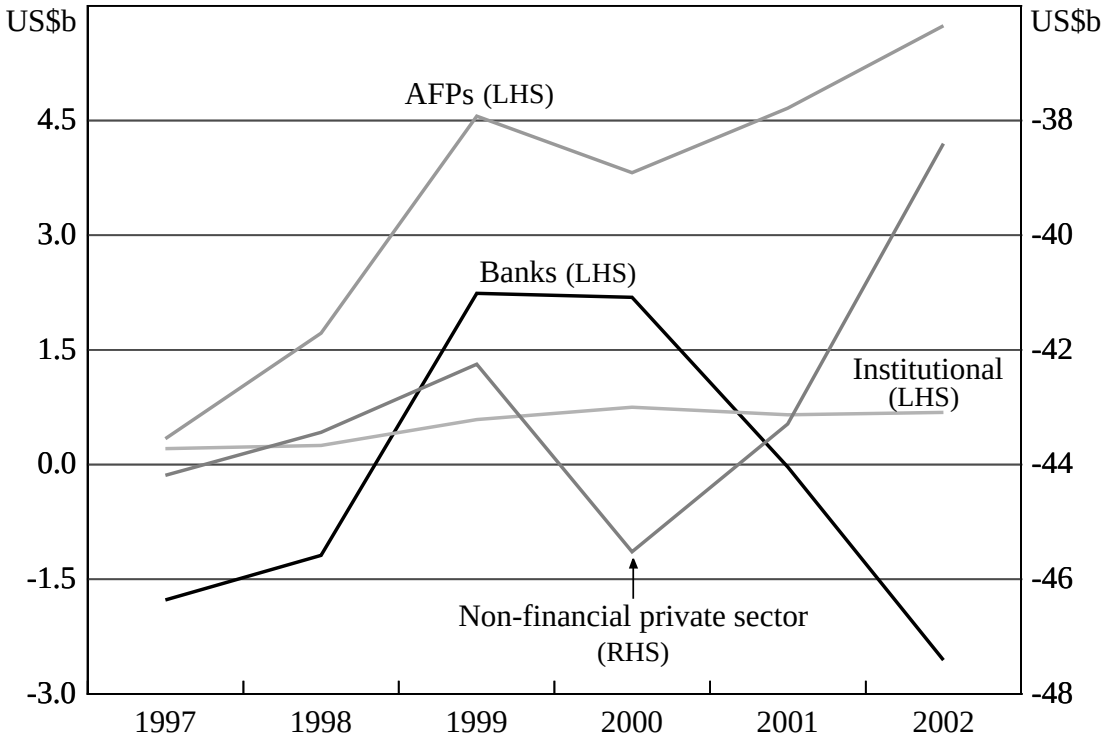

Figure 7: Foreign Assets Holdings of Chilean Pension Funds

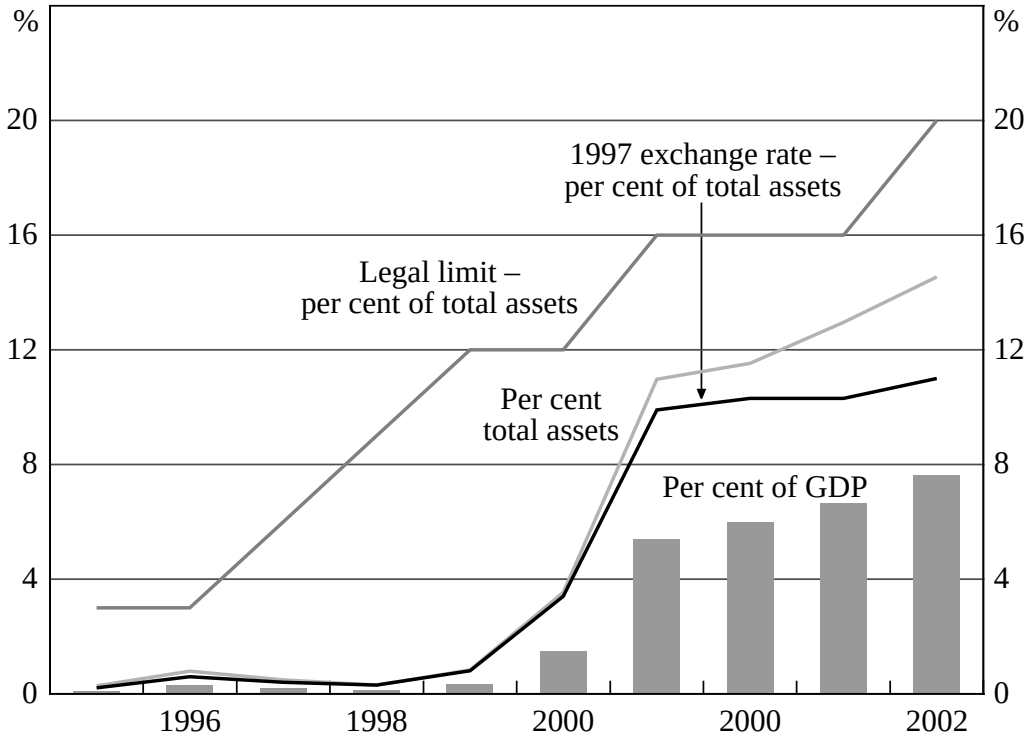

Figure 8: Banks: Foreign assets as a proportion of total assets

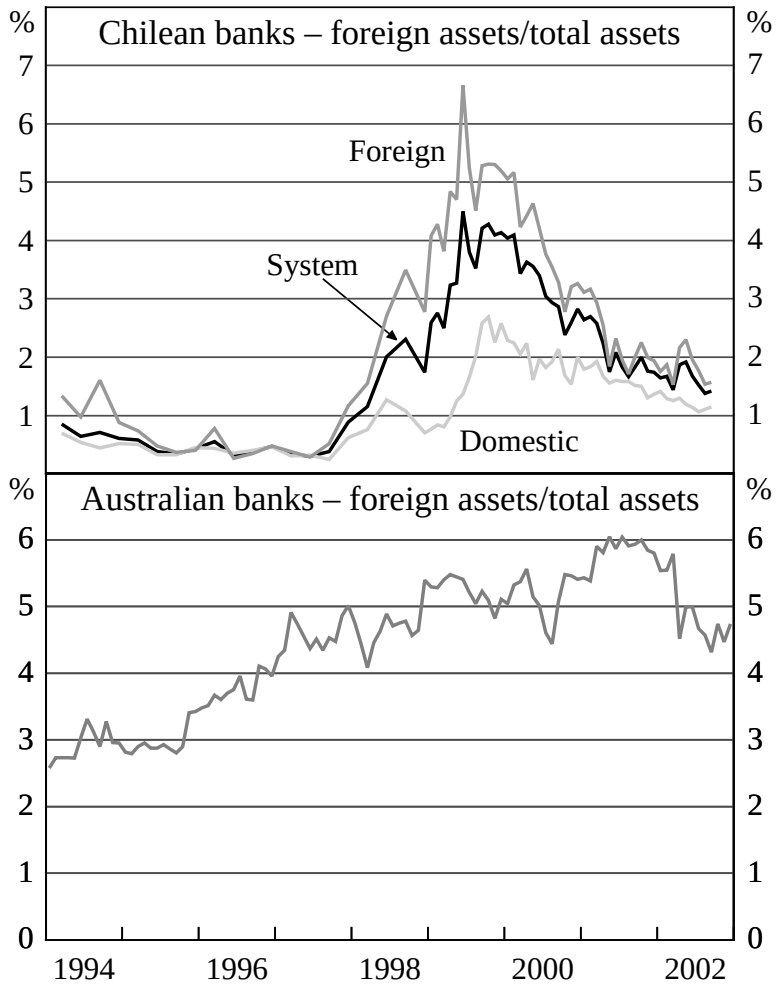

Figure 9: Share of Foreign Currency Debt over Total Debt

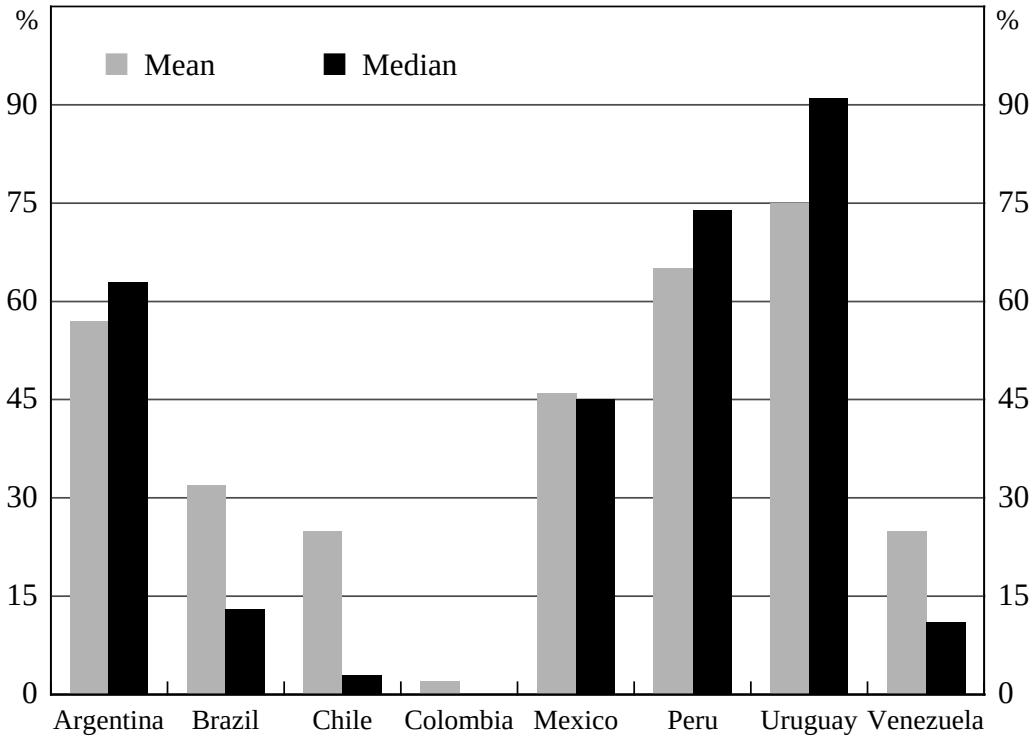

