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Exchange Rate Crises: Experience of India, East Asia and Latin America

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Abstract: A number of developing countries, mainly in East Asia and Latin America, suffered exchange rate crises in the 1990s. India also suffered a crisis in 1991. Earlier it had suffered a crisis in 1966. We examine the run up to the crisis in terms of a few macro indicators suggested by various crisis models. We then examine the aftermath of the crisis. We seek to explain the pre-crisis and post-crisis situation in the light of various crisis models. We find that crises in East Asia cannot be explained in terms of Krugman's first generation model, but those in the other countries can be explained by Krugman's model. Even so, there are a number of anomalies that cannot be explained by first generation models.

JEL Classification: E420, F310, F320,

Keywords: Monetary Regime, Currency Crisis, Balance of Payments

Introduction

There were a number of balance of payments (BOP) crises in about a ten year period in the 1990s, the East Asian crisis of 1997, Mexico in 1994, Brazil and Russia in 1998, and Argentina in 2001. India also had a crisis in 1991. India also had a crisis earlier in 1966. This paper attempts to see the similarities and differences between these crises both in terms of their causation and their effects, and to analyse to what extent the various crisis models explain the behaviour of these economies during the crises. In particular, is there a systematic difference between crises in East Asian countries and those in other countries? We analyse a number of macro indicators for the decade before the crisis and the decade after the crisis

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to analyse the differences in the run up to the crisis and its consequences. This is done in terms of simple statistics and also regression analysis. This analysis helps us to see which of the various crises models best describe these crises.

Literature Survey

Theoretical Modelling

The theoretical modelling of exchange rate (ER) crisis has evolved over time. Crises arose that could not be explained by the existing models and newer models were developed to explain the newer crises. Almost each set of crises has given rise to newer models. The first generation models (FGM) were based on the critical assumption that the supply of money and the demand for money must be equal (Krugman, 1979, Flood and Garber, 1984). Furthermore, since the demand for money in these models was given exogenously, any change in the supply of money had to be reversed.[1] Nowthe money supply increases when the government budget deficit is financed by an increase in credit to the government. The supply of money needs to be reduced to match the demand for money. This occurs through the country running a current account deficit (CAD) which leads to a decline in reserves, base money and the money supply. As long as the budget deficit persists, reserves would keep declining to ensure that the supply of money equals the demand for money. At some sufficiently low level of reserves people would expect a devaluation, and there would then be a run on the currency and a crisis.[2] This result was similar to that in the Salant and Henderson (1978) paper where speculators hold an exhaustible resource so long as the return from holding the resource is greater than the rate of interest which determines exhaustible resource pricing (Hotelling, 1931). Flood and Garber (1984) derive a shadow price of foreign exchange, the price that would prevail if the entire stock of foreign exchange was put on the market. Initially the shadow price would be less than the official price and any speculator, who acquired the stock, would suffer a capital loss and so would have no

incentive to do so. The speculative attack would occur when the shadow price equalled the market price.

In the Krugman (1979) model, an ER crisis occurs if the government persistently runs a budget deficit financed by money creation. This is a necessary and sufficient condition for a crisis.

However, the crisis in the European exchange rate mechanism (ERM) occurred despite most of the economies not running large budget deficits. Tension within the ERM began to build up from mid-July 1992, concentrating initially on the lira, then on sterling and then on a variety of other currencies. The pressure on the Swedish Krona was so strong that the Bank of Sweden raised in September 1992 short-term interest rates to 500 per cent. This stemmed the pressure. But when the currency came under renewed pressure in November, the Bank of Sweden let the currency float. Similarly, the UK government raised interest rates to 10 per cent and spent billions from its foreign currency reserves to support sterling. Finally, when even an increase of interest rates to 12 per cent failed to stem speculation against the pound, Britain left the ERM and the interest rate was reduced back to 10 per cent.

The second generation models (SGM) sought to explain the European crisis. In these models the government maximises an explicit objective function (Obstfeld, 1994; 1996), and in these models there could be two equilibria, each of which could be sustained depending on the state of expectations.[3] This maximisation problem dictates if and when the government abandons the fixed exchange rate regime. A shift in expectations would lead people to believe that policy would change. Then their actions based on this new expectation would lead to a shift from one equilibrium to another and this process would be accompanied by a crisis. The basic idea is that the reason behind currency crisis may be a crisis of confidence and therefore not a problem of macro fundamentals. For instance, in the first instance the increase in interest rates in Britain stemmed the speculative attack as people had confidence

that the exchange rate would not be changed. In the later attack, the rate of unemployment was already high and the public believed that the government would not raise the interest rate high enough to stem the speculation as this would raise the unemployment too high for the government's objectives.

In the case of the Asian crisis also the government sector did not seem to be in imbalance. The observation that currency crises coincide with crises in the financial sector (Diaz-Alejandro, 1985; Kaminsky and Reinhart, 1999) motivated a literature about the balance-sheet effects associated with devaluations. The basic idea is that banks and firms in emerging market countries have explicit currency mismatches on their balance sheets because they borrow in foreign currency and lend in local currency (Eichengreen and Hausmann, 1999). Banks and firms face credit risk because their income is related to the production of non-traded goods whose price, evaluated in foreign currency, falls after devaluations. Banks and firms are also exposed to liquidity shocks because they finance long-term projects with short-term borrowing (Chang and Velasco, 2001). They argue that currency mismatches are an inherent feature of emerging markets. Mendoza and Calvo (2000) examine cases where the private sector is in imbalance. They also show that herd behaviour can arise as it is not profitable for well diversified firms to seek costly information that would lower the risk attached to projects in different countries.[4] Because of lack of information firms follow each other's behaviour.

Country Experiences

We now briefly describe the events leading to exchange rate crises in different countries.

