Risk Re-evaluation, Capital Flows and the Crisis in Asia

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ABSTRACT

A key aspect of the financial and economic crisis that has shaken Asian economies is the rapid movement of international capital flows out of the region. Understanding this adjustment is crucial to understanding the likely adjustment path in these economies over coming years. There are competing explanations for the cause of the crisis however most commentators would agree that a major shock that impacted on the countries has been a dramatic increase in the perceived risks of investing in these economies. This paper explores the impact of a re-evaluation of the risk in the Asian economies using a global simulation model that captures both the flow of goods as well as international capital flows between countries. A rise in risk that is reversed over three years is shown to have significant real effects although these dissipate quickly. The role of this paper is not to track the Asian crisis. This is done in a companion paper. The aim of this paper is to draw out the impacts of a change in risk on the Asian economies.

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1. Introduction

The financial and economic crisis in Asia that erupted in July 1997 has sparked a vigorous debate on the causes of the crisis and the role of domestic and international policy responses in the evolution of the crisis. An excellent overview of this debate and analysis of the economies can be found in Corsetti et al (1998). Some authors have argued that the shock was purely the result of a shift in investor confidence (Sachs and Radelet (1998)) while others argue a build up of pressure from country specific problems and emerging macroeconomic problems eventually led to the crisis (Corsetti et al (1998), Krugman (1998)). All that was needed was a trigger. In McKibbin (1998) I have presented an overview of the crisis arguing that a build up of macroeconomic problems was finally triggered by a rise in US interested rates and falls in US equity markets in March and August 1997.

The goal of this paper is to focus on one important (and perhaps the most important) aspect of the crisis in Asia. That is, the impact on the Asian economies of a jump in the perceived risk of investing in these economies. Whether this caused the crisis or was a response to the crisis, it is worth examining the impact of such a risk re-evaluation in some detail. The Bank for International Settlements (1998) estimates that the jump is risk premium for 10 year Eurobonds in the Asian Economics is significant.

In order to understand the full extent of the adjustment process to a change in risk, a general equilibrium framework is essential because there are many complicated processes at work. Indeed many analysts have examined the impact of the Asia crisis on non Asian economies by looking at the extent of international trade and mapping the projected fall in domestic demand in the Asian economies to a fall in exports from the industrial economies. The fall in exports then equates to a fall in GDP. However the results below show that not only is this misleading but it can in fact give the wrong outcome. A crucial missing ingredient is that the capital outflow from Asia did not evaporate but was reallocated to other non Asian economies. Ignoring this fact misses a key part of the global adjustment story. In order to bring this as well as other general equilibrium factors into the analysis, 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 (1992, 1995) 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[1] 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 understanding other recent global shocks such as US fiscal policy in the 1980s, the consequences of NAFTA and German

Unification2. A key feature of these models is the role of international capital mobility in economic adjustment and the role of financial markets in real economic activity.

Section 3 presents a framework for thinking about how to implement changes in risk perceptions into a model such as the G-Cubed model. The scenario 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. The shock is benchmarked to yield the same fall in the nominal exchange rate that we observed in each economy by the beginning of 1998. The goal of this paper is not to predict what will happen in Asia as result of the overall crisis but to draw crucial lessons on the impact of changes in risk in general equilibrium.

Results are presented in section 4. It is clear that a revision of risk can cause significant declines in real economic activity although much of the costs are buffered by a change in the real exchange rate. Once the risk perceptions are reversed the shock dissipates although there are persistent consequences. The key reason that the financial shock has 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 economies3. The impact on the rest of the world is quite different to

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1 Referred to as DIGEM models
2 See Gagnon et al (1997) and McKibbin (1994).
3 See McKibbin and Wilcoxen (1997) for detailed analaysis of the role of adjustment costs in physical capital formation and the implications of this for macroeconomic volatility.

that portrayed by most, if not all commentators. The modeling shows that the collapse in economic activity 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 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. A General Equilibrium Multi-Country Framework: The G-Cubed (Asia Pacific) model

In order to put the Asia crisis into a global perspective a multi-country general equilibrium model is required. The G-Cubed (Asia Pacific) multi-country model is based on the G-Cubed model developed in McKibbin and Wilcoxen (1992, 1995). 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 (1990).

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 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(1996)) 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 country and sectoral breakdown of the model are summarized in Table 1. 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.

3. Modeling a shift in risk perceptions

This section sets out how the re-evaluation of risk of investing in Asian economies is modeled. Before presenting how this is done it is useful to set out how the baseline of the model is generated without the shocks to risk. The model is first solved 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 (based on a technology catch-up model) 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. The issue of projecting the future using a dynamic intertemporal general equilibrium model such as the G-Cubed 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 which 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). Without additional intervention, this initial model solution will not generate 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, stock 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 cannot 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.

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

$$r_t^i = r_t^U + {}_t e_{t+1} - e_t + \xi_t \tag{1}$$

Here the real interest rate (r) on 1 year government bonds 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. In addition we assume that there is a risk premium ξ which if positive means that country i interest rates on government debt (in real terms) are above the interest rates on comparable US government debt expressed in the same currency. In principle this risk premium varies over time.

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.

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

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

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 baseline we calculate a constant value for ξ such that the exchange rate (e) converted into nominal terms using the appropriate price deflators in 1996 is equal to the observed nominal exchange rate. 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. In this paper the model is used to calculate the expected change in the real exchange rate. It is also important to stress that although the arbitrage relation outlined above focuses on the bond rate differential, recall that within each economy all financial assets (bonds, money, equity etc) are being arbitraged and therefore there is a wedge across all assets. In addition changing the wedge between bond rates will also affect the relative returns of a range of domestic and foreign assets that are being arbitraged to the yield on government bonds.

In the simulations that follow a 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 model generated change in the nominal exchange rates are equal to the observed changes in nominal exchange rates as of December 1997. Whether the actual risk shock that is being priced in current exchange rates is permanent or temporary is difficult to determine at this stage.

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.

4. 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 3. 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 1 through 11. All results are expressed as percent deviation from baseline except where noted.