Figure 10: The Australian Economy: Real

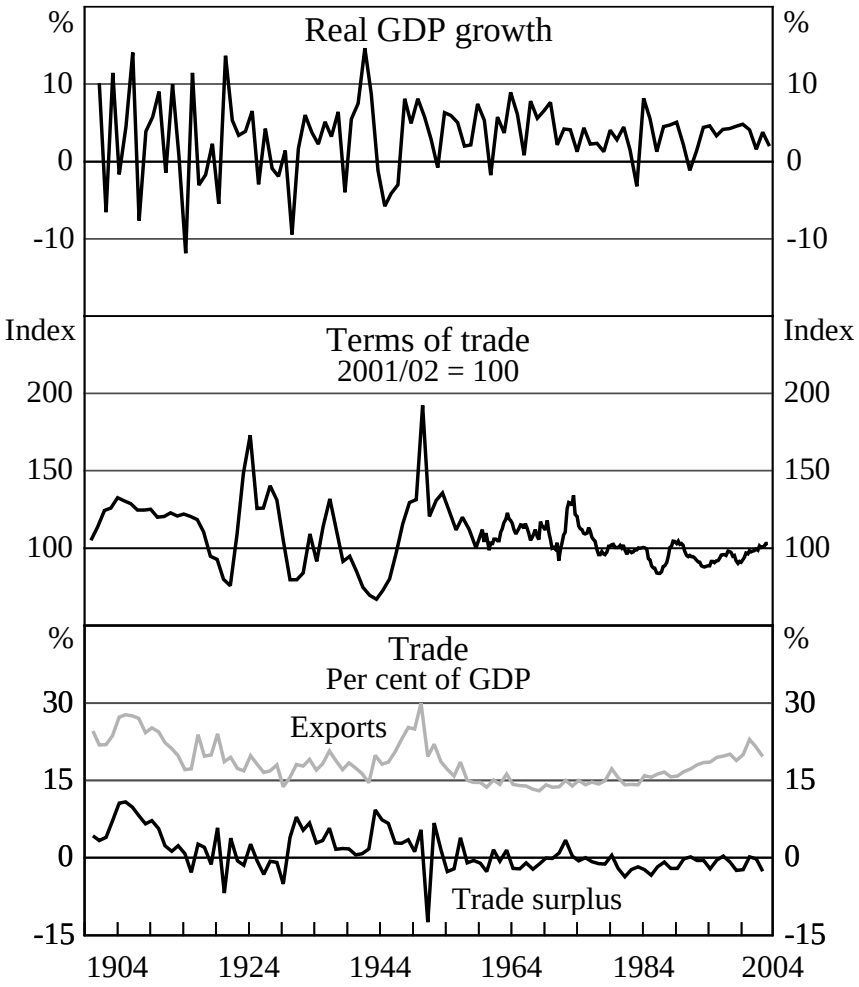

Figure 11: The Australian Economy: Nominal

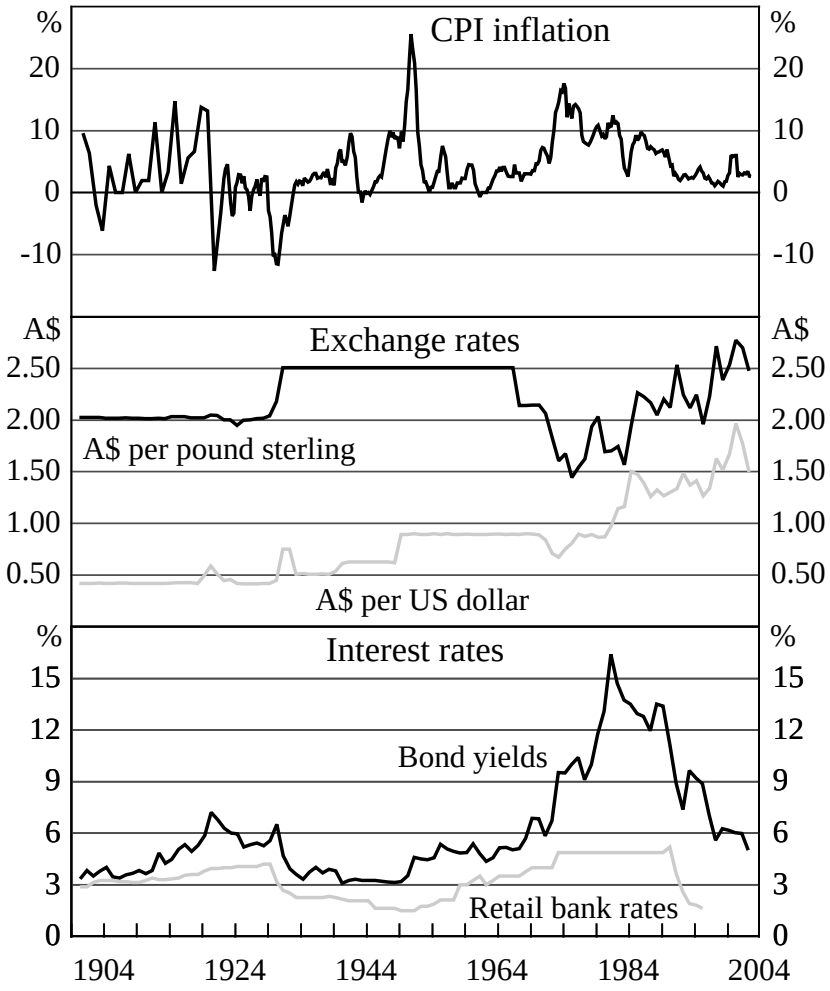

Figure 12: Australian current account
per cent of GDP

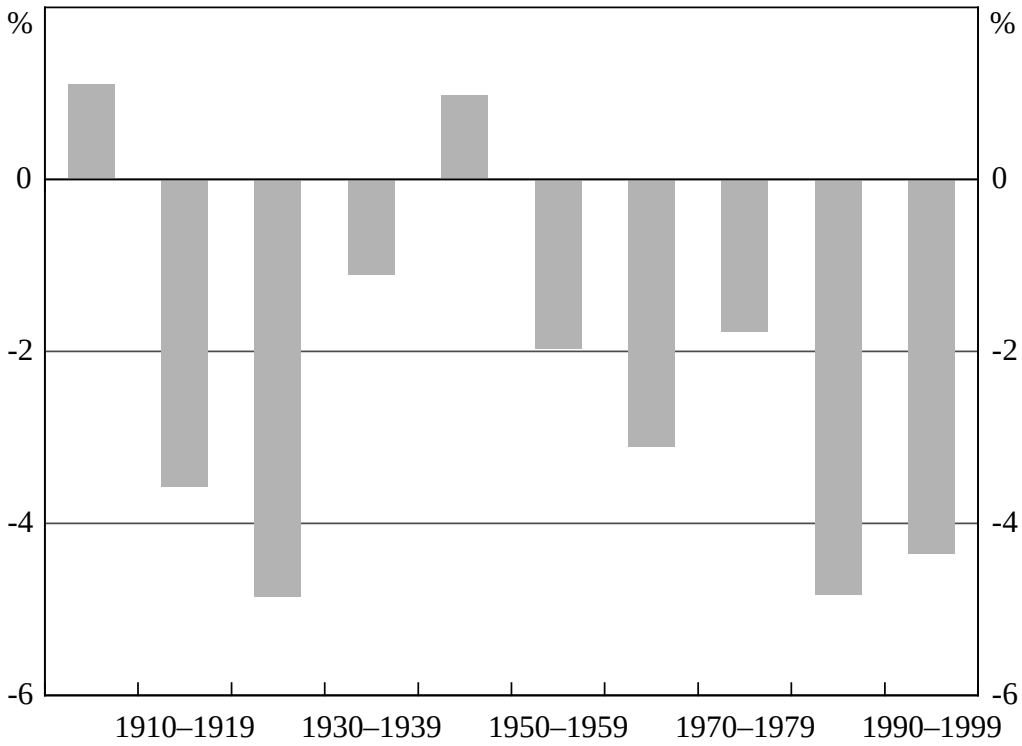

Figure 13: Australian Government Debt

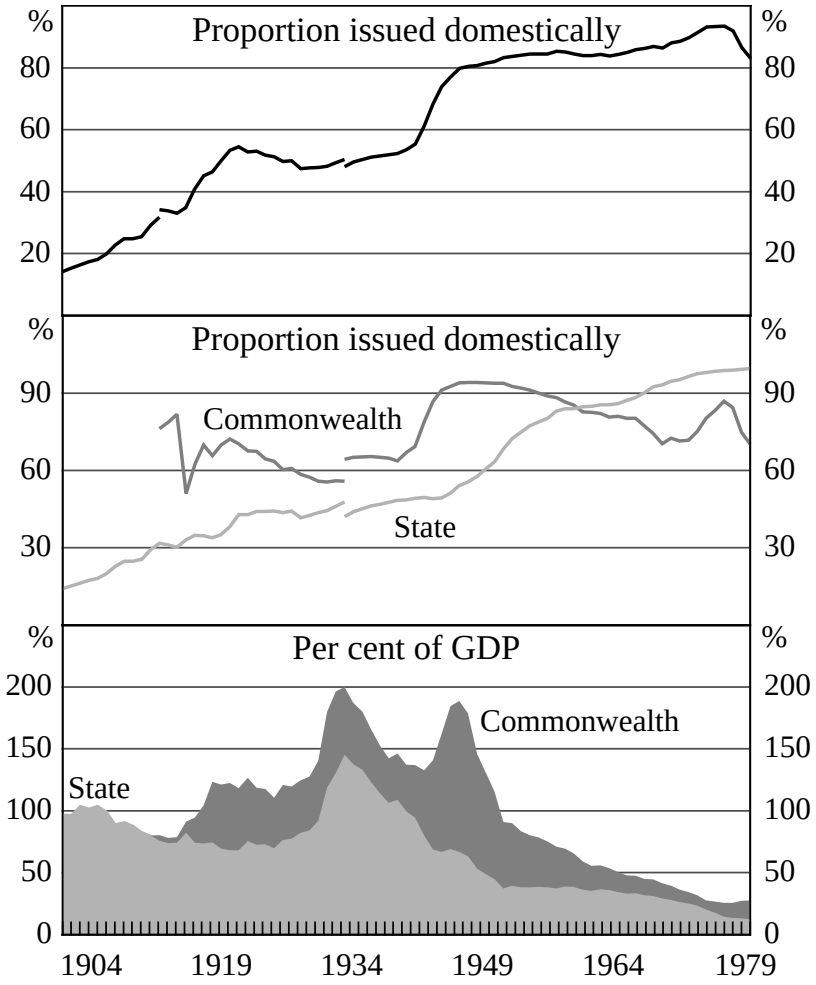

Figure 14: Australian dollar turnover in the Australian foreign exchange market

