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INTERNATIONAL CAPITAL FLOWS, FINANCIAL REFORM AND CONSEQUENCES OF CHANGING RISK PERCEPTIONS IN APEC ECONOMIES

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International Capital Flows, Financial Reform & Consequences of Changing Risk Perceptions in APEC Economies

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ABSTRACT

This paper draws on the empirical results from a number of papers that a multi-country modeling framework to explore the global impacts of financial liberalization in Asia and the impacts of a change in risk premia in Asian economies. It is shown that financial liberalization brings with it large potential gains in the medium term but causes fluctuations in key variables such current accounts and real exchange rates. It is also shown that relative small changes in financial risk can have large real consequences - consistent with the experience of countries during the Asian economic crisis. Structural weakness, excessive un-hedged exposure to foreign debt, a fixed exchange rate regime or a poorly functioning financial system is likely to accentuate the impacts of changes in risk. Open trade in goods and services as well as open capital markets act as a stabilizer for the impacted economies as well as economies outside Asia if the shock is actually a general loss of confidence in an economy.

The policy dilemma is how countries can benefit from the potential gains from financial market liberalization without exposing an economy to the costs of fluctuations in risk perceptions which this paper demonstrates can have large consequences. Rather than building barriers to international capital flows, this paper argues that risk minimization and risk management is likely to be a better approach because although capital controls may help with some shocks, these controls remove an important stabilizing channel for other shocks in the short term. Capital controls also limit access to global capital markets for countries imposing them, which is costly in the medium term. Better risk management should both reduce the likelihood of changes in risk as well as enable lower cost adjustment in the event of certain shocks.

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1. Introduction

The crisis that engulfed the Asian economies from July 1997 has settled a number of debates on the role of government in economic development in Asia[1] but has opened other debates such as on the benefits of financial market liberalization and controlling international capital flows. Although there is much debate, there is little empirical evidence brought to bear on these issues. This paper attempts to give some quantitative magnitude on the impact of financial market liberalization and changing risk perceptions on the global economy. In particular it focuses on financial market liberalization in Asia and a change in risk perceptions in Asia of a similar magnitude to that experienced during the Asia crisis beginning in 1997. This paper draws from and summarizes the results from two previous papers (McKibbin (1997) on financial market liberalization and McKibbin (1998a,1998b) on changing risk). The paper also draws out some policy implications for the current debate on financial market liberalization and changing risk perceptions.

In order to capture the many issues in a general equilibrium frameowrk, this paper uses the G-Cubed (Asia-Pacific) model. This model is outlined in section 2. It is derived from the G-Cubed model developed by McKibbin and Wilcoxen (1998) but with a specific focus on the Asian economies. As with the G-Cubed model, this model captures simultaneously the macroeconomic and sectoral linkages in a global model with partially forward looking asset market and spending decisions in which expectations of risk are integral to the functioning of domestic economies and the global economy. The G-Cubed (Asia Pacific) model has country/regional ids-aggregation of: Korea, Japan, Thailand, Indonesia, China, Malaysia, Singapore, Taiwan, Hong Kong, Philippines, Australia, New Zealand, United States, India, Rest of the OECD, Oil exporting developing

countries, Eastern Europe and Former Soviet Union and all other developing countries. Each country/region has an explicit internal macroeconomic and sectoral structure with sectoral disaggregation in production and trade into 6 sectors.

This is a model in the class of dynamic intertemporal general equilibrium models[2] that incorporate both financial and real economic activity in a global framework. This new class of models designed specifically for the highly integrated world economy of the late 20th century, integrates the desirable features on both macroeconometric models and computable general equilibrium models. This new type of model has proven useful in understanding other recent global shocks such as US fiscal policy in the 1980s, the consequences of NAFTA, German Unification[3] and the recent crisis in Asia[4]. A key feature of this model is the role of international capital mobility in economic adjustment and the role of financial markets in real economic activity when there are adjustment costs and unemployment in labor markets as well as liquidity constrained households and firms but forward looking asset markets[5].

Although the role of financial markets during trade liberalization is beginning to be analyzed, few studies to date have focused directly on the global impact of financial market liberalization. Section 3 draws on results presented in McKibbin (1997) that attempts to quantify the consequences of APEC financial market reforms on the global economy. Although it does provide empirical results, the goal of the original study was not intended to focus on the empirical

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1 See for example Garnaut (1998)
2 Referred to as DIGEM models
3 See Gagnon et al (1997) and McKibbin and Sachs (1991).
4 See McKibbin and Martin (1998)
5 The classic paper by Dornbusch(1976) illustrated that with rapidly adjusting asset markets and sticky goods markets considerable overshooting of asset prices can occur. This intuition is generalized in the G-Cubed model.

estimates but rather to draw out some lessons for policy makers about the nature of the adjustment to financial market reforms in an increasingly integrated global economy. A key focus was the adjustment of international capital markets and the fluctuations in asset prices and trade flows that resulted.

There are two steps in this part of the analysis. The first is to use the model to calculate the extent of restrictions in financial markets in a number of countries. This is done in a similar way that tariff equivalence is calculated by comparing the prices of similar goods across countries, except in this case it is based on differentials in rates of return on similar assets across countries. The technique uses a full intertemporal solution of the model, adjusting behavioral equations in the model for Awedges@ between actual and model generated rates of return, such that the model exactly replicates a base period (1996) database. This exercise is meant to be indicative of the scale of effects and indeed, because it is in a sense a residual calculation, such an adjustment captures far more than purely financial restrictions. Once these wedges are calculated, the model is then simulated removing part of these restrictions in order to explore the dynamic process from financial liberalization.

Section 4 uses the same model to examine the impact of changes in risk perceptions in Asia. This section draws on a number of papers (McKibbin (1998,1999) and McKibbin and Martin (1998)). The scenario examined is a sharp but temporary rise in the risk premium on assets denominated in the currencies of Thailand, Malaysia, Indonesia and Korea (smaller risk premiums are used for other economies in the region as indicated in section 4 below). The risk premium

jumps in the first year and then declines over a period of three years[6]. The shock is benchmarked to yield approximately the same fall in the nominal exchange rate that we observed in each economy by the beginning of 1998. The goal is not to exactly replicate the Asia crisis, since McKibbin and Martin (1998) show that a number of cumulative shocks are required to do that. What it does is to draw crucial lessons and improve our understanding of the implications of a change in risk taking account of general equilibrium linkages in the world economy.

It is clear from the results that a revision of risk alone can cause large declines in real economic activity which have serious implications for the next few years of economic performance in Asia. As shown in McKibbin (1998a) the more permanent the risk revision the more severe the consequences. The key reason that the financial shock has such large real implications is because of the role of adjustment costs in physical capital formation. In the G-Cubed model arbitrage between financial assets and physical capital takes into account that physical capital is sector and country specific for significant periods of time whereas financial capital can move extremely quickly across sectors and economies[7]. The impact of a rise in risk on the rest of the world is quite different to that portrayed by most commentators on the Asia crisis in 1997 and 1998. The modeling shows that the collapse in domestic demand in Asia reduces exports of non Asian economies, but it also reduced global real interest rates which stimulates domestic economic activity especially in interest sensitive sectors in non Asian economies. This stimulus to domestic demand can more than offset the negative impacts of a decline in exports depending on the

6 This is compared with a permanent shift in risk perception in McKibbin (1998a) and using actual data on risk premia from Euro markets in McKibbin and Martin (1998).

7 See McKibbin and Wilcoxen (1997) for detailed analaysis of the role of adjustment costs in physical capital formation

relative reliance of each economy on domestic demand versus trade with Asia. Indeed the relocation of financial capital would be expected to stimulate an investment boom in non traded production in places like the US and Europe while export sectors in these economies are suffering from the crisis. The differential impacts within each economy is both sustainable and desirable but will be associated with significant shifts in the current account balances of major economies. Those countries receiving capital from Asia would be expected to experience a deterioration in their current accounts reflecting the capital inflow. Preventing this adjustment would be costly both for the Asian economies that need the temporary export surge to dampen the negative economic shock as well as for the OECD economies that need the additional investment to expand the productive capacity of their economies in the face of stronger domestic demand.

2. The G-Cubed (Asia Pacific) model

The G-Cubed (Asia Pacific) multi-country model is based on the G-Cubed model developed in McKibbin and Wilcoxen (1998). It combines the intertemporal macroeconomic approach taken in the MSG2 model of McKibbin and Sachs (1991) with the disaggregated, econometrically-estimated, intertemporal general equilibrium model of the U.S. economy by Jorgenson and Wilcoxen (1989).

The G-Cubed model was constructed to contribute to the current policy debate on global warming, trade policy and international capital flows, but it has many features that make it useful for answering a range of issues in environmental regulation, microeconomic, macroeconomic and

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and the implications of this for macroeconomic volatility.

trade policy questions. It is a world model with substantial regional disaggregation and sectoral detail. In addition, countries and regions are linked both temporally and intertemporally through trade and financial markets. The explicit treatment of financial flows has been shown to be important for analyzing the response to trade liberalization (see McKibbin(1997)) but it is absolutely crucial for analyzing the consequences of financial shocks such as the re-evaluation of risk. G-Cubed contains a strong foundation for analysis of both short run macroeconomic policy analysis as well as long run growth consideration of alternative macroeconomic policies.