Mexican Crisis

Mexico had many crises before 1994. Usually there would be a period of expansion, real appreciation as the ER was fixed, large external deficits and a collapse. The 1994 collapse did not follow this pattern though the government had adopted a fixed exchange rate as an anchor for its

stabilization plan adopted in 1988. At end of 1993, the overall public sector had a surplus of 1 per cent of GDP, inflation was down to single digits and foreign exchange reserves were at a record level of US$ 26 billion. The private sector, however, was in disequilibrium. Private investment rose and private savings fell so that there was a large gap between savings and investment (Sachs, Velasco and Tornell, 1996). Furthermore, the real exchange rate had appreciated and there was a large current account deficit. Assassination of a presidential candidate in March 1994 triggered a panic. But this seemed to have been weathered with a nominal devaluation of 10 per cent and a 700 basis points increase in interest rates and some draw down of foreign exchange reserves. The government increased money supply to prevent a further increase in interest rates. Disallowing interest rates to rise not only prevented a narrowing of the investment savings gap but also cut off inflow of foreign funds. To shore up foreign exchange reserves and confidence, the government converted short-term debt denominated in pesos, the cetes, into short-term debt in foreign exchange, tesbonos, so that the share of tesobonosin privately held public debt increased from 4 to 75 per cent. The current account deficit that was earlier being financed by capital inflows was now financed by drawing down reserve. While the situation seemed to be under control it made the government more vulnerable with large short-term liabilities in foreign exchange, namely vulnerable to a self-fulfilling crisis.

Two hypotheses have sought to explain the Mexican crisis that finally erupted in December 1994. The real disequilibria hypothesis (Dornbusch and Werner, 1994) points to unsustainable fundamentals, viz. burgeoning CAD and an overvalued peso. The second is the standard speculative attack explanation. However, Sachs, Velasco and Tornell (1996) argue that both these hypothesis don't adequately explain the crisis. Fiscal policy and debt ratios were conservative and the speculative attack doesn't fit the first generation models. Due to the "sudden death" and panic that ensued however, after the government ran down reserves, the second generation model is also incomplete.

Calvo and Mendoza (1996) argue that the economic boom after the 1987 structural reformsresulted in large capital inflows amounting to 5.6 per cent of the GDP during 1988 to 1994, so that monetary aggregates (M2) grew faster than GDP and the real exchange rate appreciated rapidly leading to a widening CAD.[5] The real appreciation of the peso between 1989 and 1994 was 28.5 per cent and the average CAD was 5.4 per cent of GDP. The country's public debt at 40 per cent of GDP was not inordinate. But there was a significant gap between M2, valued in US dollars, and gross foreign reserves and this grew during the summer of 1994 as the central bank did not rein in the money supply. Furthermore, there was a large gap between short-term public debt held by the private sector, also in dollars, and gross reserves" (Calvo and Mendoza,1996). A relatively small devaluation, which would have corrected the external imbalance, created a panic because of the large balance sheet effects. The exchange rate plunged and Mexico had to approach the IMF for a large loan. So, according to Calvo and Mendoza (1996), balance sheet effects were the cause behind the Mexican crisis.

A herding panic was the reason behind strong contagion effects in the region and the greater world economy (Calvo and Reinhart, 1995).[6] The crisis was due to a combination of FGM where, however, the imbalance was not in the public sector accounts but the private sector and a third generation model (TGM).

East Asian Crisis

The East Asian financial crisis, that affected Thailand, Malaysia, Indonesia, South Korea and Philippines, was unexpected because it didn't follow the standard Krugman 1979 model. The fundamentals were not bad enough and capital inflows remained too strong through 1996 to warrant a crisis. The crisis seemed to be caused by the large capital inflows following financial liberalisation and deregulation. Capital flows were a remarkable 10.3 per cent of GDP over 1990-96 in Thailand, the bulk of which were in the form of offshore portfolio or other flows.

The large inflows could not be invested in traded goods production and were invested in non-traded goods production, particularly housing in Thailand (Wade, 2002). This resulted in a bubble in the real estate market that eventually went bust and created a financial crisis.[7] Savings rates were high but savers put their money in banks which lent to enterprises. So debt-equity ratios were much higher than would be the case in a market oriented financial system (Wade 2002). When the countries ran out of reserves because of capital flight, the countries had to abandon their pegged exchange rates. Moreover, interest rates soared and non-performing loans increased which eroded the capital base of the banks. The balance sheet losses of banks significantly contributed to the crisis in Indonesia, Thailand and Korea, (Krugman 1999).

Net government borrowings were less than half a per cent in each country except in Philippines (1.3 per cent). Due to fiscal prudence, inflation across the region had been below 10 per cent. Savings and investment rates were high. Capital inflows were larger than current account deficits leading to growing reserves. The ratings by international agencies remained unchanged and strong till the onset of the crisis and a few weeks into it and the IMF didn't raise any concerns even during 1996.

The appreciation of the dollar against the Yen created a significant real appreciation of 25 per cent in these countries which led to a fall in growth of exports from 24.8 per cent in the five countries in 1995 to 7.2 per cent in 1996.

The current account deficits averaged 4 per cent in most countries and were on the rise, Malaysia's rose by 8 per cent, Thailand's by 5 per cent and Philippines by 3 per cent.[8] The only exception is Indonesia which remained at 3.5 per cent in 1995 and 1996. There also existed political uncertainty in the region. The fear of depreciation unleashed a self-fulfilling panic when foreign lenders became wary about repayment of their debts. This sparked new withdrawals as domestic borrowers with unhedged currency positions rushed to buy dollars.