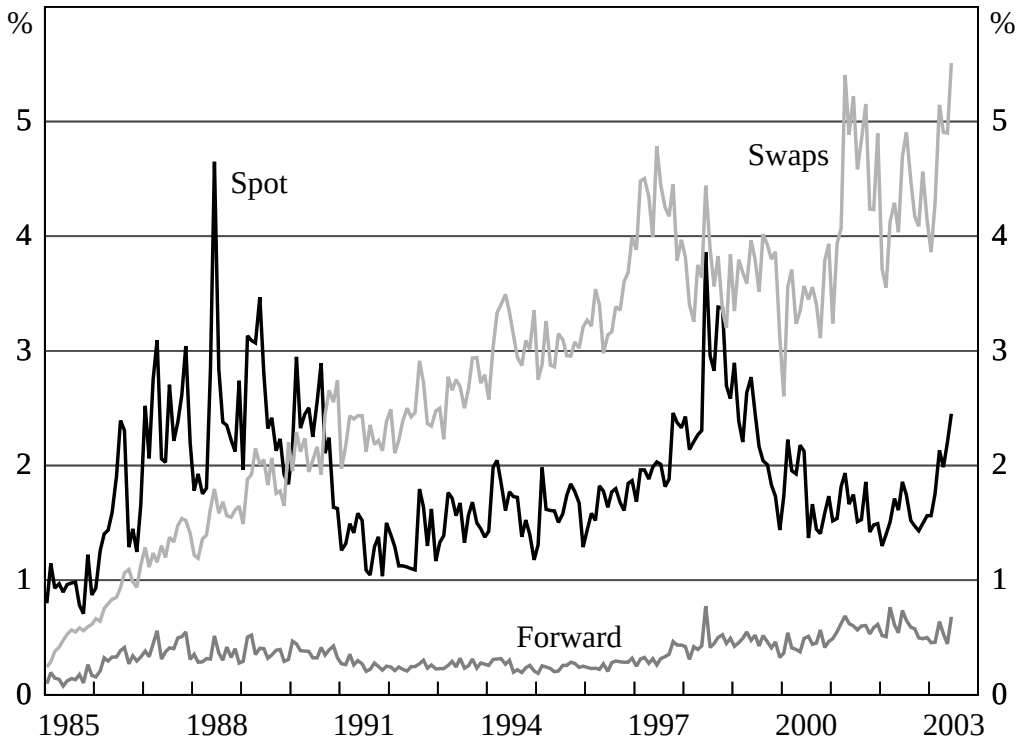

Table 1: International Investment Position 1997
per cent of nominal GDP

	Chile			Australia		
	Gross Assets	Gross Liabilities	Net Liabilities	Gross Assets	Gross Liabilities	Net Liabilities
Private sector:						
Banks						
Debt	1.4	3.0	1.6	4.8	22.3	17.6
Portfolio Equity	0.0	0.6	0.6	0.1	2.5	2.4