Figure 1 contains results for nominal exchange rates in 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 2 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 3 for consumption and figure 4 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 4. 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 5. 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 6 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 early 1998 it appears that the actual adjustment is not occurring through exports but rather through a sharp drop in imports. This largely reflects the collapse of the domestic and international financing of international trade. Given the recovery in each economy, apart from Indonesia, it is expected that the model projection will be closer to being realized over the coming few months.

The effects on domestic demand in Asia are large. What are the effects on the rest of the world? Many analysts calculate this using a back of the envelope calculation which entirely relies on the flow of trade between economies before the crisis. 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 results above 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 7 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 9. This figures 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. Figure 10 shows that in the case of the temporary shock, the effect in the very short term is negative on balance but more so for Australia (GDP is lower by 0.25%) because of the greater reliance on trade with Asia relative to the trade reliance of the United States. The results for GDP shown in figure 10 show the reallocation of production in the global economy since GDP is a measure of value added by domestically located factors of production. A better measure of welfare in reflected in income changes rather than production location. Gross National Product (GNP) is the income earned by domestic residents on all factors of production owned by domestic residents either located domestically or overseas. The results for GNP for Australia and the United States are shown in figure 11. GNP falls in the short term but then rises for several years before being permanently lower. The relocation of capital increases production in the US but the capital owned by US residents now earns a lower rate of return than it would have earned in the previously high return Asian economies. Thus although GDP rises over time, GNP is permanently reduced for non Asian economies. A rise in risk thus reduced world income even though it can raise production in some countries while lowering it in others. The fact that physical capital is difficult to move in the short run means that there are capital losses that are permanent. In other words, the Asia crisis is not good for the world economy as a whole despite what it may do for the location of production.

5. Conclusion

This paper has explored the global implications for trade and capital flows of a change in the perceived risk of investing in Asia. An important lesson is that a financial shock can quickly become a real shock because of the interdependence of the real and financial economies. Too often policymakers and modelers ignore this interdependence. The reaction of policymakers directly, and in the implications for risk of their responses are crucial to the evolution of the crisis. We know far too little about the determinants of risk but the impacts of changing risk perceptions pointed to by this paper appear to be large. The second lesson is that if the model is correct, the impact of the apparently large contractions in domestic demand are largely offset through a rise in exports so that the consequences of the temporary rise in risk are quickly dissipated. This is not the case for a more permanent shift in risk (see McKibbin (1998)). The fact that the real effects of the shocks actually being experienced on production in the affected economies appear to be larger than the model simulations predict, suggests that other policy mistakes or market failures are preventing adjustment. This is largely occurring through the lack of a strong export response. The current lack of export growth reflects the initial collapse of domestic and international export financing arrangements which should be a key focus of policies to ameliorate the crisis.

One implication of the approach taken in this paper is that the re-evaluation of risk and subsequent capital outflows can 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) unless all countries impose the same tax. 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. Unless all countries impose the tax, a large real exchange rate depreciation could be expected in those countries that do relative to those that do not, as markets adjust for the changes in expected rates of return differentials allowing for the impediment. The alternative which appears more likely to succeed is to allow free 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. For every country that experienced an economic crisis after the exchange rate crisis there are other countries such as Taiwan, Singapore, Australia and New Zealand that were able to survive the turbulence because of relatively recent improvements in their domestic financial systems. 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.

Finally it is 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. It would be counterproductive for the non Asian economies since 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.

In a world of increasing economic integration and significant capital mobility, understanding the response of capital markets to shocks in the global economy is a fundamental priority for policymakers. Understanding the determinants of risk evaluation is also a crucial area for future research. This paper demonstrates a change in the perception of risk in investing in an economy can have a large impact on real economic activity. How policy responds to shocks and how this response affects risk evaluation is clearly of fundamental importance and in need of a great deal of research.

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Table 1: 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 2: 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
Taiwan	Risk	20	14	7	0 forever

All units are percentage change relative to base.

Figure 1: Change in Nominal Exchange Rates per $USD due to Temporary Loss in confidence