Intertemporal budget constraints on households, governments and nations (the latter through accumulations of foreign debt) are imposed. To accommodate these constraints, forward looking behavior is incorporated in consumption and investment decisions. Unlike the MSG2 model, the G-Cubed model also contains substantial sectoral detail. This permits analysis of environmental and trade policies which tend to have their largest effects on small segments of the economy. By integrating sectoral detail with the macroeconomic features of the MSG2 model, G-Cubed can be used to consider the long run costs of alternative environmental regulations and trade policy changes yet at the same time consider the macroeconomic implications of these policies over time. The response of monetary and fiscal authorities in different countries can have important effects in the short to medium run which, given the long lags in physical capital and other asset accumulation, can be a substantial period of time. Overall, the model is designed to provide a bridge between computable general equilibrium models and macroeconomic models by integrating the more desirable features of both approaches. The G-Cubed (Asia Pacific) model differs from the G-Cubed model because of the focus on the Asia-Pacific region as well as having

6 sectors compared to 12 for G-CUBED. The theoretical structure is essentially the same.

The key features of the G-Cubed (Asia Pacific) model are summarized in Table 1. The country and sectoral breakdown of the model are summarized in Table 2. The model consists of eighteen economic regions (the new version (29) used in this paper also includes India and New Zealand) with six sectors in each region (there are also two additional sectors in each region that produce the capital good for firms and the household capital good). The regions in the model can be divided into two groups: 15 core countries/regions and three others. For the core regions, the internal macroeconomic structure as well as the external trade and financial linkages are completely specified in the model.

Each core economy or region in the model consists of several economic agents: households, the government, the financial sector and the 6 production sectors listed in table 2. Each of these economic actors interact in a variety of markets, both domestic and foreign.

The eighteen regions in the model are linked by flows of goods and assets. Flows of goods are determined by import demands for final consumption as well as for intermediate inputs. Trade imbalances are financed by flows of financial assets between countries. It is assumed (based on calibrating the model to a 1996 base year) that existing wedges between rates of return in different economies are generated by various restrictions that generate a risk premium on country denominated assets. These wedges are calculated using a technique outlined in section 4 below. They are assumed to be exogenous during simulation. Thus in general when the model is simulated, the induced changes in expected rates of return in different countries generate flows of financial capital reacting to return differentials at the margin. In this paper I also explore the

impact of changing these wedges in some countries primarily as a result of risk re-evaluation. These can also be used to explore the consequence of financial liberalization (see McKibbin (1997)).

International capital flows are assumed to be composed of portfolio investment, direct investment and other capital flows. These alternative forms of capital flows are perfectly substitutable ex ante, adjusting to the expected rates of return across economies and across sectors. Within an economy, the expected return to each type of asset (i.e. bonds of all maturities, equity for each sector etc) are arbitraged, taking into account the costs of adjusting physical capital stock and allowing for exogenous risk premia. Because physical capital is costly to adjust, any inflow of financial capital that is invested in physical capital (i.e. direct investment) will also be costly to shift once it is in place. The decision to invest in physical assets is based on expected rates of return. However, if there is an unanticipated shock then ex-post returns could vary significantly. Total net capital flows for each economy in which there are open capital markets are equal to the current account position of that country. The global net flows of private capital are constrained to zero.

Before running counterfactual simulations, we first solve the model from 1996 to 2070 to generate a model baseline based on a range of assumptions. These assumptions include assumptions about population growth by country (based on World Bank projections) and sectoral productivity growth by country by sector as well as assumptions about tariff rates, tax rates, and a range of other fiscal and monetary policy settings. Monetary policy is assumed to be targeting a stock of nominal money balances in each economy. Fiscal policy is defined as a set of fixed tax

rates (apart from a lump sum tax on households that varies to satisfy the intertemporal budget constraint facing the government) and government spending constant relative to simulated GDP. With higher output, tax revenues rise implying a move towards fiscal surplus in each economy. The issue of projecting the future using a dynamic intertemporal general equilibrium model such as the G-Cubed (Asia-Pacific) model model, is discussed in detail in Bagnoli et al (1996). This initial projection step is important for simulations because it builds in underlying structural change in the global economy that is endogenous to the exogenous assumption about differential productivity growth.

Given all of the exogenous assumptions and initial conditions the full rational expectations solution of the model is found using a numerical technique outlined in Appendix C of McKibbin and Sachs (1991). Note that not all agents are rational but for those that are we need to solve the model for this solution. Without additional intervention, this solution will not replicate the actual outcomes for the first year of simulation (in the current example 1996) because a range of forward looking variables such as human wealth, exchange rates, share markets etc will be conditioned on the future path of the world economy and there is no reason these should be equal to the observed values for the initial year. The next step of baseline generation is then to calculate a vector of constants for all equations in the model, including arbitrage equations, such that the solution of the model in the base year (1996) is exactly equal to the observed data in that year. It is important to stress that in no way are we assuming that 1996 is a steady state solution of the model. It clearly can=t be. What we are imposing is that the 1996 database is on the stable manifold of the model in which all variables are moving on a stable path towards a steady state in the long distant future.

4. Modeling Financial reform in Asia

a. Methodology for Estimating the Extent of Financial Impediments

A key aspect of the baseline generation technique outlined above is the interpretation of the various constant adjustments that are made so as to have the model replicate the baseline year of 1996. To see more precisely what the technique does and how it relates to calculating the size of impediments to capital flows, consider the uncovered interest parity assumption that is used in the model. This is shown in equation (1)

$$r_t^i = r_t^U + {}_t e_{t+1} - e_t + \chi_t \qquad (1)$$

Here the real interest rate (r) in country i in period t is equal to the interest rate in the United States (r^U) in period t, plus the expected rate of depreciation in the bilateral real exchange rate between country i and the United States (${}_t e_{t+1}$-e_t) where e_t is the log of the real exchange rate in period t and ${}_t e_{t+1}$ is the expectation, formed in period t, about the exchange rate to prevail in period t+1. We calculate the term ξ so that equation (1) holds exactly in the data given the model generated expectation of exchange rate changes.

The term ξ measures a range of factors including sovereign risk, impediments to financial flows, the degree of departure from rational expectations in actual data as well as a range of other factors. In the simulations of financial liberalization, it is assume that 50% of this wedge reflect

financial restrictions that can be removed by government intervention.

In practice this calculation can be done using actual data outside the model as long as some measure of the expected change in the exchange rate can be found. The difference in this study is that the model is used to calculate the expected change in the real exchange rate. This is crucial because it is an ex-ante concept that matters and using ex post actual exchange rate changes may bias the estimate.

It is also important to stress that although the focus is on the bond rate differential, recall that within each economy all financial assets (bonds, money, equity etc) are being arbitraged and therefore removing this wedge between bond rates across countries will also affect the relative returns of a range of domestic and foreign assets.

The wedges calculated for a range of countries in the model using this bench-marking procedure are shown in Table 3. This table suggests that in 1996 Australian real interest rates were 84.5 basis points (or .845 percentage points) below US real interest rate after adjusting for the model consistent expected exchange rate change between 1996 and 1997. As can be seen for the countries shown, the wedges tended to be positive suggesting investors required a high rate of return for investing in these economies, or that the return on bonds and therefore capital and other assets were higher in these economies, not because of risk but because of impediments to capital flowing into these economies and therefore preventing the rate of return on a range of assets being driven towards the rate of return on US assets.

b. Simulation Results for Investment Liberalization

In this section the results from the above section are used as a basis for simulating the effect of financial market liberalization. The experiment performed is for developing Asian economies to remove 50% of the wedges calculated above, in equal increments from 1997 to 2000. In 1997 this is fully anticipated by all agents in the global economy. In 1997 12.5% of the wedge in removed, 25% in 1998, 37.5% in 1999 and 50% from 2000 onwards.

The results are presented in figure 1 through 3. Only a subset of results are presented to make the key points. These are results for Indonesia, Thailand and Korea on the one hand (where wedges are reduced) and the United States, Japan and Australia on the other (where no wedges are changed). Results are all expressed as changes relative to the underlying baseline projections. Variables such as GDP, consumption, investment and real exchange rates are expressed as percentage deviation from baseline. The trade balance is percent of GDP deviation from baseline. Real interest rates are percentage point deviation from baseline.

The consequences of the financial liberalization is to initially lead to an arbitrage opportunity for investment funds held in assets outside the liberalizing economies. Financial capital flows into these economies very quickly leading to a large real and nominal exchange rate appreciation. In Thailand for example the real exchange rate (relative to the US) appreciates by close to 18% in 1997. This real exchange rate appreciation crowds out net exports and leads to a large deterioration in the current account and trade balance (reflecting the capital inflow). This capital that flows into the liberalizing economies goes into a range of assets but more importantly into physical capital accumulation over time. The marginal product of capital is above the return of government debt when the liberalization is announced. Because of adjustment costs in capital

accumulation, arbitrage does not remove this differential because the economies can=t absorb a large quantity of physical capital instantly. Over time, investment continues to be above the steady rate of investment. In the steady state, real investment is permanently higher because of the higher desired capital stock resulting form a necessary fall in the marginal product of capital in the steady state (being arbitraged to the US return).

As the capital stock rises, GDP rises because of the expansion of production possibilities in the economy. GDP continues to rise over time as more investment is put in place. In the long run GDP is permanently higher in each liberalizing economy.

An important point to note is that income in these economies does not rise by as much as production (measured by GDP) because the capital that being put in place is partly owned by foreigners and the return to this investment is repatriated over time. This can be seen by the gradual depreciation of the real exchange rate over time as well as the gradual improvement in the trade balance. This change in the trade balance reflects the transfer of real resources through additional net exports for foreigners. Note that consumption rises sharply, reflecting both a rise in expected future income in these economies a well as short run Keynesian style stimulus from the strong economy. Over time, consumption falls as more of the gains in production are repatriated to foreign consumers. Thus the income gains (reflected in GNP - not shown) are smaller for residents in the liberalizing economies than the GDP gains.