Russian Rouble Collapse

The Russian crisis of 1998 was due to macroeconomic fundamentals, mainly the high fiscal deficits during most of 1996-1997. Macroeconomic stabilisation policies during the period July 1992-August 1998, aimed at stable economic recovery. The policy combination was strict monetary-control, but fiscal laxity (Desai 2000).[9] Strict monetary control brought down growth of consumer prices to less than 1 per cent per month by September 1997. Nonetheless, the federal budget deficit remained high, in the range of 7-8 per cent of GDP during most of 1996-1997. The large deficit was because of declining revenues and increasing interest payments, and jumped from 23 per cent of the revenues in January 1998 to a whopping 51 per cent in July 1998. The government was adversely affected by the East Asian Crisis' contagion effects as well as the fall in export prices.[10] The fiscal consolidation attempted by the government under an IMF led programme resulted in weak GDP growth. The government prohibited from borrowing from the central bank and unable to raise taxes relied on market borrowings, short-term bills and longer-term bonds, to finance the deficit. Moreover, the lifting of capital controls led to a surge of inflows, especially short-term funds that were disproportionately in excess of the reserves. Premature capital account convertibility was a fundamental cause as well since it incited the later speculative attack.

This worsened the position of the Russian banks. The Russia crisis had symptoms of both first and third generation models (Krugman1979, 1999).

Brazil

Brazil adopted an exchange rate based stabilisation policy in 1994 to stem the hyperinflation.[11] The real Plan of 1994 sought to reduce inflation gradually by reducing both inflationary expectations; through the real being 'pegged' to the US dollar at a rate of around one real to US$ 1 (but

allowed to move in a narrow band), and inflationary 'inertia' (indexation). Simultaneously, there was the aim of a progressive achievement of internal and external macroeconomic equilibrium (Palma 2012). It was based on limiting fiscal deficits and adopting a very tight monetary policy to limit increases in the money supply. One of the main strengths of this new Plan was the fact that it succeeded in gathering an overwhelming degree of consensus and public support. It had initial success. The Real Plan of 1994 successfully reduced inflation from 2000 per cent in 1993 to 1000 per cent in 1994 to 7 percent in 1997 and raised the real GDP growth to 4 per cent (Ayres *et. Al* ....). This resulted in large capital inflows but these were sterilised, and tight control on the money supply was maintained.

However, the Brazilian economy faced two problems. It was buffeted by a series of external shocks, especially the Mexican, East Asian and Russian crises. The effects of these shocks were met by increases in the rate of interest. When the shock was successfully met, interest rates came down. The Brazilian economy was characterised by excessively high and unstable domestic interest rates. Fluctuating interest rates were accompanied by fluctuating growth.

The second problem arose from the exchange rate based stabilisation plan adopted. Even though inflation was controlled there was a tendency for the exchange rate to become overvalued. The real exchange rate fell by nearly one-half between mid-1992 and mid-1996. This trend began to be reversed in 1997 and 1998, but at a rate that eventually proved to be too little, too late. Resumption of growth together with the overvalued exchange rate meant a worsening of the current account. During the four and a half years from July 1994 to the end of 1998 the price index for non-traded goods increased by 120 per cent, and the price index for traded goods increased by about 27 per cent (Ferreira and Tullio, 2002). This resulted in an enormous loss of competitiveness of Brazilian exports on world markets, a substantial worsening of the current account which moved from a surplus of 1 per cent of GDP in 1992 to a deficit of 4.5

per cent in 1998 (both were recession years) and a significant increase in Brazilian foreign debt both private and public (Ferreira and Tullio, 2002).

Monetary policy with its high interest rates led to major financial fragility in the financial sector and State finances, and to an unmanageable Ponzi finance in the accounts of the Federal Government (Palma, 1998). After an initial budget surplus in 1994 (equivalent to 1.1 per cent of GDP), the budget returned to massive deficits as high as 8 per cent of GDP in 1998. Consequently, total net public debt (that is, total debt minus international reserves and other financial assets of the public sector) nearly doubled during this period, from 28.5 per cent to 50 per cent of GDP. This amount, although not excessively large as a share of GDP compared with other countries, became unmanageable due to the remarkably high interest rates. Thus Brazil had a crisis in the midst of low growth rate in contrast to other cases where crises occurred after a period of rapid growth.

The disequilibrium became obvious and the resulting net outflows proved unsustainable, the government had no option but to devalue the real in January 1999. Thus, 1998 posted both the all-time record for net inflows (first quarter), and for net outflows (third quarter)! This exemplifies the difficulties confronted by economic authorities in the implementation of their macroeconomic policies when they voluntarily operated with a liberalised capital account in a world of highly volatile flows, a high degree of 'contagion', and asymmetric information.

Once again it became evident that no matter how large the levels of reserves, and no matter how high interest rates, they can never be large enough and high enough to withstand a sudden collapse in confidence and withdrawal of funds by restless international fund managers in an economy with a liberalised capital account. Although high interest rates were able to check the development of a Kindlebergerian mania (via credit expansion leading to a consumption boom and asset bubbles in

construction and the stock market), which in particular characterised other experiments with financial liberalisation in Latin America, this 'success' came at a huge cost: high interest rates created an 'interest rate trap', which equally led to a financial crisis but via a different route.

The exchange rate based stabilisation pursued by Brazil after the hyperinflation was the most reasonable policy to follow and can be considered successful. However, it was pursued for too long at the cost of a large loss in competitiveness first and of economic growth later.

Argentina Crisis

The Argentina crisis followed after the fall of the Russian Ruble and the Brazilian Real and partly due to the devaluation by its major trading partners which affected the profitability of its trading sector. Argentina after its experience with hyperinflation adopted a currency board so that any increase in the money supply would have as its counterpart an increase in foreign exchange reserves. It was believed that a fixed exchange rate with a currency board would prevent increases in the money supply and would imply that the rate of inflation in Argentina would be the same as in the world so that its goods would not become non- competitive leading to large current account deficits. Thus the twin problems of the past high rates of inflation and large current account deficits would be avoided. For many years this exchange rate centred stabilisation policy worked and the economy grew rapidly with low rates of inflation.