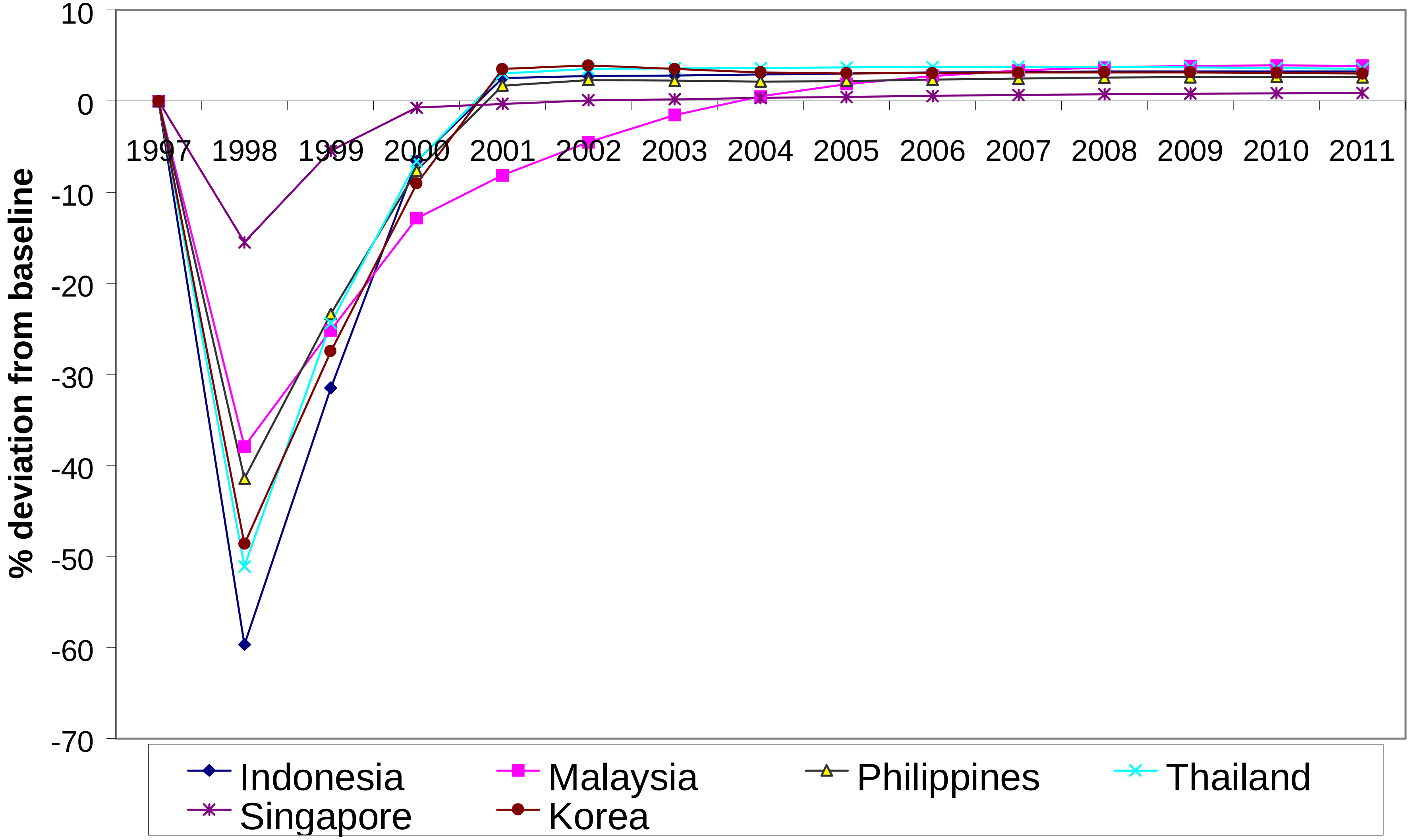

Figure 2: Change in Stock Market Value of Manufacturing due to Temporary Loss in Confidence