In economies not liberalizing, the adjustment is the mirror image of the results for liberalizing economies. Financial capital initially flows out of these economies leading to a depreciation of their real exchange rates (figure 3). Note that in figure 3 the real exchange rate

relative to the US appreciates for Australia and Japan because the US real exchange rate is depreciating and both rates are expressed relative to the United States. But relative to the liberalizing economies, these real exchange rates depreciate. The outflow of financial capital leads to a decline in the desired capital stock in these economies which leads to a fall in investment (2.6% in the United States). The lower capital stock reduced GDP and through a multiplier channel reduced private consumption in the non liberalizing economies for a number of years. Consumption which falls initially gradually rises as incomes rise through the repatriation of the returns to foreign capital investments.

The outflow of capital also leads to an improvement in the trade and current account balances in non liberalizing economies reflecting the capital outflow. The liberalization also permanently raises interest rates in the non liberalizing economies by various amounts around 20 basis points because of the liberalization process. Thus real returns fall in liberalizing economies and rise in non liberalizing economies when the financial distortions are removed.

Thus the process of financial liberalization brings large gains to the economies that liberalize in the short to medium term and gains to the global economy in the longer term but it does cause fluctuations in asset prices and international trade flows that could easily be misunderstood and could lead to inappropriate policy responses. For example fixing an exchange rate during a process of financial liberalization would lead to a loosening of monetary policy and the adjustment through the trade account occuring through rising prices rather than an appreciating exchange rate. This place added pressure on domestic policy. Also the simulations assume that the cpaital flows into high real return activities, yet if severe distortions exist in

liberalizing economy then the capital inflow may be diverted into activities with low economic return and therefore make the process of repatriation of future profits difficult to sustain.

5. A rise in the perceived risk of investing in Asia

This section sets out how the re-evaluation of risk of investing in Asian economies is modeled and presents results from McKibbin (1998b).

a. Modeling a risk shock

To see more precisely what the technique does and how a re-evaluation of risk is modeled, consider again the uncovered real interest parity assumption relating the returns to government debt in each country, that is used in the model. This was shown in equation (1) repeated here for convenience.

$$r_t^i = r_t^U +_t e_{t+1} - e_t + \chi_t \qquad (1)$$

Recall that the term ξ captures a range of issues including sovereign risk, impediments to financial flows, the degree of departure from rational expectations in actual data as well as a range of other factors. Suppose for expositional reasons that some fraction of ξ represents risk.

Equation 1 can also be interpreted differently. Solving for e_t it can be shown that:

$$e_t = \int_t^T (r_s^U - r_s + \chi_s)\, ds + {}_t e_T \qquad (2)$$

The real exchange rate in any period t is the sum of future expected interest rate differentials as well as the expected future risk premium on assets denominated in the home currency plus the equilibrium (period T) value of the real exchange rate.

In the simulations that follow a new path is selected for the expected future risk premium. This is completely arbitrary but illustrative. The values of the risk shock are selected such that the change in the nominal exchange rates generated by the model are approximately equal to the observed changes in nominal exchange rates as of the end of 1997. Whether the risk shock that was actually being priced in exchange rates in late 1997 was permanent or temporary is difficult to determine.

It is also worth stressing that from equation (2) we can choose any path for ξ and get the same exchange rate for the first year of the simulation for given paths of interest rates. However over time the path of the risk premium will have a very different impact on the real exchange rate path.

b. Simulation Results for the shift is risk perceptions

The simulation is a temporary shock to the risk premium as outlined above. The exact shock is set out in table 4. Note that these differ from the temporary shock shown in McKibbin (1998) because in that paper there was both a risk shock and a collapse of the domestic financial

systems in some economies (modeled as a drop in productivity) whereas in the current paper only a risk shock is considered. In order to benchmark the change in the nominal exchange rate to replicate the actual data at the end of 1997, a larger shock to risk is required in the absence of the productivity shock.

There is also a problem with the timing of the shock in an annual model because the actual shock began in mid 1997. In these simulations I assume that the shock occurs at the end of 1997 and therefore 1998 is the first year of the shock. This will cause some problem with lining up model predictions with actual data but again the goal of these simulations is not to be predictive but to give insights into key adjustment processes in an empirical framework.

The results for a temporary increase in risk are contained in figures 4 through 10. All results are expressed as percent deviation from baseline except where noted.

Figure 4 contains results for nominal exchange rates relative to the $US for a number of economies. The rise in risk leads to a large outflow of financial capital. This outflow depreciates the nominal and real exchange rates by between 15% and 60% through 1998. The exchange rates recover over time reflecting the restoration of confidence in each economy. The outflow of capital also leads to a sharp rise in real interest rates in each economy and a general deflation of asset prices. Figure 5 illustrates the change in the stock market value of industries in the non-durable manufacturing sector in each economy. The rise in real interest rates, decline in wealth and sharp reduction in expected future incomes leads to a sharp drop in domestic demand. This is illustrated in figure 6 for consumption and figure 7 for investment. According to the model, consumption falls by 50% in Indonesia through 1998. Investment falls by over 40% during 1998 in Indonesia

and by 60% in Malaysia. This apparently reflects the reliance of Malaysia of imported inputs into production of manufactured products for export which become very experience as the exchange rate falls. This sharp contraction in economic activity reflects the large capital losses experienced by residents of these economies. In particular the fixity of physical capital implies a significant reduction in capital use given the large increase in the cost of capital.

Despite the large contraction in domestic demand, gross domestic product (GDP) is quite surprisingly not so badly hit as shown in figure 8. The economies hit by the shock are able to maintain production in the face of a sharp drop in domestic demand because of the adjustment in exports shown in figure 9. The sharp depreciation in the nominal and real exchange rate increases the demand for products from the Asian economies in non Asian economies. The model distinguishes between nominal and real exchange rates because the overall price level is endogenous. In this simulation there is a sharp jump in inflation in the shocked economies although monetary policy is assumed to return the price level back to its original level. In practice there is likely to be some monetary accommodation (in particular we have seen this in Indonesia) which implies a bigger difference between the change in real and nominal exchanges rates shown in this experiment. The larger the inflationary shock the less the nominal exchange rate change will translate into a real exchange rate change and the less the export surge expected. The sharp export surge shown in Figure 9 is consistent with the change in the balance of payments reflecting a capital outflow. A capital outflow is associated with a current account surplus. This can be achieved either by a rise in exports or a fall in imports (or both). The model projects that this adjustment occurs through a large rise in exports and small fall in imports. In fact the adjustment

occurred in 1998 through a fall in imports rather than a very large rise in exports although there was substantial export adjustment (in real terms not $US terms). This largely reflected the collapse of the domestic and international financing of international trade.

The effects on domestic demand in Asia are large. What are the effects on the rest of the world? In the wake of the crisis many analysts using a back of the envelope calculation which entirely relies on the flow of trade between economies before the crisis got this completely wrong. The fall in domestic demand signals a fall in demand for imports from non Asian economies and therefore a decline in growth from these economies in rough proportion to the decline in Asian domestic demand. The first indication that this may be less than accurate is the already alluded to in the above results where we find that the change in domestic demand does not necessarily translate into the same fall in output given the export response. Thus if a country is exporting goods to Asia not for domestic demand but as inputs into products that are largely exported from Asia, the change in the demand for that countries goods is not likely to reflect the fall in domestic demand in Asia. More important is the fact that such a partial analysis ignores completely the general equilibrium effects of the large shifts in international capital flows that are a crucial part of the Asian crisis. The model in this paper captures these effects.

Figure 10 contains the results for the change in the Australian and US current account balances (expressed as a percent of GDP). The deterioration in the current account balances of both countries reflect the capital that flows into these economies out of Asia. As capital flows into the United States and Australia the real exchange rate of each economy tends to appreciate which reduces exports and increase imports. Indeed the rise in Asian exports is accommodated by this

change in imports in non Asian economies. The Australia dollar strengthens relative to the Asian currencies but depreciates relative to the US dollar. In the short term there is a depreciation of around 1.7% .This is not as large as was actually experienced in the early stages of the crisis. The reason that the Australia dollar depreciates relative to the United States is because Australia is more exposed through trade with Asia than is the United States and therefore the equilibrium real exchange rate for Australia is relatively depreciated compared to the United States. The depreciation is offset however by the capital inflow into Australia which tends to appreciate the Australia dollar.

The importance of this capital inflow is shown next in figure 11. This figure shows both Australian and United States exports and investment. As expected, the fall in demand in Asia is reflected in a fall in exports from both countries of 10% for the United States and 18% for Australia. Investment on the other hand rises by close to 5% in each economy. The fallout from the Asia crisis includes a fall in global long term interest rates. This fall in interest rates stimulates domestic economic activity outside of the export industries in these economies. Thus whether GDP will rise or fall in the United States and Australia depends on whether the negative demand shock from lower exports is more or less important than the positive demand shock from higher investment spending resulting from lower long term real interest rates.