However, the devaluation of the real and other developments in the external sector resulted in the Argentine currency becoming overvalued. There was capital flight that reduced the money supply and resulted in a fall in economic activity. As its currency arrangements prevented the government from devaluing the currency and so restore the competiveness of Argentine's goods, the only solution was to

engineer an internal deflation. Finally, the government had to abandon the currency board arrangement and the fixed exchange rate. Argentina was a case where the exchange rate could not be maintained not because of government policies but because of external events, unlike in the Krugman case, and the currency board arrangement did not permit devaluation. The devaluation then generated balance sheet effects akin to the third generation model (Krugman,1999).

India's Balance of Payments Crises

India was one of the most closed economies between 1947 and 1991. Two of the major balance of payments crises during this period were in 1996 and 1991.[12] We find that both crises were preceded by large current account deficits and eroding investor confidence. Inflation caused by expansionary monetary and fiscal policy depressed exports and led to a persistent trade deficit. In each case, there was a large adverse shock to the economy that precipitated, but did not directly cause, the financial crisis. Both crises follow the first generation models as discussed below.

1966

Soon after independence in 1947, the Indian government implemented a large investment programme to push up its growth rate. Investment required substantial imports of capital goods resulting in large current account deficits. These were financed till 1957 by running down reserves and subsequently by aid as foreign investments and exports were stagnant. During the years 1965-1966 there were two severe droughts in succession and a major war with Pakistan which had been preceded in 1962 by a war with China. These events worsened the economic situation as economic activity fell and the BOP deteriorated because of higher imports including those of military equipment and a fall in exports as most exports were agro based. India entered into a stand-by arrangement with the IMF. On June 6, 1966, the rupee was officially devalued by 57.5 per cent.[13] This was accompanied by reforms in the foreign trade system involving

mainly elimination of some quantitative restrictions and rationalisation of the system of export subsidies, and a reduction in import tariffs, which reduced the effective devaluation to 17.8 per cent for exports and 29.7 per cent for imports.[14] (Bhagwati and Srinivasan, 1975)

The results of the devaluationwere, however, not entirely successful. Inflation rose sharply to 12 per cent in 1966-67 and 15 per cent in 1967-68. The drought and its effect on agricultural output prevented an increase in the agro based exports. In addition, aid by the US and the World Bank was cut off prompting a cut back in real government expenditures, particularly investments which declined by 11 per cent in 1966-67.[15] Due to this structural break in economic momentum, there was a plan holiday from 1966 to 1969 while domestic savings were raised to compensate for the fall in aid. Growth resumed after the structural adjustments. [16]

1991

During the 1980s, the government sought to accelerate growth by higher government expenditures. As suggested by theory this, in the presence of a fixed rate and no flows capital flows, would lead to higher interest rates and BOP deficits.[17] Policy changes resulted in higher savings rates and a larger flow of funds through the financial system particularly the stock market.[18] A relatively fixed exchange rate in the face of rising domestic demand meant that though the growth rate of the economy increased it was accompanied by a rising BOP deficit. Since aid was insufficient, remittances and commercial borrowings were used to finance this gap making India more vulnerable to external shocks. The Gulf crisis due to the invasion of Kuwait by Iraq precipitated a crisis because of a spike in oil prices and a fall in remittances as workers came home. Political uncertainty after the 1989 elections and loss of investor confidence aggravated the situation through capital flight.

The second balance of payments crisis resulted in a depreciation of the rupee mid 1991 and adoption of a more market based exchange rate.

The rupee was subsequently allowed to float. But unlike in 1966, the reforms were more far reaching as the import substitution industrialisation model was abandoned. Tariffs were reduced substantially and industrial and import delicensing limited, if not eliminated, foreign capital flows, both FDI and portfolio flows, liberalised. The financial sector was reformed with interest rates freed and the rules for monetary policy were systemised (Agarwal and Shah, 2019).

The Pre-crisis and Post-crisis Performance

We compare the behaviour of the crisis hit economies by comparing the average for the pre-crisis 10 year period and for the post crisis period for important macro indicators. We find a distinct difference in the behaviour of the East Asian countries from that of the Latin American (LA) countries in practically all the indicators. The East Asian countries experienced a very substantial almost 50 per cent drop in the rate of growth of per capita income (Table 1). Growth rates declined in all the four Asian countries. On the other hand, there was hardly any difference in the pre-crisis and post crisis growth rates in Argentina and Mexico, and, for Brazil, the growth rate increased substantially (Table 1).

Corresponding to the sharp decline in GDP growth rates in the Asian countries there was a sharp drop in the ratio of gross fixed capital formation (GFCF) to GDP. The ratio declined by an average of almost 30 per cent and in the four countries. The decline was much less in the LA countries and it actually increased for Brazil, perhaps in keeping with its faster pace of growth after the crisis.

The crisis also resulted in a shift in demand patterns. We have seen that there was a sharp drop in investment in the Asian countries whereas the GFCF to GDP ratio had remained almost constant in the LA countries. The share of exports in GDP increased in all the seven countries in both the regions; it increased more in LA, though it must be remembered that ratio started from a much lower base in LA (Table 1). Also the budget

balance worsened in the Asian countries. So investment demand declined and was replaced by government demand and exports.