Non financial private sector						
Debt	11.6	21.6	10.0	4.6	18.9	14.3
Portfolio Equity	1.1	8.0	6.9	7.7	12.6	4.9
FDI	6.2	41.7	35.5	16.5	28.9	12.4
Private Sector						
Debt	13.1	24.6	11.6	9.4	41.2	31.8
Portfolio Equity	1.1	8.6	7.5	7.8	15.1	7.3
FDI	6.2	41.7	35.5	16.5	28.9	12.4
Total	20.3	74.9	54.6	33.7	85.3	51.5
Government						
General Government	0.6	5.8	5.2	0.3	8.8	8.5
Central Bank	22.1	0.2	−21.9	4.3	0.0	−4.3
Total	22.7	6.0	−16.7	4.6	8.8	4.2
Total	43.0	80.9	37.9	38.4	94.1	55.7

Memo items:

	Chile	Australia
Share of private sector offshore bonds in local currency :	100	76
Share of public sector offshore bonds in local currency :	100	63
Share of foreign currency deposits in total deposits :	3.5	-

Sources: Central Bank of Chile, IMF (2003) Balance of Payment Statistics and International Financial Statistics. Bond currency composition data is from Eichengreen et al (2003), share of foreign deposits is from De Nicolo et al (2003).

Notes: Debt = portfolio debt + loans + commercial loans + currency and deposits. General Government corresponds to Central Government plus Other Public Sector.