In this example, the rise in risk causes large shifts in international capital flows. These are actually part of the natural stabilization process in that for directly affected economies, the real exchange rate depreciation stimulates net exports and offsets the substantial decline in domestic demand. Outside Asia, the capital flows lower real interest rates and stimulate domestic demand

which acts to offset the negative effects of a collapse in exports to Asia. Without international capital flows the collapse in confidence in the affected economies would cause an economic collapse without the stimulus through real exports responding to the exchange rate change. A crucial question is what caused the increase in risk and why in practice in the short run, exports didn't respond as quickly as the model predicts in order to help stabilize the economies. If the risk shock was entirely generated by foreign investors, then the existence of foreign capital in the economy may be argued to be a net negative. However there is evidence that the domestic stock markets in Korea and Thailand were declining well before July 1997 and indeed there were numerous mini-crises in Thailand leading up to the devaluation of July 1997.

A final point is that a loss of confidence is but one of many shocks that might impact on an economy. In may cases open capital markets enable the benefits of other policies to be increased. For example in McKibbin (1997) it is shown that capital inflows enable the benefits of phased in trade liberalization to be bought forward through borrowing in global capital markets. Thus it is not just risk revisions that should be considered in deciding on the costs and benefits of capital controls.

5. Conclusion

This paper has presented results from a global model on both the impacts of financial liberalization and changes in risk in Asian economies. The results suggest that financial liberalization significantly raises the incomes of liberalizing economies by reducing the cost of capital. It also enables borrowing of expected future income increases in global capital markets so

as to raise current consumption in these economies without sacrificing current investment (or equivalently to raise investment without sacrificing consumption). However, the implications of this are large swings in the current account balance and asset prices. This can be a problem for a number of reasons. Policymakers may respond inappropriately to these developments because they don't understand the adjustment process in a high capital mobility world. There may be severe distortions in the liberalizing economies which channel the capital inflows into low productivity activities. There may be weak institutional structures such as the domestic banking system which is unable to appropriately channel these resources into productive activities. Crucially there may be no mechanism for managing risks in these economies. For example if a government commits to a fixed exchange rate then borrowers in foreign currencies will not need to insure against exchange rate changes because the government has promised to bear the risk on this. Similarly if governments get involved in investment projects effectively guaranteeing returns then the government bears the commercial risk. With no effective risk management and the government holding the role as risk bearer of last resort, a shift in risk perception is not only more likely to happen as economic conditions change but when there is a sharp change in risk perceptions the outcome is likely to be more devastating.

One implication of the approach taken in this paper is that the re-evaluation of risk and subsequent capital outflows lead to severe economic disruption. Is the conclusion that countries should act to slow movement of international financial capital? The framework for thinking about exchange rate determination used in this paper suggest this could be a very expensive strategy to follow. To model restrictions on capital flows or a "Tobin tax" on capital transactions in the

model used here is exactly the same as a rise in ξ (increasing the risk premium on investment in a country). In a forward looking view of exchange rate determination where the expected rate of return on alternative activities is the determinant of the exchange rate, a Tobin tax or any capital flow impediments (or an expected capital flow impediment) has exactly the same implications as the experiments that form the basis of this paper. A large real exchange rate depreciation could be expected as markets adjust for the changes in expected rates of return differentials allowing for the impediment. In the short run this could cause further crisis and in the medium run it is likely to raise the cost of capital and inhibit growth and income smoothing. A higher cost of capital should be expected because many countries with high growth prospects require more capital than they can generate locally. Thus the return on capital inside the country will be higher than the world average and additional income from exploiting these returns will be lost. Consumption will be lower both because of an inability to borrow against future income and because future income paths will be lower.

The alternative which is more likely to succeed is to allow reasonable mobility of financial capital but to improve the way in which domestic financial systems allocate capital within the economy. This includes improving systems of accountability, transparency in accounting systems, and monitoring of financial systems so a better evaluation of risk can be formulated. Shifts in risk perceptions are unavoidable in an uncertain world but minimizing the size of these shifts as well as managing them better when they happen is crucial. For every country that experienced an economic crisis after the exchange rate crisis, there are other countries, such as Taiwan and Australia, that were able to survive the turbulence because of relatively recent improvements in

their domestic financial systems. These reforms improved risk management within the economies and made clearer the implications of economic fluctuations on the balance sheets of firms. In particular, the crisis in Asia has illustrated an important lesson that government acting as insurer (either ex-ante or ex-post), for a wide range of economic activities, (especially exchange rate risk) is a hazardous exercise.

The other key, and more pressing policy issue that emerges from the results in this paper, relate to the extent to which the output effects within the Asian economies of the collapse in domestic demand are able to be buffered by a rise in exports to the rest of the world. This offset generated by the adjustment of global capital occurs in the model because it is possible to get the exports out of these economies and into other economies. In fact during the crisis there were severe problems particularly in Indonesia with both the lack of domestic credit inhibiting exports and the problem of non acceptance of letter of credit issued by Indonesian importers. This has now improved and there are signs of economic recovery in most affected economies however earlier action through a international agency providing some form of export finance is likely to be important for future crises. The fact that Australia was able to relocate exports from Asia to Europe and the United States suggests that there is considerable responsiveness of exports to change in relative prices.

Another important issue is whether non Asian economies would allow the rise in cheap exports from Asia into their economies. It was shown above that the current account implications of the capital flows are relatively large, with the US current account projected to deteriorate by about 1 percent of GDP over 1998 and the Australian current account projected to deteriorate by

over 2% of GDP during 1998. Similar magnitudes would be expected for other non Asian economies. Attempts to prevent this adjustment would be counterproductive to the Asian economies since the export adjustment is crucial for buffering the collapse in domestic demand. Preventing the large trade flow adjustment would be counterproductive for the non Asian economies, because the reason why the spillover effects from the Asian crisis are small in the model results, is precisely because the capital inflow (which is the current account deficit) reduced long term real interest rates in these economies and sustains continued strong economic activity. Preventing the current account deterioration would worsen the export loss by worsening the economic outcome in Asia as well as reduce the domestic investment stimulus in economies outside Asia.

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Table 1: Summary of Key Features of the G-Cubed (Asia Pacific Model)

- Specification of the demand and supply sides of economies;
- Integration of real and financial markets of these economies with explicit arbitrage linkage real and financial rates of return;
- Intertemporal accounting of stocks and flows of real resources and financial assets;
- Imposition of intertemporal budget constraints so that agents and countries cannot forever borrow or lend without undertaking the required resource transfers necessary to service outstanding liabilities;
- Short run behavior is a weighted average of neoclassical optimizing behavior based on expected future income streams and Keynesian current income;
- The real side of the model is dis-aggregated to allow for production of multiple goods and services within economies;
- International trade in goods, services and financial assets;
- Full short run and long run macroeconomic closure with macro dynamics at an annual frequency around a long run Solow/Swan/Ramsey neoclassical growth model.
- The model is solved for a full rational expectations equilibrium at an annual frequency from 1996 to 2070.

Table 2: Overview of the AP-G-CUBED Model

Regions:	***Sectors***:
United States	Energy
Japan	Mining
Australia	Agriculture
New Zealand	Non Durable Manufacturing
Rest of the OECD	Durable Manufacturing
India	Services
Korea	
Thailand	
Indonesia	
China	
Malaysia	
Singapore	
Taiwan	
Hong Kong	
Philippines	
Oil Exporting Developing Countries	
Eastern Europe and the former Soviet Union	
Other Developing Countries	

Agents	***Markets***:
Households	Final Goods
Firms	Services
Governments	Factors of production
	Money
	Bonds
	Equities
	Foreign Exchange

Table 3: Estimated Rate of Return Wedges Between Country and the United States in 1996

Australia	-0.845
Indonesia	4.169
Malaysia	4.682
Philippines	4.375
Singapore	5.900
Thailand	4.375
China	4.151
India	3.028
Taiwan	3.516
Korea	3.148
Hong Kong	3.914

Source: G-Cubed (Asia Pacific) Model simulations

Table 4: Time Profiles for the shock

Country	Variable	1998	1999	2000	2001
Indonesia	Risk	40	30	10	0 forever
Malaysia	Risk	40	30	10	0 forever
Thailand	Risk	35	20	10	0 forever
Korea	Risk	35	25	15	0 forever
Japan	Risk	6	4	2	0 forever
Philippines	Risk	30	20	10	0 forever
Singapore	Risk	16	8	0	0 forever

All units are percentage change relative to base.