Table 1: Some Macroeconomic Indicators

Countries	GDP Rate		GFCF		XG&S		CAB		Budget Balance	
	Before	After	Before	After	Before	After	Before	After	Before	After
Indonesia	6.9	2.8	27.4	21.9	26.2	35.8	-2.4	3.1	0.2	-1.3
Korea	8.7	4.8	35.8	30.8	37.4	36.1	0.4	2.7	1.7	3.8
Malaysia	7.3	4.6	34.7	22.3	78.3	112.9	-2.5	12.3	2.0	-3.6
Thailand	9.3	3.9	37.6	23.6	36.0	78.3	-5.5	4.5	2.5	-1.9
Average	8.1	4.0	33.9	24.7	42.0	65.8	-2.5	5.7	1.6	1.3
Argentina	4.7	4.7	18.0	16.7	9.1	22.6	-3.1	2.7	-1.3	-0.8
Brazil	2.2	3.4	20.3	17.9	8.5	13.6	-1.2	-0.7	-4.0	-2.4
Mexico	2.7	2.5	18.5	19.1	17.1	25.3	-1.0	-1.8	-5.7	-0.6
Average	3.2	3.5	18.9	17.9	11.6	20.5	-1.3	0.1	-3.7	-1.3
Russia	-6.1	6.9	22.5	19.2	26.9	35.9	1.6	9.7	-5.8	4.9

Source: World Bank World Development Indicators.

In the LA countries, the share of exports increased substantially and the growth rate increased slightly despite the fall in the investment ratio. The relation between the current account balance and the budget balance is complicated. The budget balance improved substantially with hardly any improvement in the CAB. In Mexico the CAB worsened despite the improvement in the budget balance. Also in the case of Argentina a slight improvement in the budget balance, 0.5 per cent of GDP, resulted in a large improvement in the CAB, an improvement of 5.8 per cent. Since the growth rate did not change much the increase in exports was at the expense of private consumption.

The budget balance behaves very differently in the Asian and LA countries. The Asian countries had run surpluses on an average in the pre crisis period. But post-crisis they have run deficits except for South

Korea. In contrast the LA countries had run deficits before their crises and continued to do so after their crises, though of a smaller magnitude, considerably smaller for Mexico. Except for Korea, all the other countries were running current account (CA) deficits before the crises. After the crises the Asian countries ran surpluses, Malaysia had a particularly large surplus. In LA, all the countries ran deficits on the CA before the crises and continued to do so after the crises, except for Argentina; the deficit increased in Mexico after the crisis.

The behaviour of the Russian economy resembles more that of the LA economies. The rate of growth actually increases after the crisis. The investment ratio declines while the exports ratio increases. The budget balance improves, in fact, Russia runs surpluses.

The pattern of deficits/surpluses in the East Asian countries before the crisis does not support the FGM where budget deficits drive current account deficits. The results would also be puzzling from the viewpoint of the FGM for the post crisis period as increases in budget deficits are coupled with CA surpluses. The budget surpluses in these countries before the crisis might have arisen if their governments believed in models such as the FGM and so governments ran budget surpluses to obviate a BOP crisis.

As the exchange rate became more flexible after the crisis they might be less concerned about possible BOP deficits and so were not as concerned about budget deficits. But this explanation does not find support in the data. While the currencies did depreciate in the immediate aftermath of the crisis, the year of the crisis and the following year, subsequently they have followed a de facto fixed exchange rate, and even appreciating slowly (Table 2). Thus it is difficult to explain the conjunction of budget deficits and CA surpluses after the crises.

Table 2: Changes in Exchange rates (Average annual)

	Years			
	-9 to -1	0 and 1	2 to 10	Change between 0 to 10
Argentina	0.5	103.2	3.5	311.2
Brazil	819 .4	28.6	2.1	10.2
Mexico	46.1	49.3	6.7	234.4
Russia	-56.7	110.7	0.3	156.6
Indonesia	4.0	134.2	-0.3	214.2
Korea	-0.1	32.8	-4.2	-2.3
Malaysia	0.0	25.7	-1.4	22.8
Thailand	-0.2	27.8	-1.8	10.1

Source: Calculated from data in World Bank World Development Indicators.

In the case of the LA countries, both the budget and the CA are in deficit as would be expected under the FGM. But while the budget balance improved considerably after the crises the CA deficit unexpectedly worsened in Brazil and Mexico.

The behaviour of the exchange rate (ER) is also puzzling. In the Asian economies the ER was fixed in the pre-crisis period. It then depreciated substantially during the year of the crisis and the subsequent year. It subsequently appreciated in these economies as would be expected by the overshooting model. But 10 years after the crisis, the ER had appreciated relative to its value in the year of the crisis. In Malaysia and Thailand it was only marginally higher; in Thailand the exchange rate had depreciated by 10 per cent, hardly a degree of overvaluation that should have had the cataclysmic effect that the crisis was. In the case of the LA countries the ER continued to devalue after the crisis, and the total devaluation was significant, except for the case of Brazil.

The behaviour of the ER suggest that while it was significantly out of equilibrium in the LA countries it was not so in the Asian economies. But the impact of the crises was much greater in the Asian economies than in the LA countries. While the share of exports in GDP increased in all the countries, the other parameters differ substantially among the two

regions. The fiscal deficit usually worsened in the Asian countries, while it improved in the LA countries. On the other hand, the CA improved in the Asian countries, unlike in the LA countries. The exchange rate continued to depreciate gradually in the LA countries, while it appreciated in the Asian economies. The changes in the budget deficit the CA balance and the share of GFCF in GDP added 1.9 per cent of GDP to demand. In the case of the LA countries these components resulted in a drop in demand by 3.9 per cent of GDP. Yet there was a striking difference is the effect on growth rates, there is hardly any effect in LA unlike in Asia. Growth rate of GDP, before and after the crisis is very similar in LA and it even increased in Brazil, while in the Asian countries there was a sharp deceleration in the rate of growth. We now discuss the Indian case.

Table 3: India: Ten Year Average Of Macroeconomic Variables

	GDP g rate		GFCF*		XG&S*		CAB*		Fiscal Deficit*	
	Before	After	Before	After	Before	After	Before	After	Before	After
India-1966	3.56	3.89	14.18	15.85	4.71	4.73	-2.02	-0.52	4.61	3.65
India-1991	5.40	6.13	23.08	25.35	6.51	11.62	-2.06	-0.97	7.44	6.06

Source: EPWRF India Time Series. *variables expressed as percentage to GDP.