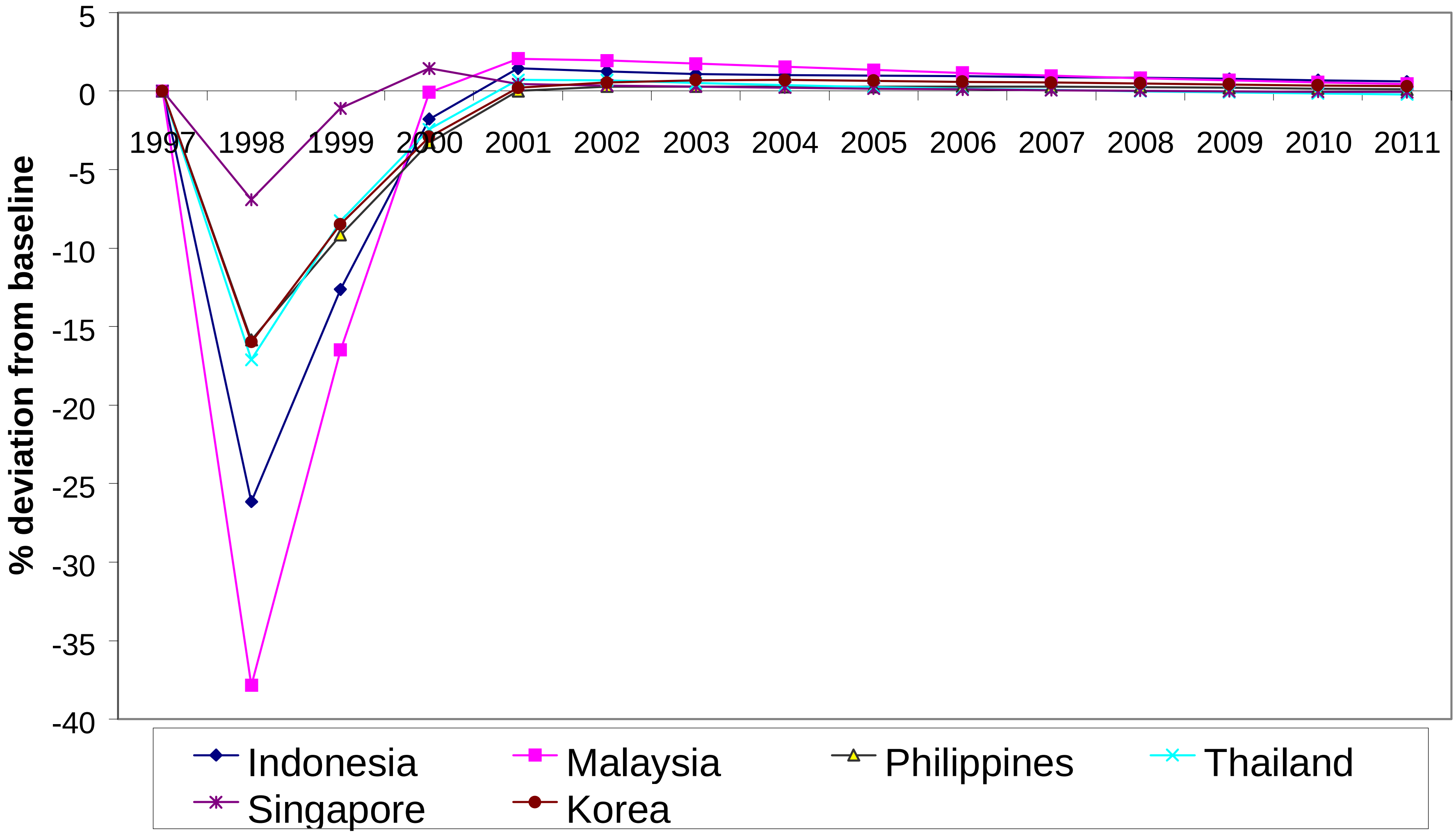

Figure 3: Change in Private Consumption due to Temporary Loss in Confidence

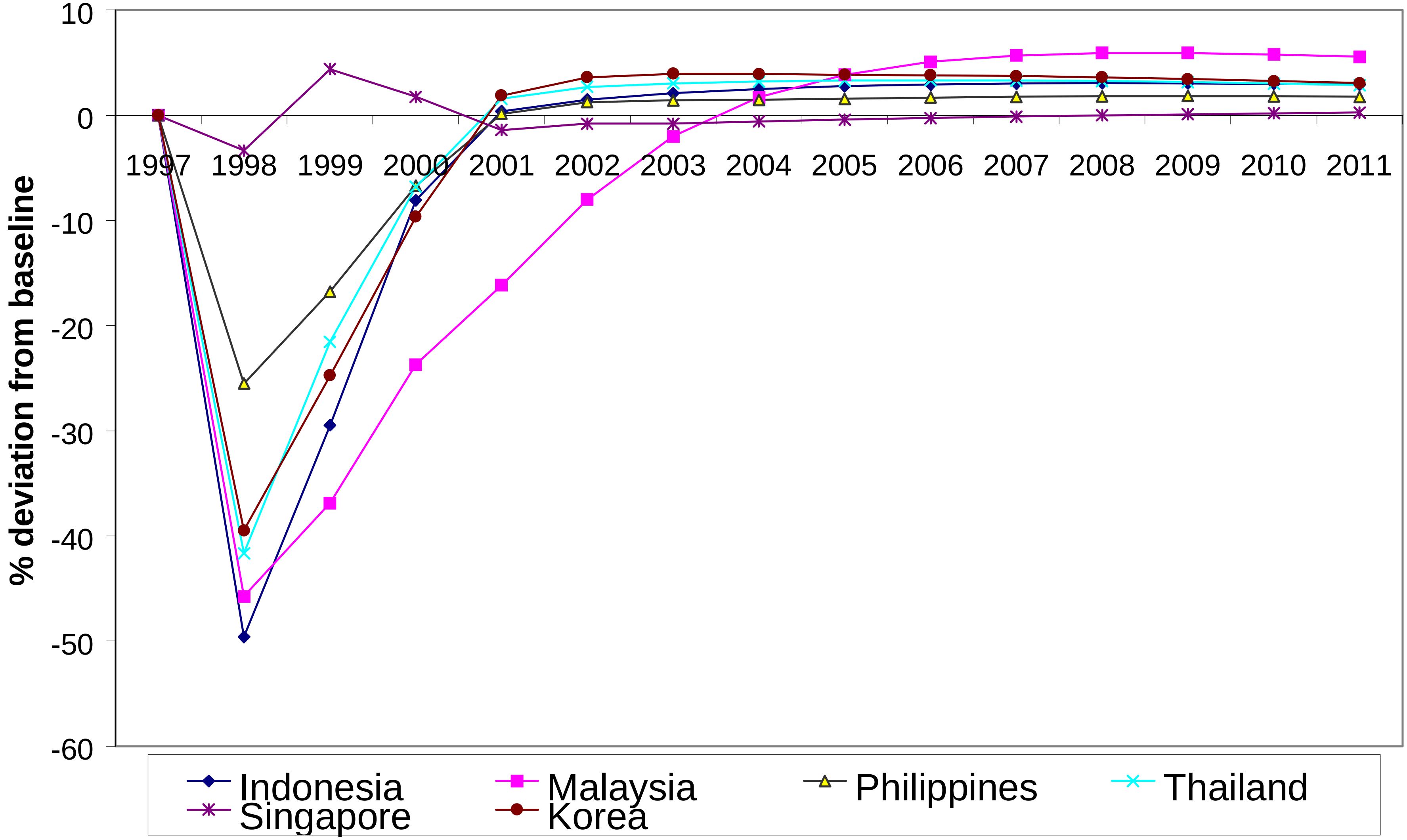

Figure 4: Change in Private Investment