Figure 1: Real Effects on Financially Liberalizing Economies of Financial Liberalization

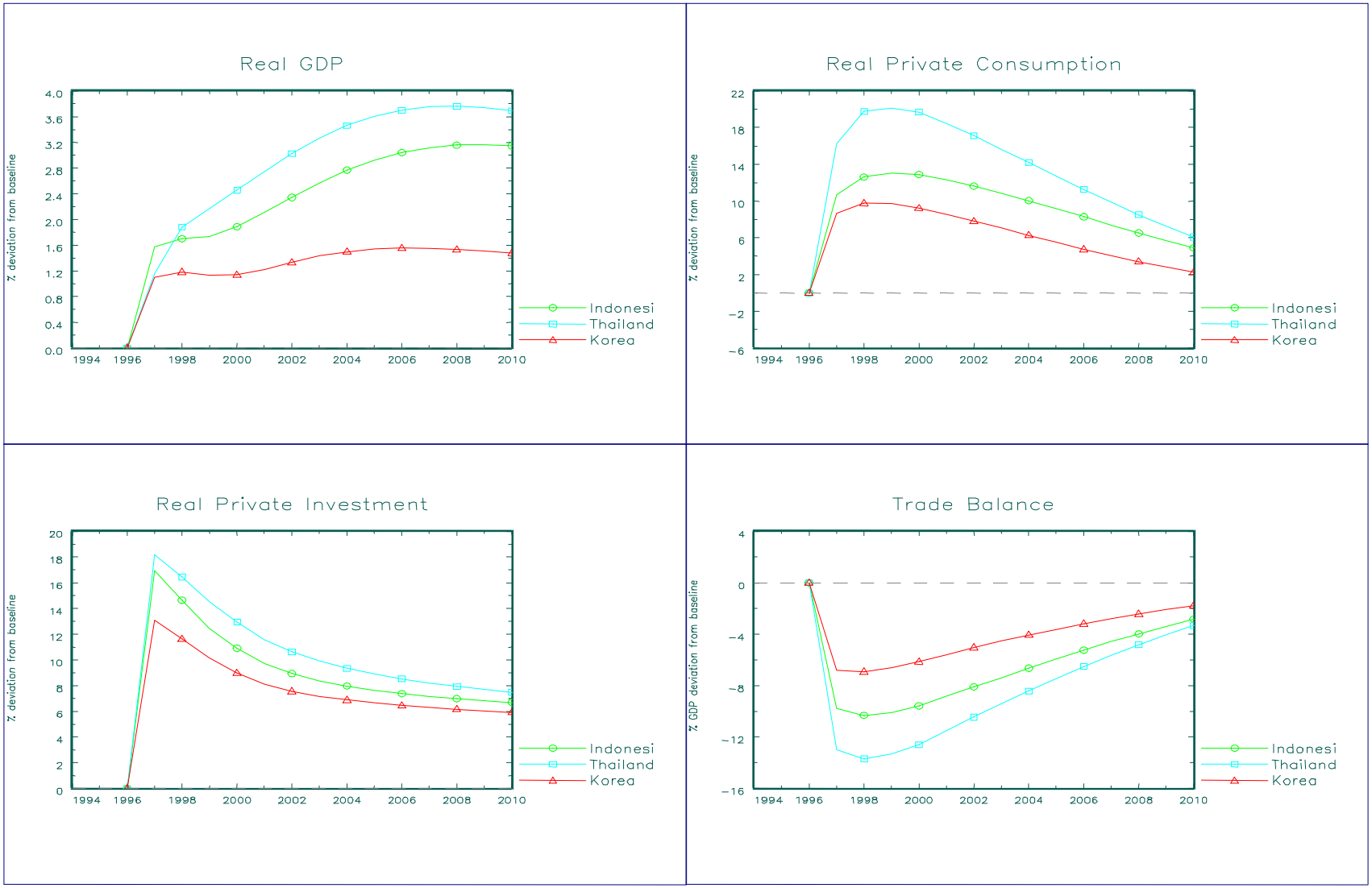

Figure 2: Real Effects on non-Liberalizing Economies of Financial Liberalization

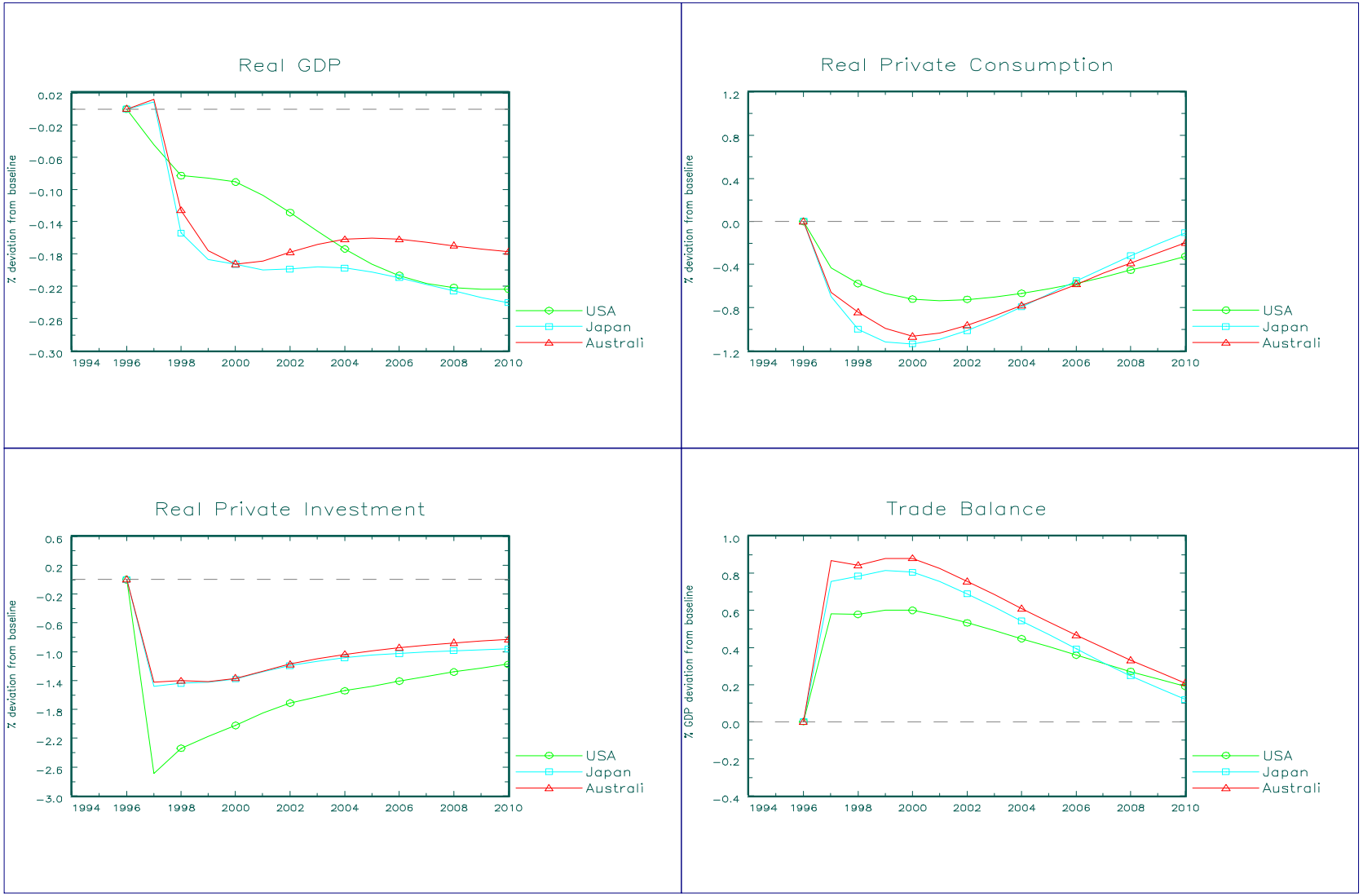

Figure 3: Financial Effects of Financial Liberalization

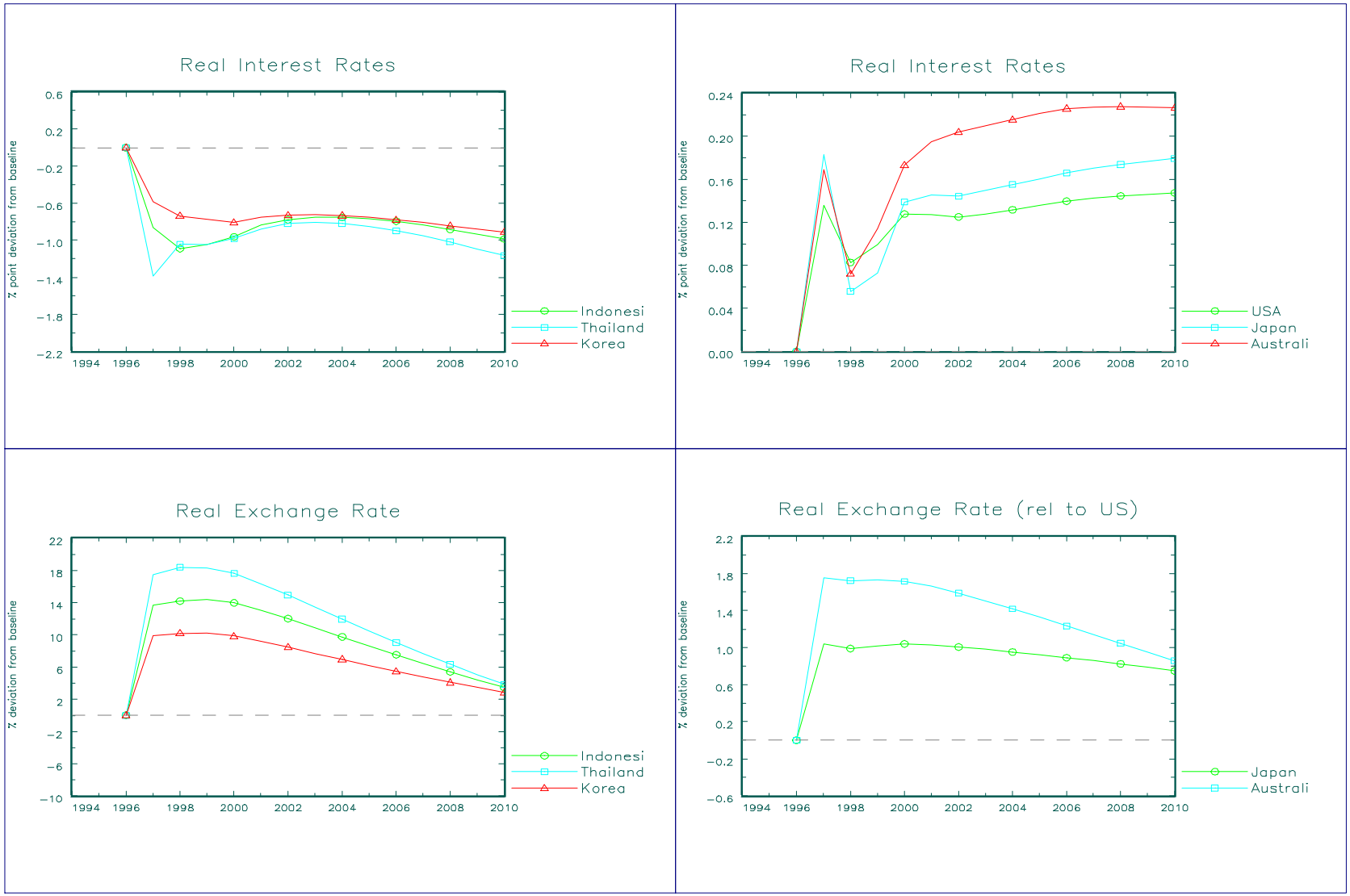

Figure 4: Change in Nominal Exchange Rates per $USD due to Temporary Loss in confidence