Figure 1: Trend of Exchange Rates During the Two Episodes
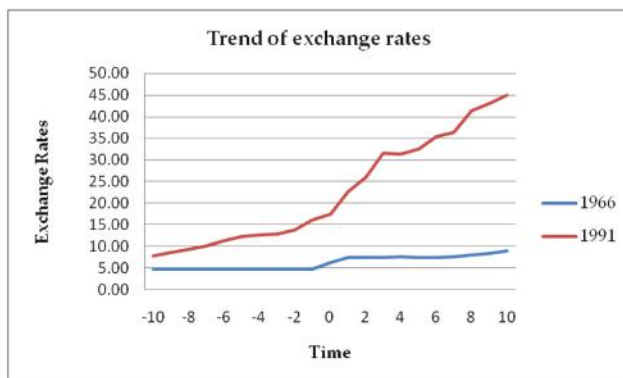
Source: RBI, Penn World Tables.

Comparing the average ten year performance of major macro indicators before and after the crisis, it can be observed that the economy behaved similarly in both crises. There were high current account and fiscal deficits before the crisis and much better performance after. Both crises behave according to the FGM. Additionally, exports were significantly greater after the second crisis vis-à-vis the first, which contributed to a higher GDP growth rate in the second crisis.

Comparing the Indian cases with the Asian and Latin American countries, there were more similarities with the Latin American countries than its Asian counterparts. The rise of GDP growth rate and reduction of fiscal deficit after the crisis are features shared with the Latin American countries, which are at stark contrast with the other Asian ones.

Depreciation of exchange rates after the second crisis was considerably higher than after the first crisis, owing to significant devaluation and floating of the rupee. (See Table 4) This could explain the greater share of exports after the 1991 crisis. This behaviour of the exchange rate corresponds to that of Latin American countries rather than the Asian ones.

Table 4: Changes in Exchange Rate

Exchange Rate Changes*	Years			
	-9 to -1	0 and 1	2 to 10	b/w 0 to 10
India-1966	0.00	1.14	1.50	2.64
India-1991	7.53	5.19	19.02	27.44

Source: RBI, Penn World Tables. *positive indicates depreciation.

We now examine the changes in these variables more formally by fitting a regression equation over the 21 year period, 10 years before the crisis, ten years after and the crisis year itself and we use both an intercept dummy and a slope dummy.

The regression equation is:

$$Y = a + bt + cd + edt$$

So that *c* represents the coefficient on the intercept dummy and *e* the coefficient on the slope dummy. *t* is time and Y is the dependent variable. The dummy *d* is 1 for the post crises years and 0 otherwise. *b* reflects the rate of growth in the pre-crises years, and (*b+e*) reflects the rate of growth in the post crises years..

The results indicate that whereas in the case of the LA countries and Russia the crises had no effect on growth rates either the level or the rate of change this was not the case for the Asian countries (Table 5).

Table 5: Shifts in the Behaviour of the Key Variables

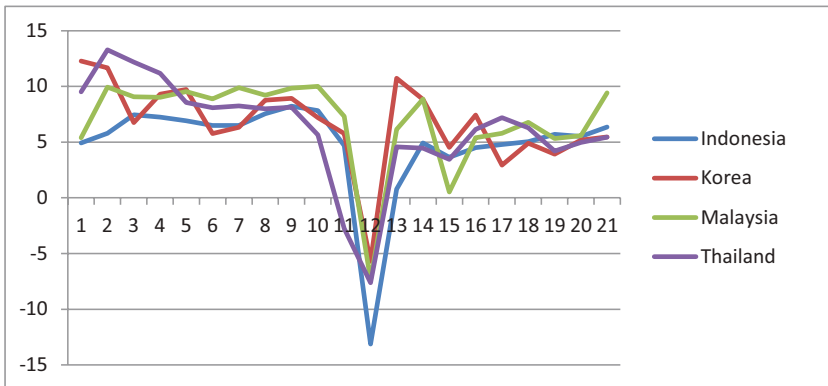|	GDP g rate		GFCF		XS		ER		CAB		FB	
	c	e	c	e	C	e	c	e	c	e	c	e
Indonesia	-	n	-	n	+	n	-	n	+	n	-	-
Korea	n	n	-	-	+	+	n	n	+	n	n	n
Malaysia	-	n	-	-	+	-	-	n	+	n	n	n
Thailand	-	+	-	+	+	n	-	+	+	n	-	n
Argentina	n	n	n	n	+	n	n	+	+	-	-	n
Brazil	n	n	-	+	+	n	n	n	n	+	n	n
Mexico	n	n	n	-	+	n	n	n	+	+	n	-
Russia	n	n	n	+	n	n	n	n	+	n	n	n

Note: n means coefficient not significant at the 5 percent level. + or – means significant at, at least the 5 per cent level, with the sign signifying whether the coefficient was positive or negative. *c* is the coefficient of the intercept dummy and *e* of the slope dummy.

Since the dependent variable is the rate of growth, the dummy *d* represents a shift in the rate of growth and e represents whether there was an acceleration or deceleration after the crisis. Among the Asian countries there was no effect only in the case of Korea. The other three Asian countries experienced a significant fall in their growth rates after the crisis. The Asian countries display different patterns (Figure 2). After a significant fall, Korea

recovered to almost its pre crisis growth as almost did Malaysia. But the growth rate in Korea fell in later years. Only Malaysia at the end of the ten year period seems to be reaching its pre-crisis growth rate. Both Indonesia and Thailand seems to have settled at a lower rate of growth, though Thailand seems to be steadily albeit slowly accelerating its growth rate and thus the positive sign on 'e'.