due to Temporary Loss in confidence

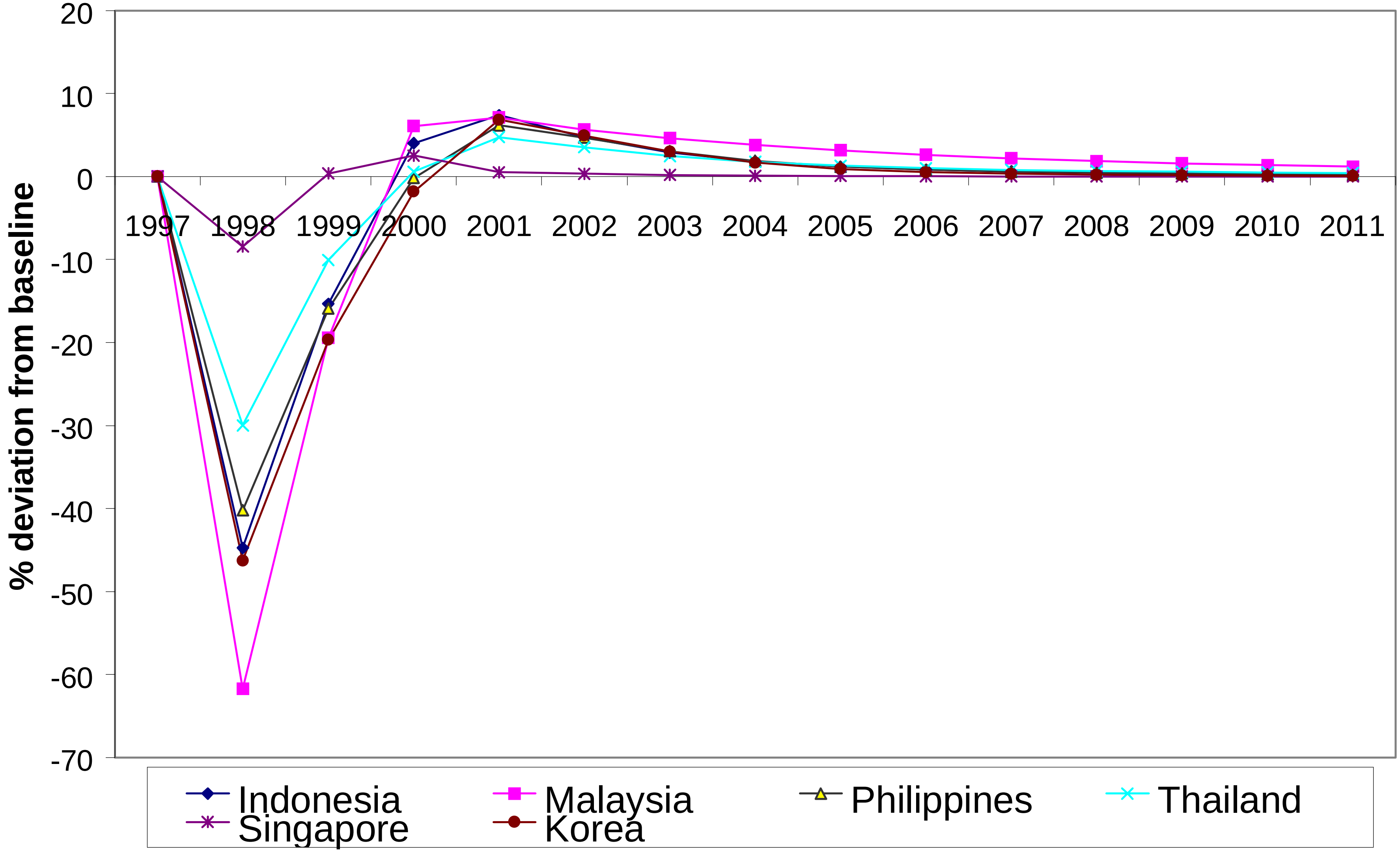

Figure 5: Change in Real GDP due to Temporary Loss in Confidence

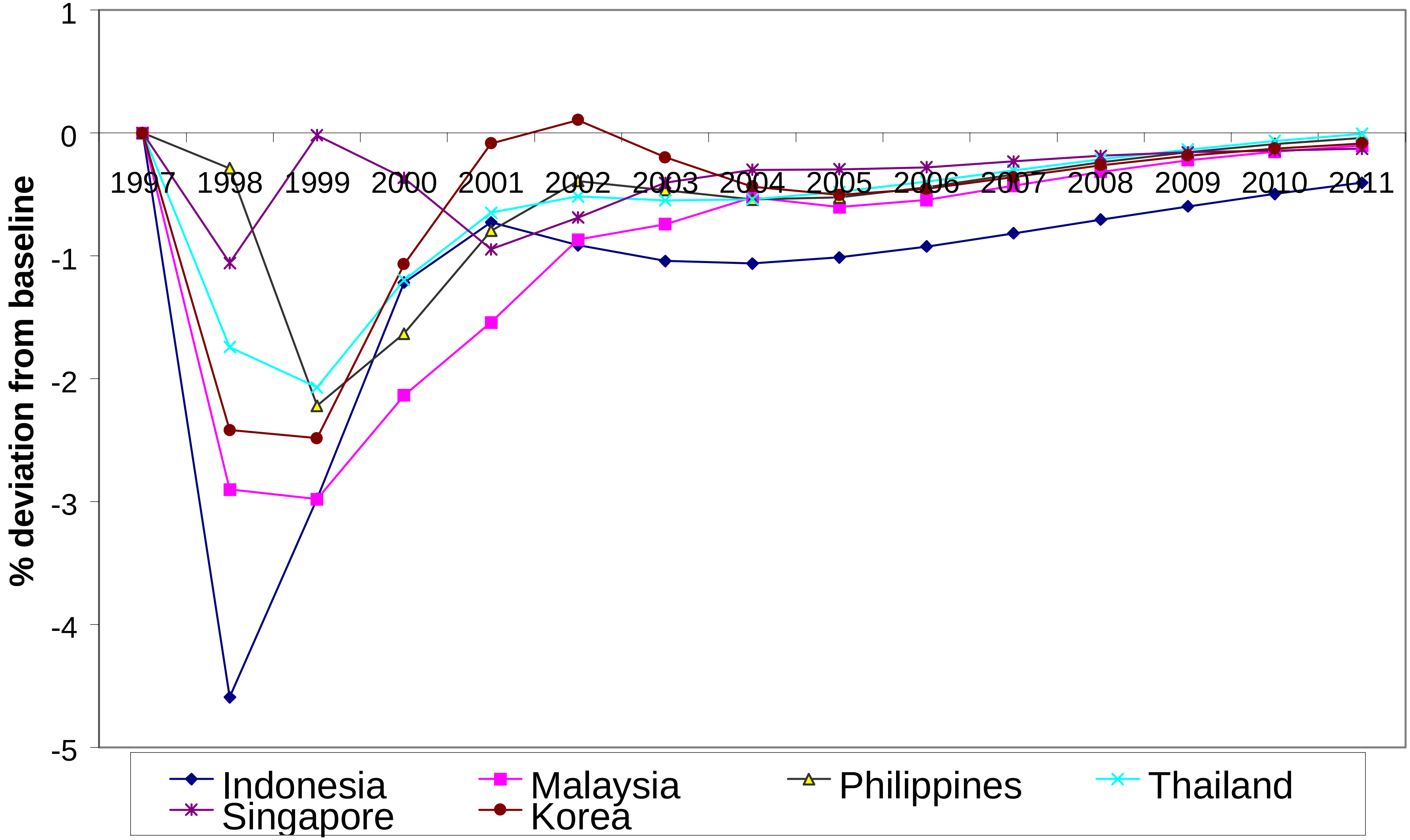