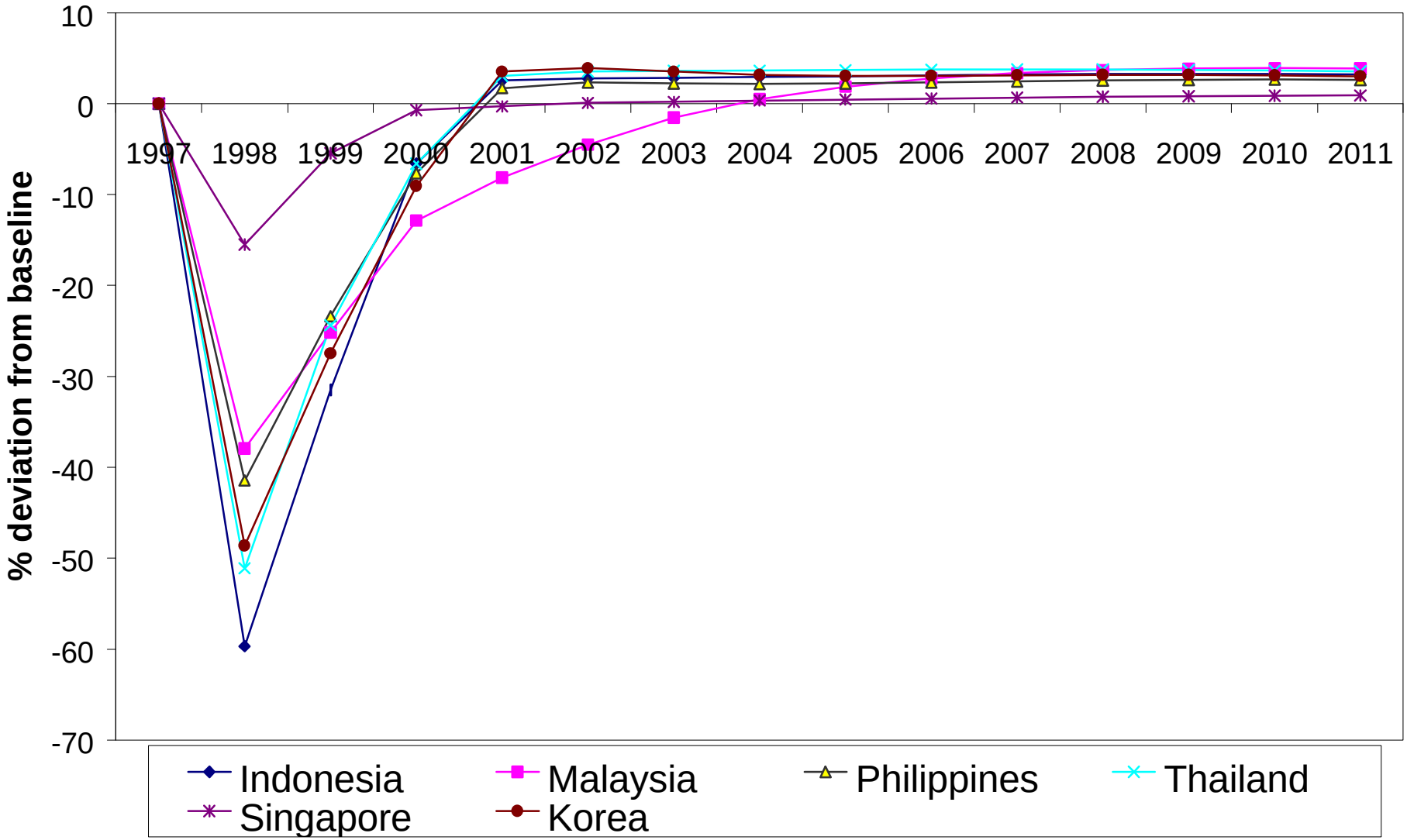

Figure 5: Change in Stock Market Value of Manufacturing due to Temporary Loss in Confidence