Table 2: External Debt 1997 (Selected Countries)

	as a per cent of GDP			
	Total foreign debt D*	Total foreign debt in foreign currency D*US$	Net foreign debt in foreign currency D*US$ – A*	Net foreign debt in foreign currency minus reserves D*US$ – A* – R*
Chile	27	27	13	−9
Australia	47	34	23	19
New Zealand	60	57	47	40
Canada	70	57	30	27
Israel	53	53	35	15
LAC	70	70	23	8

	as a per cent of exports			
	Total foreign debt D*	Total foreign debt in foreign currency D*US$	Net foreign debt in foreign currency D*US$ – A*	Net foreign debt in foreign currency minus reserves D*US$ – A* – R*
Chile	125	125	61	−41
Australia	291	209	142	116
New Zealand	280	266	218	187
Canada	206	168	87	79
Israel	238	238	157	68
LAC	299	295	140	57

Source: IMF (2003) International Financial Statistics, BIS, and World Bank (2002) World Development Indicators.

Notes: D* (total foreign debt) = debt securities liabilities + other investment liabilities. D*US$ (foreign debt in foreign currency) = D* adjusted by the share of external debt in foreign currency from Eichengreen (2003). D*US$ - A* (net foreign debt in foreign currency) = D*US$ minus foreign assets, where assets are defined as the sum of debt securities assets and other investment assets. D*US$ - A* - R* (net foreign debt in foreign currency minus reserves) = D*US$ - A* minus reserves. The data of liabilities and assets were extracted from IFS International Investment Position. LAC (Latin American countries) includes: Argentina, Colombia, Costa Rica, Panama, Peru, Uruguay and Venezuela.

Table 3: Firm Level Determinants of Dollar Debt in Chile 1997

	dependent variable: dollar liabilities / total liabilities		
	(1)	(2)	(3)
tradable sector dummy	0.134***	0.117**	0.072
	(0.043)	(0.046)	(0.048)
export dummy			0.134***
			(0.051)
exports / sales		0.290**	
		(0.120)	
size (ln[assets])	0.053***	0.057***	0.047***
	(0.008)	(0.009)	(0.083)
Obs	232	232	232
R^2	0.22	0.29	0.25

Source: Author's calculations based on data from Cowan and Kamil (2004).

Notes: Robust standard errors reported in parenthesis. Sample includes publicly listed firms only. ***, *** and * indicate significance at 1, 5 and 10 per cent levels respectively.

Table 4: Firm Level Currency Mismatch Australia and Chile

	Derived mismatch m_{it} (per cent)			
	Australia		Chile	
	Mean	Median	Mean	Median
Non Tradeable	−1.19	0.00	0.33	0.13
Tradeable	5.50	0.00	4.85	2.31
Total	2.38	0.00	3.00	1.13

Source: Authors' calculations base on Bloomberg data.

Note: Derived mismatch is foreign currency liabilities net of foreign currency assets as a ration of total assets.

Table 5: Turnover in derivative markets, 2001

	Chile	Australia	Latin America	Emerging excluding Latin America	Developed excluding Australia	*Chile (1998)*
Derivative turnover as a per cent of:						
spot currency turnover	0.4	3.1	0.5	1.2	2.5	*0.6*
trade flows	4.4	78.1	2.1	6.7	32.3	*3.2*
trade + capital flows	3.3	58.2	1.7	10.0	23.3	*2.5*
GDP	2.2	25.1	0.7	5.4	27.4	*1.5*
Derivative turnover with non financial agents as a per cent of GDP	0.4	1.6	0.1	0.3	1.8	*0.1*

Sources: Authors' calculations based on the BIS Triennial Central Bank Survey (BIS 2001); IFS (2003) International Financial Statistics and World Bank (2002) World Development Indicators.

Notes: Trade flows are the sum of exports and imports; capital flows are the sum of gross capital inflows and gross outflows. Total turnover corresponds to total transactions of currency derivatives contracts in the foreign exchange and over-the-counter (OTC) markets with domestic and foreign agents, net of double accounting. Derivative turnover with domestic non-financial counterparts excludes turnover between reporting agents, between reporting agents and other financial institutions and between agents and non-financial counterparts abroad. Emerging economies are those in the lower and middle income groups of the World Development Indicators 2002.