Figure 6: Change in Real Exports due to Temporary Loss in confidence

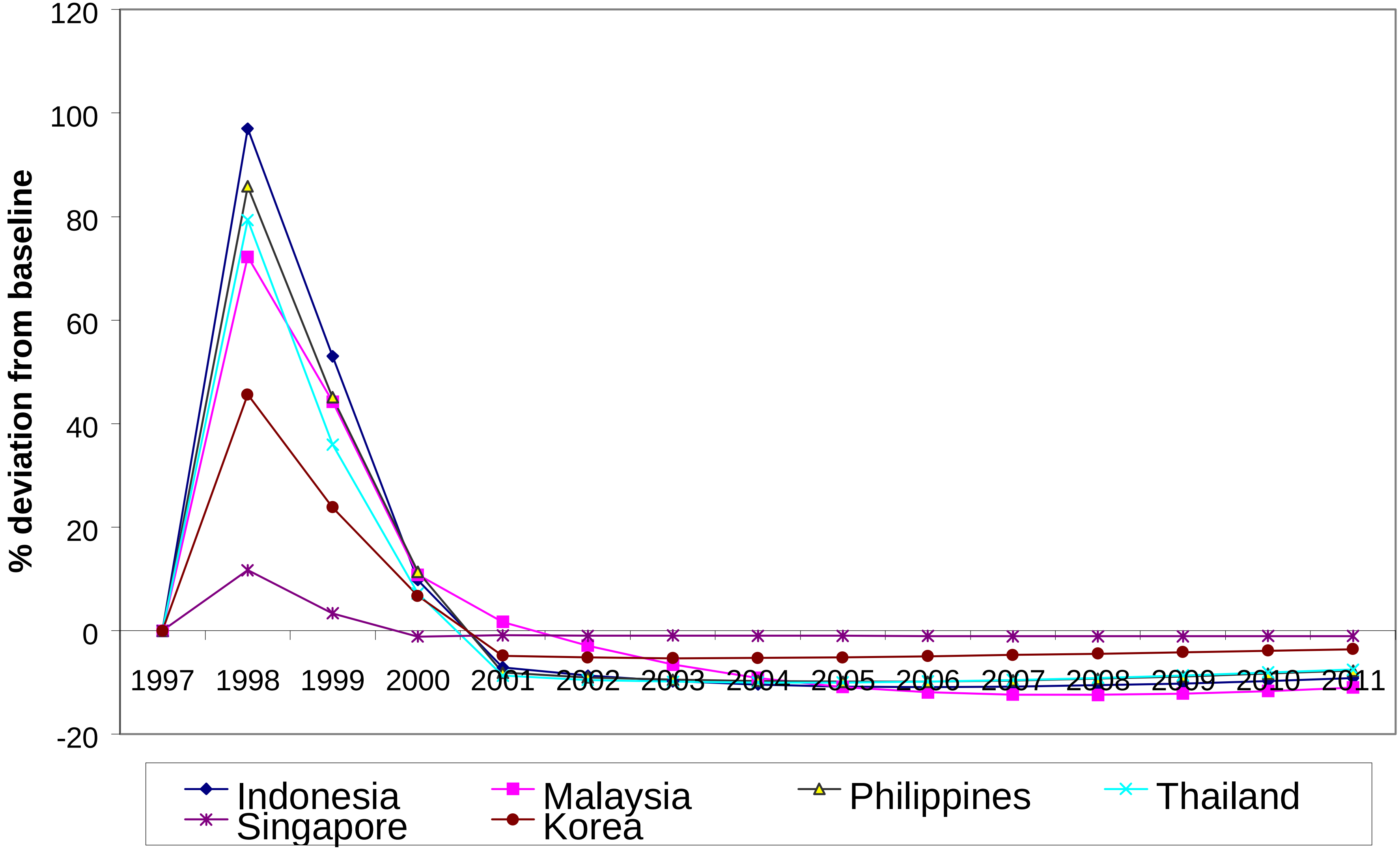

Figure 7: Change in Australian and US Current Accounts due to Temporary Loss in confidence