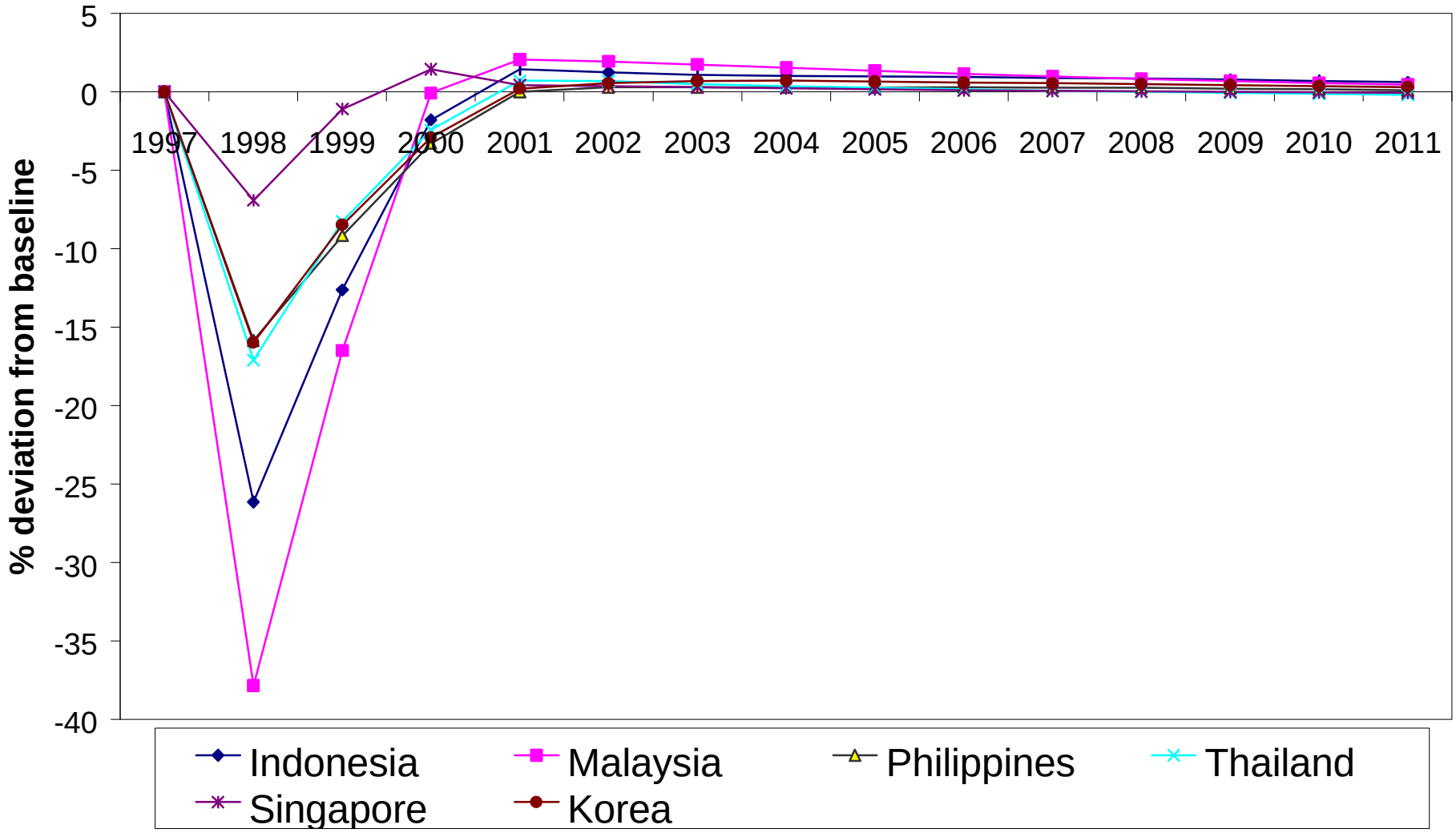

Figure 6: Change in Private Consumption due to Temporary Loss in Confidence

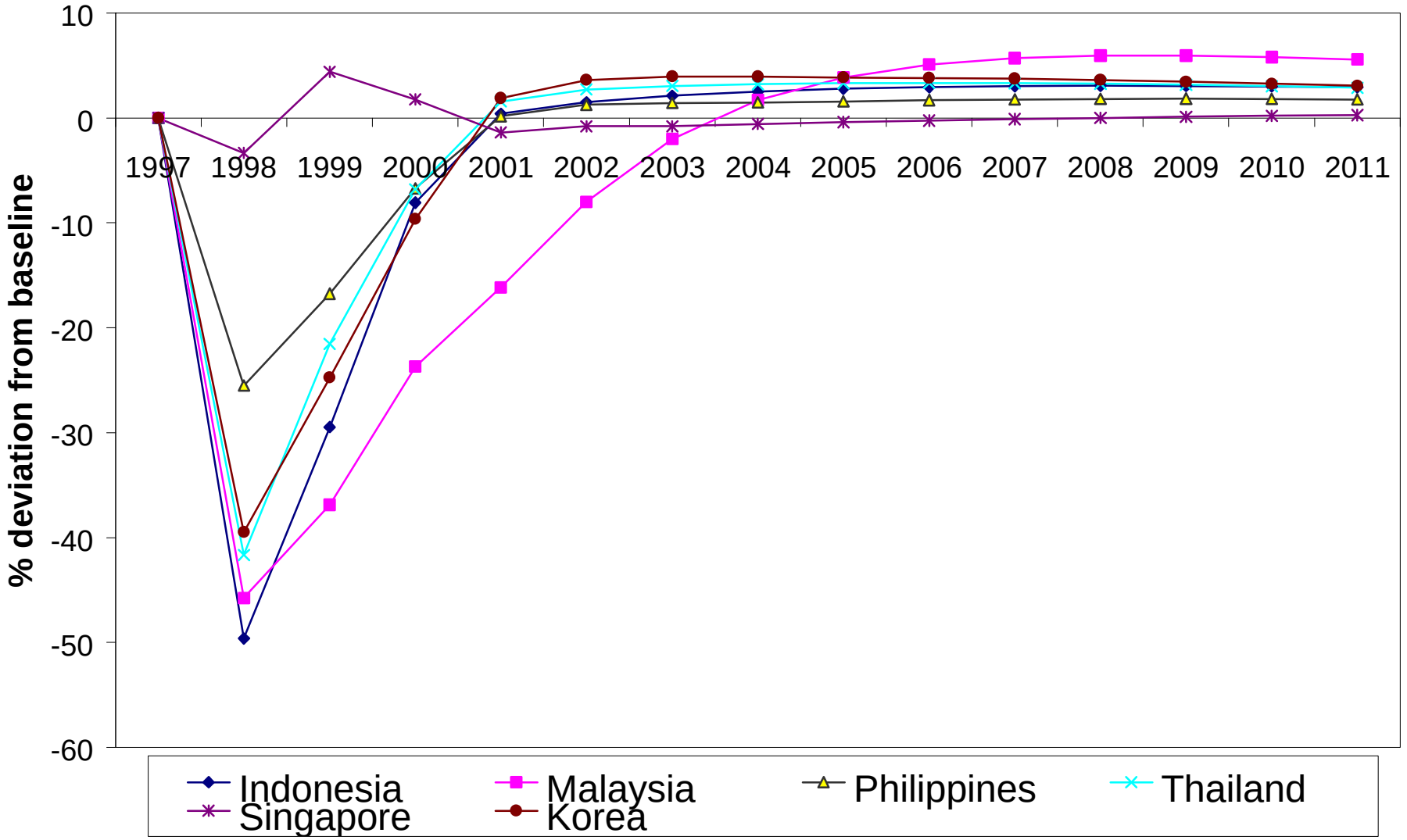

Figure 7: Change in Private Investment due to Temporary Loss in confidence

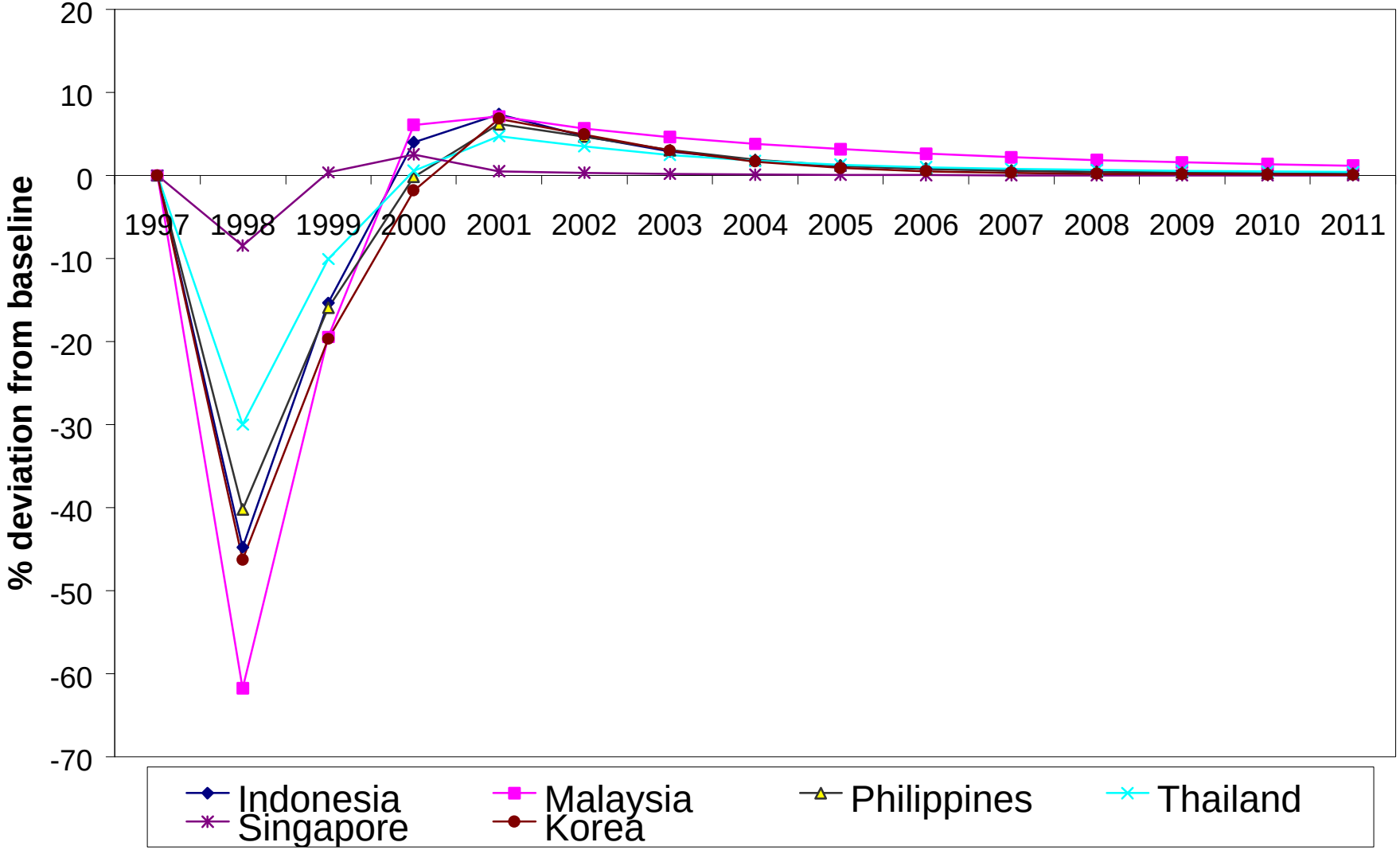

Figure 8 Change in Real GDP due to Temporary Loss in Confidence