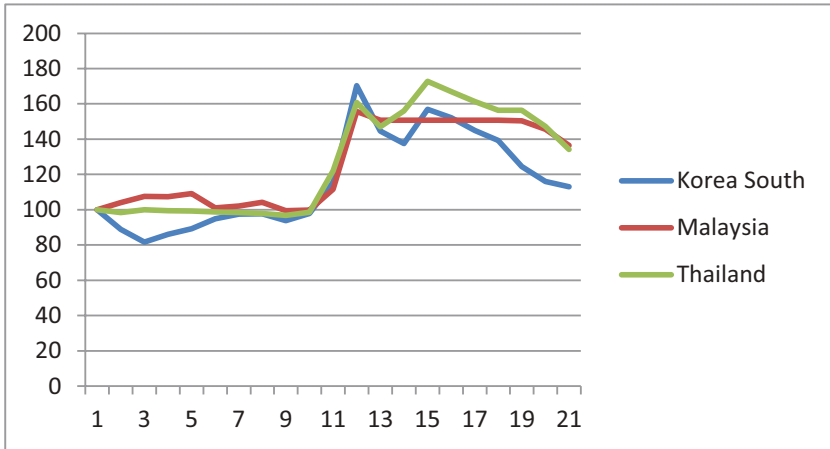**Figure 2: Behaviour of the Growth Rate in Asian Countries**

When we look at the behaviour of the LA countries, the first generation crisis model seems to fit their case, though there are some anomalies. In the first generation case there is no effect on GDP after the crisis. There may be no effect on the fiscal deficit. Only effect in comparison to the pre crisis situation is that if the government budget deficit continues then the current account balance will continue to be in deficit and the exchange rate will continue to depreciate. The budget balance improves in these countries (Table 1) from an average deficit of 3.7 per cent to an average deficit of 1.3 per cent of GDP. With the improvement in the fiscal situation the current account balance should also improve. The CAB improves immediately in the case of Argentina and Mexico, 'a' is positive. While the improvement in the case of

Argentina is subsequently gradually eroded ('b' is negative), the CAB improves in the case of Brazil and Mexico ('b' is positive). The effect on export shares is positive, foreign demand substitutes for government demand, there is crowding in of exports. The increase of exports occurs despite a lack of depreciation of the exchange rate, 5 of the 6 coefficients are insignificant. The effect on GFCF is often not clear cut for these economies so one may not expect lasting effects on the growth rates. Only for Brazil both the intercept and the slope are positive so growth rate can be expected to increase and this happens.

The crisis in the Asian countries does not fit the first generation models. Again as in the LA countries the fiscal balance does not show a significant change between the pre-crisis and post-crisis years. But the growth rates plummet, as noticed above. The intercept dummy for exports is positive and so is the intercept dummy for the CAB. Exports increase and the CAB improves. However, the share of GFCF in GDP declines. So here we have exports at the expense of investment.

This is very different from Rodrik's (1995) explanation of the export performance in East Asia. According to him, these countries maintained a very high investment ratio which required very large imports of capital goods which could only be financed by high exports. In his model, investment resulted in exports. But we now find that export shares grew even when investment shares fell. The exchange rate played a limited role in this export performance as the exchange rate at the end of the 10 year period was very close to that before the crisis.[19] For Korea, the depreciation was less than 20 percent. For Thailand and Malaysia, the depreciation was less than 40 percent. For all three countries the exchange rate was appreciating towards the end of the post crisis period. There was overshooting immediately after the crisis.

Figure 3: The Behaviour of the Exchange Rate (1986=100)

The case of Indonesia is different. There was about 500 per cent deprecation after the crisis. Since then the exchange rate has been fluctuating between 400 per cent depreciation and 500 per cent depreciation. This would suggest that there was disequilibrium in the Indonesian case. The behaviour of the other three countries would suggest that they needed to move from a high growth rate based on high rates of investment to a lower growth rate with lower rates of investment. The crisis was the mechanism to move from the earlier equilibrium to the new one. This move can be seen in two ways. One would be the Obstfeld (1986) self-fulfilling prophecy way. There were two sustainable equilibrium points. An event triggered a move from one equilibrium to the other. The other way is that the earlier growth pattern of high growth rates accompanied by high levels of investment was no longer sustainable. The crisis showed that, but also enabled a move to a more sustainable pattern of growth. We now discuss the Indian cases.

Table 6: Shifts in the Behaviour of Key Variables

Country	GDP rate		GFCF		XS		ER		CAB		FD	
	C	e	c	e	c	e	c	e	c	E	c	e
India-1966	N	n	-	n	n	+	+	n	n	N	-	n
India-1991	N	n	-	-	+	n	+	+	n	N	-	n

Source: Results from regression analysis.

Note: n means coefficient not significant at the 5 percent level. + or – means significant at, at least the 5 per cent level, with the sign signifying whether the coefficient was positive or negative. c is the coefficient of the intercept dummy and e of the slope dummy.

The results indicate that neither of the crises had any effect on GDP growth rates, either on the level or rate of change. This can be observed from Figure 4 as well. This is similar to the trend of Latin American countries and corresponds to FGM. The effect of the 1991 crisis on exchange rate depreciation is also more pronounced than the previous one. (See Figure 1). However, there seems to be no long-term effect on the level or rate of change of current account, despite the crises proving beneficial in reducing the level of the fiscal deficit.

Figure 4: Trend of GDP Growth Rates Over 21 Years
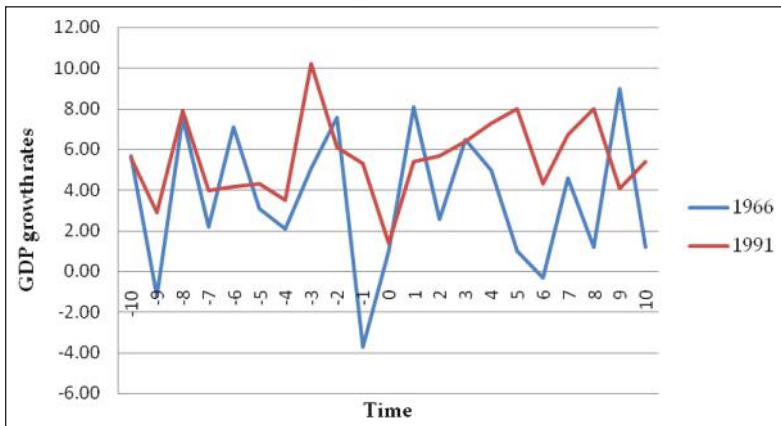
Source: EPWRF India Time Series.