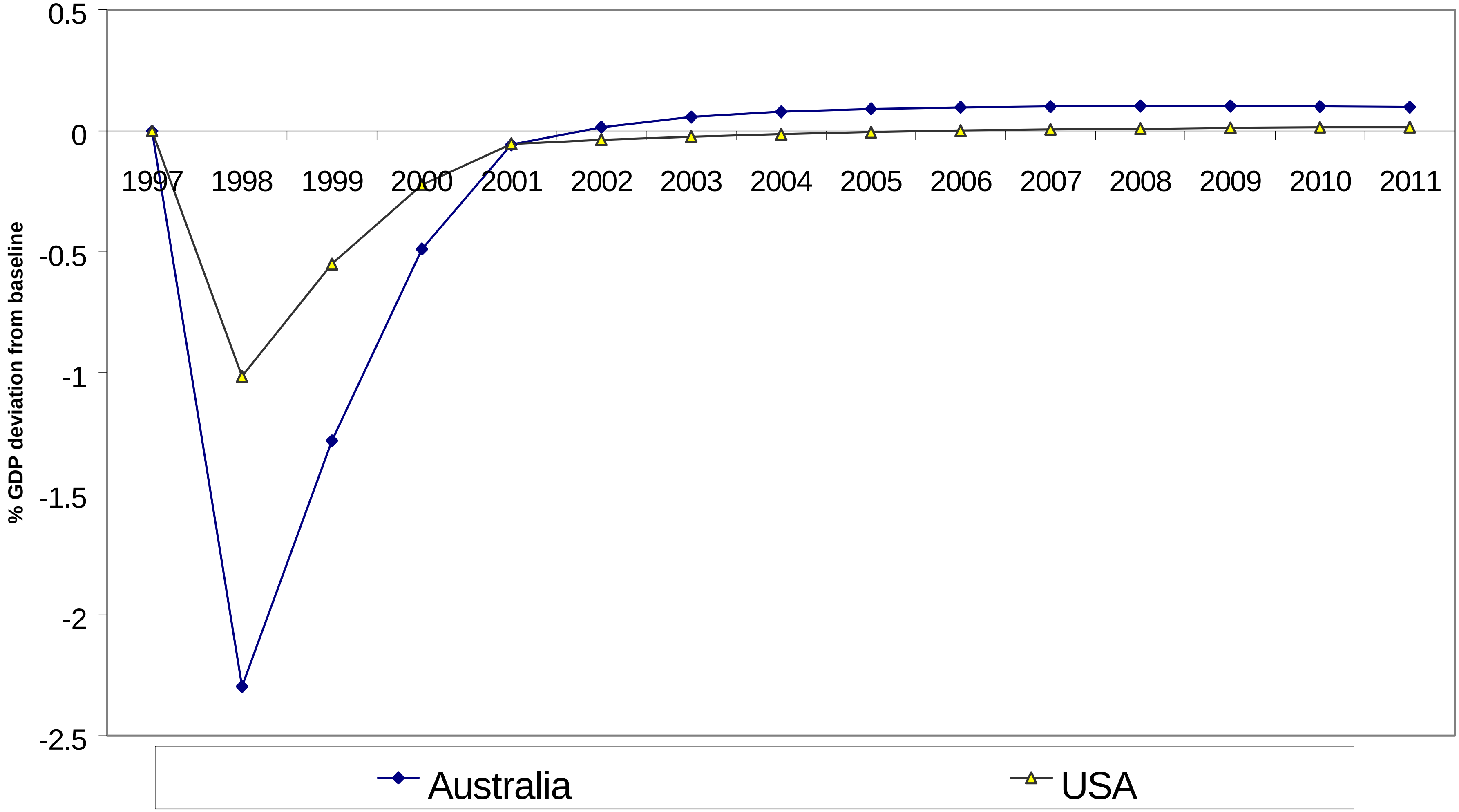

Figure 8: Change in Australian Dollar due to Temporary Loss in confidence

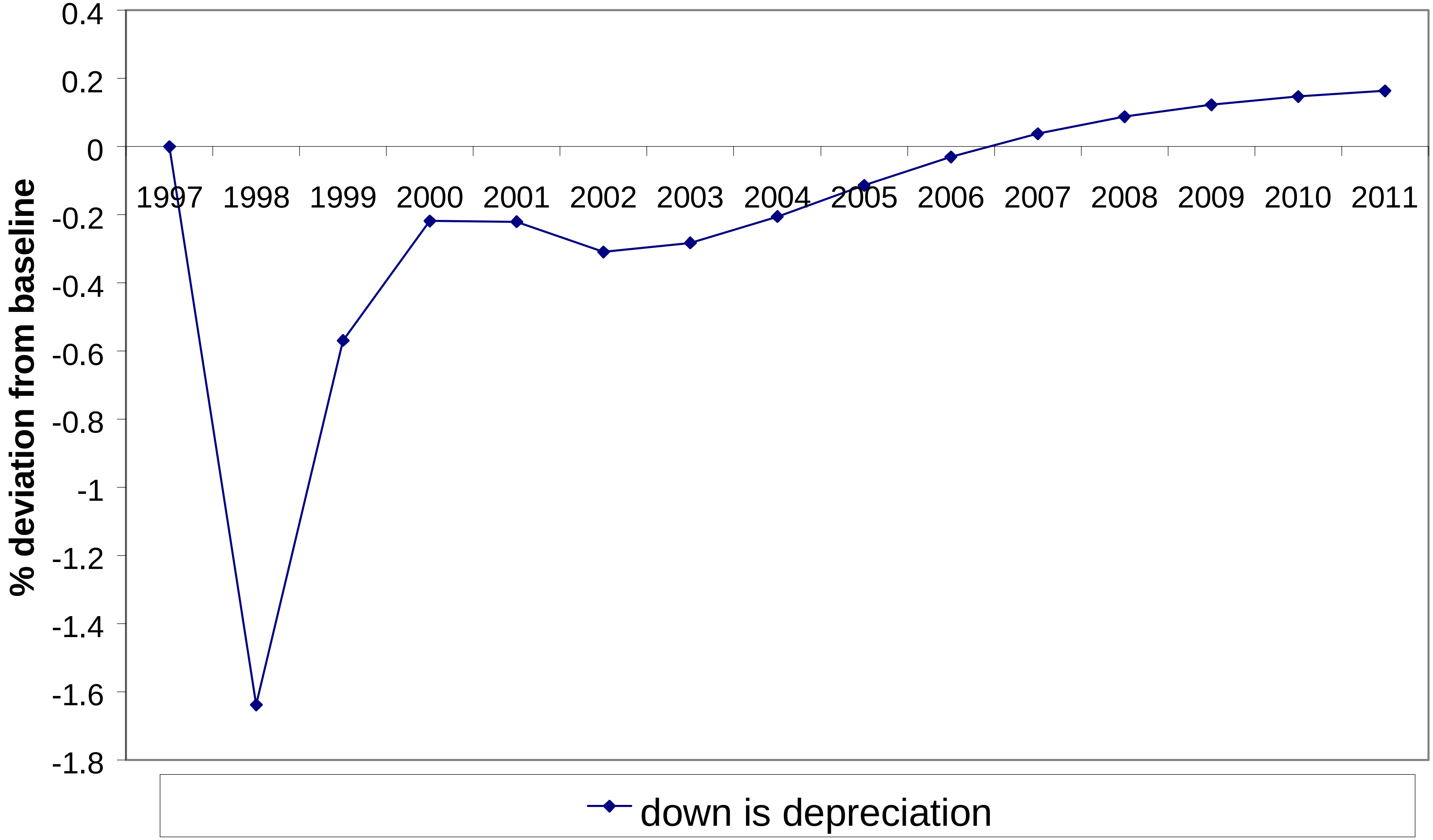

Figure 9: Change in US and Australian Exports and Investment due to Temporary Loss in confidence