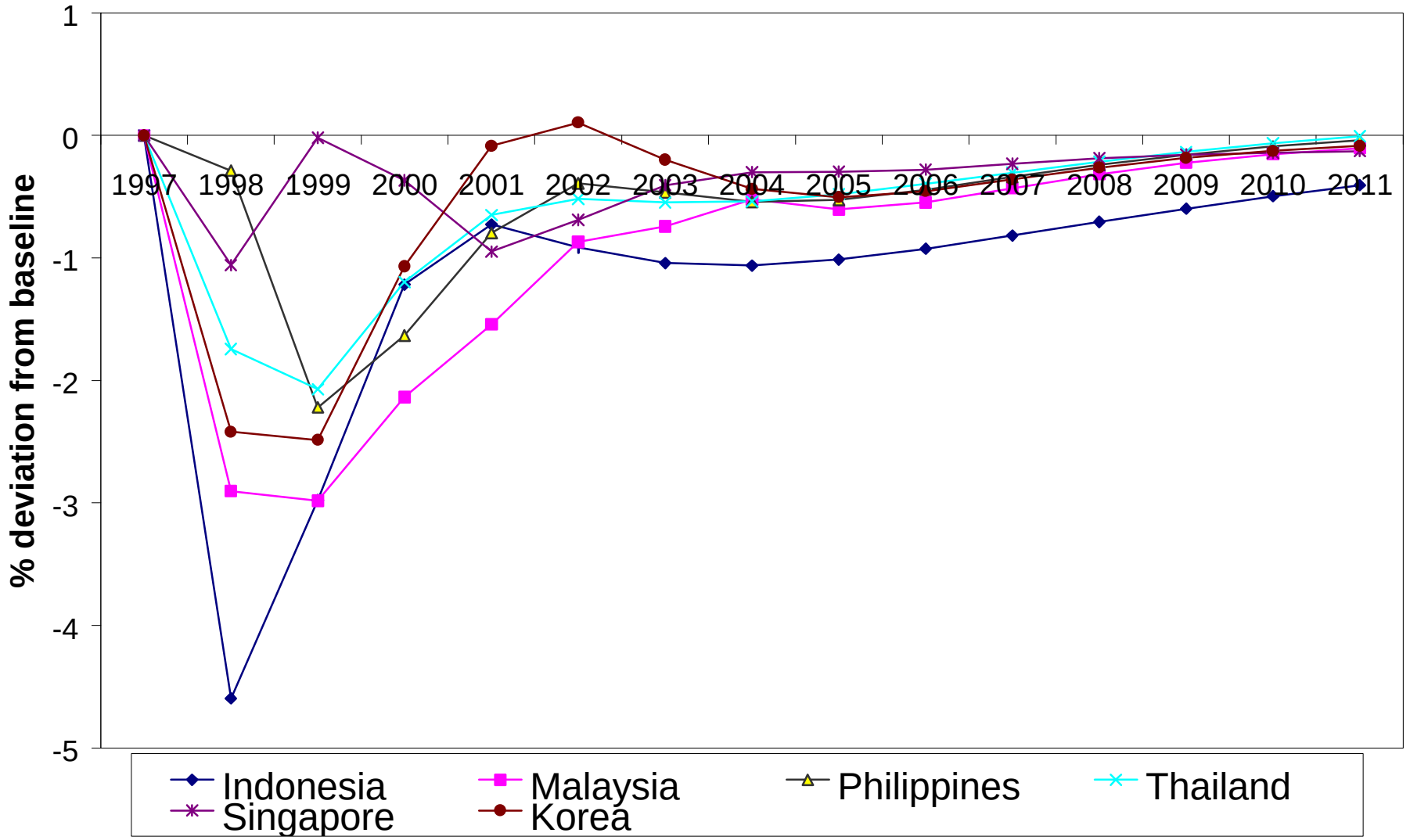

Figure 9: Change in Real Exports due to Temporary Loss in confidence

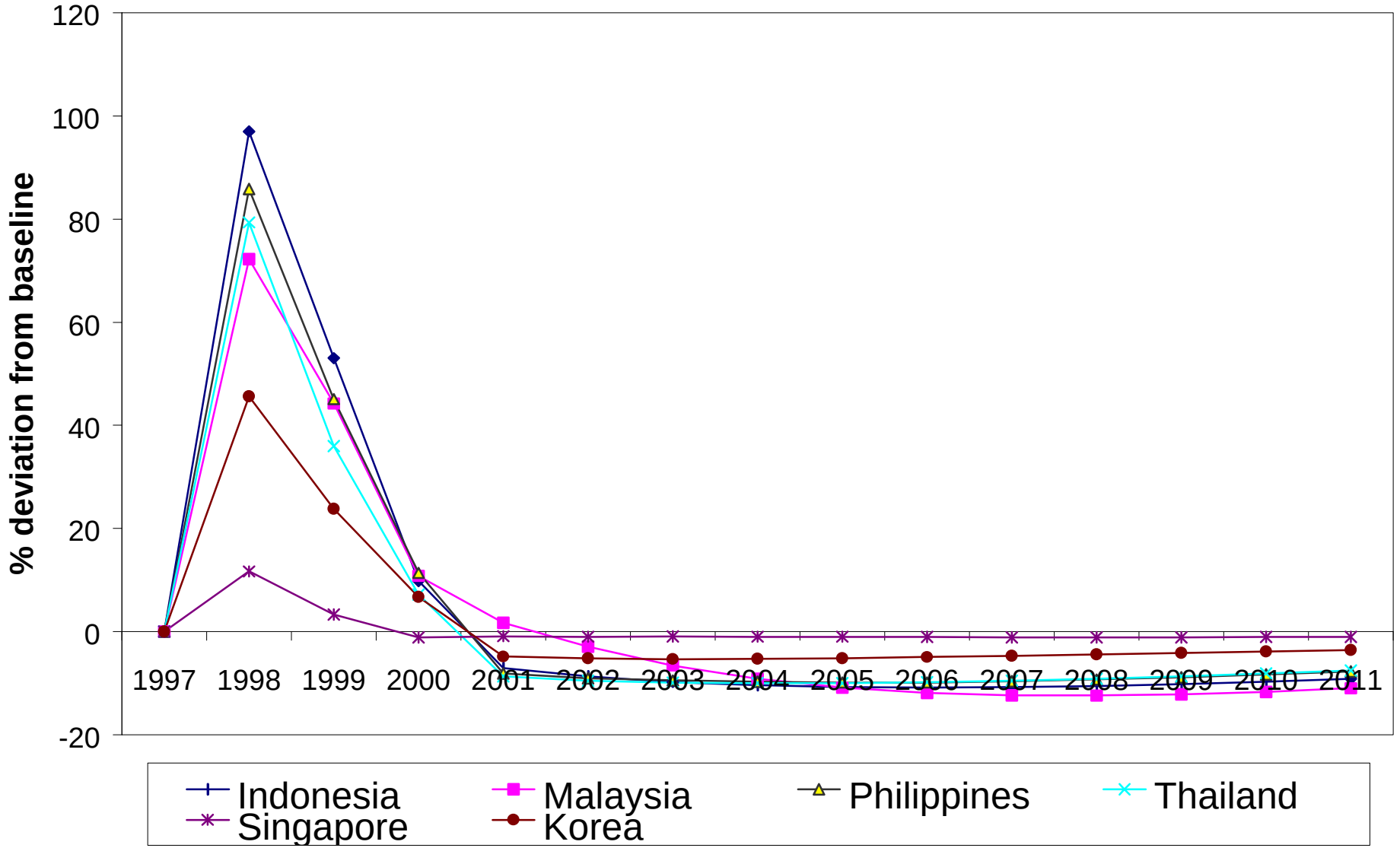

Figure 10: Change in Australian and US Current Accounts due to Temporary Loss in confidence

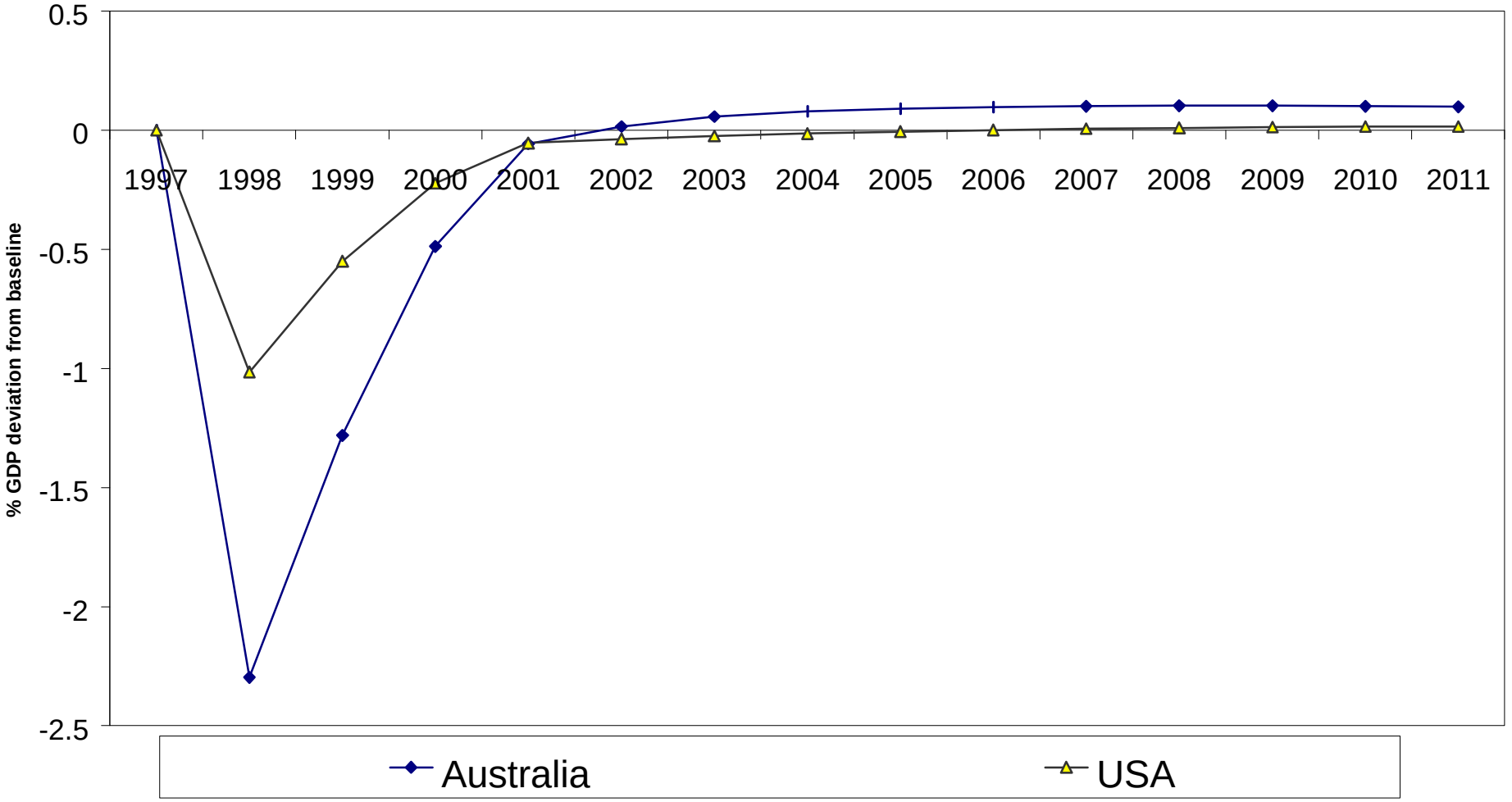

Figure 11: Change in US and Australian Exports and Investment due to Temporary Loss in confidence