Although from Table 6, the ten year average of GFCF has improved after the crisis, regression results show that both crises have negatively affected the level of GFCF, which is possibly the reason for GDP growth rate not picking up pace after the crisis.

Conclusions

The first generation crisis model despite anomalies seems to fit the crises in LA countries. The GDP growth rate does not decline after the crisis actually increases for Brazil. The improvement in the budget balance did result in an immediate improvement in the CAB. The effect on export shares is positive, foreign demand substitutes for government demand, despite a lack of depreciation of the exchange rate, 5 of the 6 coefficients are insignificant.

The crisis in the Asian countries does not fit the first generation models. The fiscal balance does not show a significant change between the pre-crisis and post crisis years. But the growth rates plummet, as noticed above despite the exports increase and the CAB improvement. However, the share of GFCF in GDP declines. So here we have exports at the expense of investment, very different from Rodrik's (1995) explanation that the very high investment ratio drives exports. The exchange rate played a limited role in this export performance as the exchange rate at the end of the 10 year period was very close to that before the crisis. For Korea, the depreciation was less than 20 per cent. For Thailand and Malaysia, the depreciation was less than 40 per cent. For all three countries the exchange rate was appreciating towards the end of the post crisis period. There was overshooting immediately after the crisis.

The case of Indonesia is different. There was about 500 per cent deprecation after the crisis. Since then the exchange rate has been fluctuating between 400 per cent depreciation and 500 per cent depreciation. This would suggest that there was disequilibrium in the Indonesian case. The behaviour of the other three countries would suggest

that they needed to move from a high growth rate based on high rates of investment to a lower growth rate with lower rates of investment. The crisis was the mechanism to move from the earlier equilibrium to the new one. This move can be seen in two ways. One would be the Obstfeld (1986) self-fulfilling prophecy way. There were two sustainable equilibrium points. An event triggered a move from one equilibrium to the other. The other way is that the earlier growth pattern of high growth rates accompanied by high levels of investment was no longer sustainable. The crisis showed that, but also enabled a move to a more sustainable pattern of growth.

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Although from Table 6, the ten year average of GFCF has improved after the crisis, regression results show that both crises have negatively affected the level of GFCF, which is possibly the reason for GDP growth rate not picking up pace after the crisis.

Endnotes

[1] Demand for money is given by prices, income and the rate of interest. For a small open economy domestic prices equal international prices multiplied by exchange rate. Since international prices are given and the exchange rate is fixed, domestic prices are constant. Income is at the full employment level and so fixed. Domestic interest rates equal international interest rates plus expected rate of change of the exchange rate, the interest parity equation, and since the exchange rate is fixed the domestic interest equals the international interest rate and so is also fixed and so the demand for money is constant.

2   This is so because if they wait till the country runs out of reserves there would be a sudden shift in the exchange rate and people holding foreign exchange would make infinite profits and those holding domestic currency infinite losses and these are ruled out in a model of rational expectations.

3   Also see Krugman (1996).

4   For a review see Burnside, Eichenbaum, and Rebelo(2007).

5   Also see Calvo(1998),

6   As the Calvo and Mendoza (1996) model explains such herding behaviour can arise as diversified investors may not have the incentive to spend money to collect investment that would prevent such herd behaviour.

7   Also see Radelet and Sachs (1998).

8   The immediate cause of the increase in the deficit was not domestic macro imbalance, but external factors ,particularly the US dollar Japanese exchange rate.

9   For an analysis of the underlying structural problems see "The Russian Crisis," paper prepared jointly by the secretariats of the United Nations Conference on Trade and Development and the United Nations Economic Commission for Europe Geneva, October 1998

10   See Chiodo and Owyang (2002) for a discussion of the series of missteps that created uncertainty in the minds of investors.

11   For a history of Brazilian monetary and fiscal policies see Ayres, Garcia, Guillen and Kehoe(2018)andAfonso, Araújo and Fajardo,(2016)

12   For a discussion of all the BOP crises between 1958 and 1991 see Agarwal and Ghosh (2017).

13   Earlier in 1949 the rupee had been devalued along with the devaluation of the pound to which it was pegged.

14   Some of these actions followed the recommendations in the Bell report which was a massive study of the Indian economy sponsored by the World Bank in the context of policy actions necessary for the success of the Fourth Plan which would start in 1966.

15   For a discussion of this episode in the context of the importance of aid see Lele and Agarwal (1991)

16   The long run effects of the devaluation are controversial. Sen (1986), Bhagwati and Srinivasan (1975) and Joshi and Little (1994) believe the devaluation had a "sizeable positive effect on India's trade balance". Mukherji (2000) argues that the devaluation did not lead to sustained liberalisation due to government aversion to it. For a detailed analysis of the events of 1966 and the subsequent policy changes and their economic effects, see Agarwal (1991) and Lele and Agarwal (1991).

17   For analysis of the effects of monetary and fiscal policy in an open economy, see Kenen (2000).

18   The main change was that to be considered a domestic company withal its attendant advantages for expansion foreign companied had to reduce the share of foreign holdings to 40 % of the share capital. The subsequent boom in the stock market attracted substantial savings into the stock market. For a detailed analysis of these developments see Agarwal (1997).

19   The exchange rate played a very limited role in Rodrik's (1995) analysis of growth in Korea and Taiwan.

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