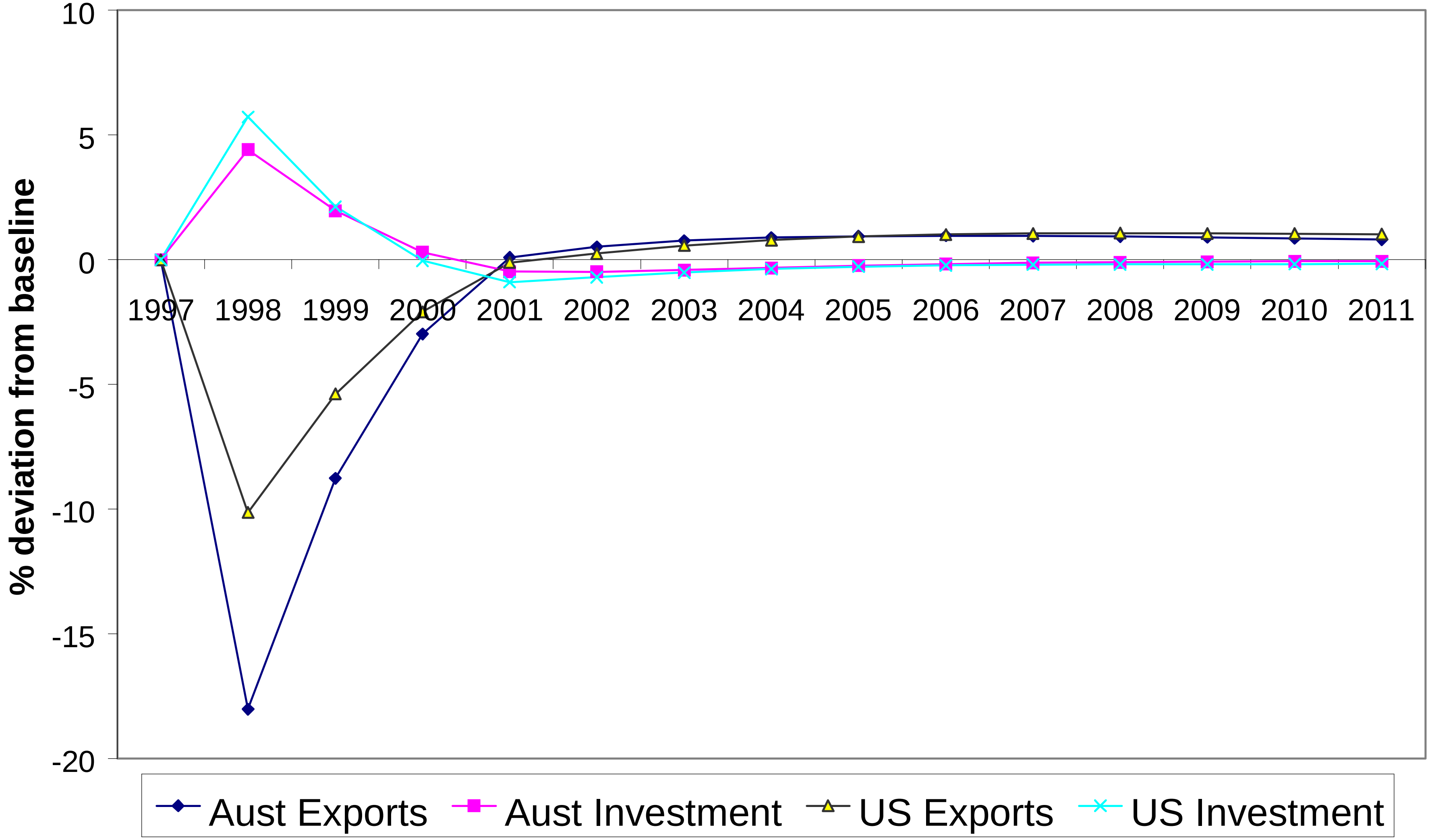

Figure 10: Change in Australian and US GDP due to Temporary Loss in Confidence

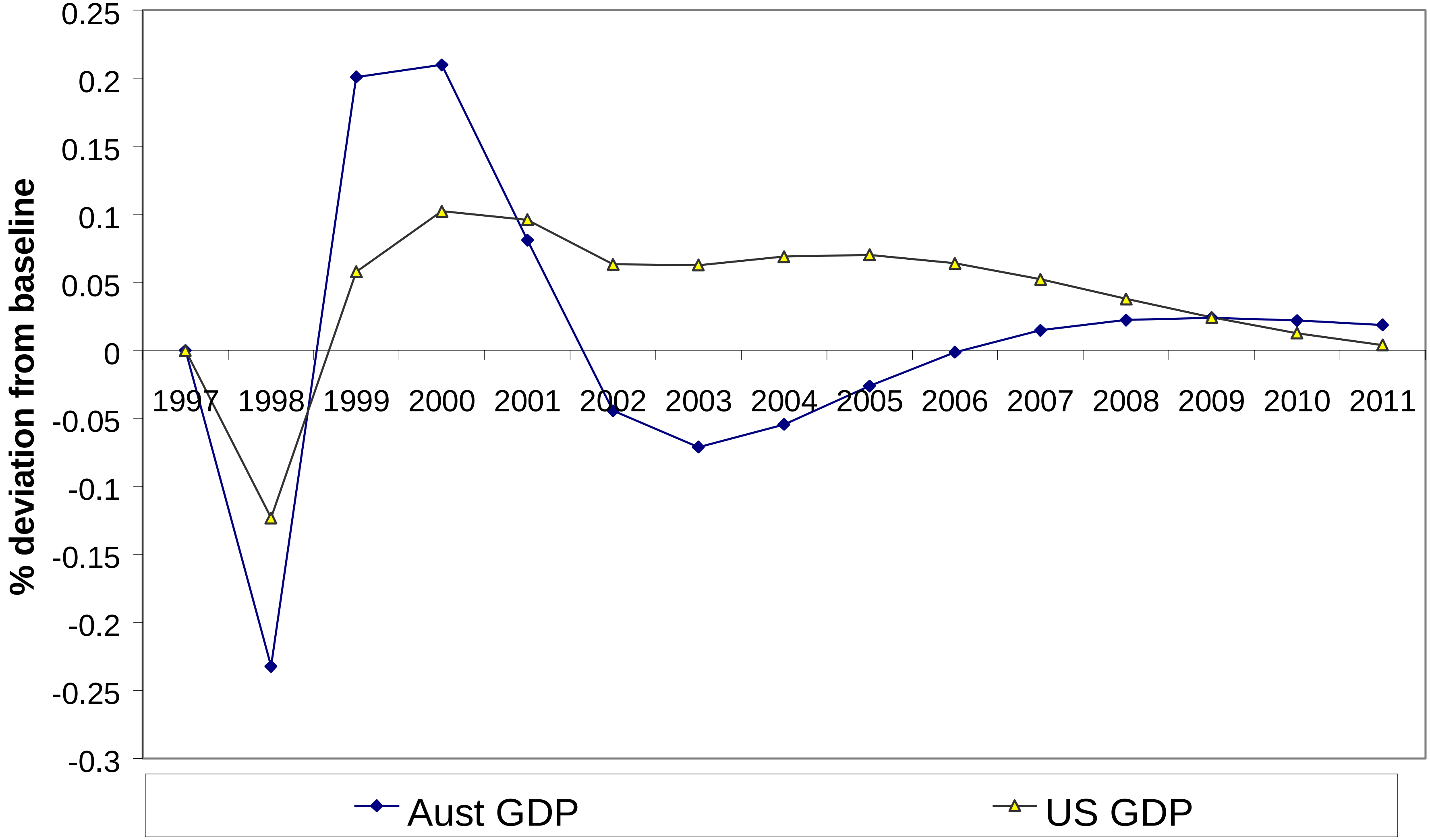

Figure 11: Change in Australian and US GNP due to Temporary Loss in confidence