Table 6: Australian Foreign Currency Exposure by Sector
June 2001, A$ billion

Instrument	Financial Sector			General government	Other resident sectors	Total all sectors
	Banks	RBA & CBAs(a)	Other financial corps			
FC denominated financial debt						
assets	−69.8	−36.9	−33.6	−5.5	−10.6	−156.5
liabilities	186.5	8.8	61.4	4.1	60.1	321.0
Net position on debt	116.7	−28.1	27.8	−1.4	49.5	164.5
Principal of FC derivative contracts						
in a bought position	−435.3	−11.3	−69.8	−0.4	−31.7	−548.4
in a sold position	325.8	32.1	61.8	8.9	34.9	463.4
Net position on derivatives	−109.5	20.8	−8.0	8.5	3.2	−85.0
Net position on debt unhedged after derivatives	7.2	−7.4	19.8	7.2	52.6	79.5
Foreign equity assets	−30.7	0.0	−84.0	0.0	−113.9	−228.5
Foreign Currency Exposure	−23.4	−7.4	−64.1	7.2	−61.2	−149.0

Source: Australian Bureau of Statistics.
Notes: (a) CBAs: State and Territory Central Borrowing Authorities

Table 7: Composition of Gross Capital Inflows
US$ million

	Chile			Australia		
	1994−97	1998−99	2000−01	1994−97	1998−99	2000−01
By type of inflow:						
FDI	3.9	6.9	4.1	7.7	5.9	8.3
Portfolio Equity	0.9	0.6	−0.3	5.4	8.4	4.6
Portfolio Debt	0.4	1.2	1.0	11.3	3.7	12.2
Other Investment	1.1	2.0	1.0	2.3	10.0	3.4
By type of agent:						
Government Debt	−0.8	0.0	0.2	3.2	−3.4	−2.2
Bank Equity	0.1	0.1	0.0	0.4	1.4	1.3
Other Equity	0.5	0.5	−0.3	5.0	6.9	3.3
Bank Debt	−0.4	−0.3	0.1	11.2	13.7	11.6
Other Debt	3.2	3.4	1.7	−0.8	3.4	6.2
FDI	3.5	6.4	4.1	7.7	5.9	8.3

Source: IMF (2003), Balance of Payment Statistics.

Table 8: Currency Composition of Debt 1997

Sector (ISIC)	Tradable, Non-tradable	Dollar Debt / Total Debt			
		Chile		Argentina	
		mean	median	mean	median
Agriculture	T	0.32	0.21	0.65	0.82
Mining	T	0.34	0.09	0.73	0.85
Manufacturing	T	0.37	0.31	0.53	0.62
Electricity, Gas and Water	NT	0.21	0.00	0.63	0.74
Construction	NT	0.00	0.00	0.51	0.55
Trade	NT	0.22	0.17	0.49	0.61
Transport, storage and communications	NT	0.32	0.13	0.54	0.62
Financing, Insurance, Real Estate and Business Services	NT	0.15	0.00	0.81	0.76
Community, Social and Personal Services	NT	0.00	0.00	0.37	0.33
Tradable		0.40	0.38	0.56	0.63
Non-Tradable		0.15	0.00	0.58	0.63
Total		0.24	0.02	0.57	0.63

Source: Authors' calculations based on data from Cowan and Kamil (2004).

Notes: For both Chile and Argentina tradable firms are those in Agricultural, Mining and Manufacturing sectors. For Chile the sample is 237 publicly listed firms. For Argentina the data set includes 202 non-financial firms (publicly traded companies, publicly held but no publicly traded companies and privatized companies).

Table 9: Explanators of Derivative Turnover

	Dependent variable ln(derivatives turnover / GDP)						
Specification	1	2	3	4	5	6	7
Income per capita (PPP) 1995-2000	0.095*** (0.025)	0.108*** (0.028)	0.132*** (0.022)	0.154*** (0.026)	0.127*** (0.021)	0.127*** (0.022)	0.125*** (0.022)
(Exports + Imports) / GDP	0.713** (0.349)	0.713** (0.349)	0.844** (0.355)	0.382 (0.587)	0.960*** (0.344)	1.102*** (0.357)	1.054*** (0.354)
Private lending / GDP	1.015* (0.604)	0.912 (0.614)					
Dummy EMU membership		−0.461 (0.501)					
Gross capital flows / GDP			0.107 (0.441)				
Commodities share of exports				−0.011 (0.012)			
Dummy for commodity currency					0.410 (0.747)		
Years with floating exchange rate (1995-2000)						0.074 (0.078)	
Dummy for floating exchange rate in 2000							0.212 (0.385)
R^2	0.549	0.558	0.54	0.782	0.526	0.54	0.533
Observations:	46	46	46	15	47	46	46

Source: Authors' calculations based on data from BIS (2002), IMF (2003), International Financial Statistics, World Bank (2002), World Development Indicators, Cashin et al (2001) and Levy-Yeyati et al (2003).