ABSTRACT

ISIK, GOZDE. Policy Responses to Financial Crises: Capital Controls as an Alternative to IMF Programs. (Under the Direction of Dr. John Lapp)

The purpose of this study is to compare the post–treatment economic performances of countries which implemented IMF- designed recovery programs, and the counterfactual, all-encompassing capital and exchange controls, as a policy response to financial crisis. By doing so, I aim to find out which policy response provides crisis-hit countries better assistance in the short-run recovery process.

I extend the scope of the Rodrik & Kaplan study by including additional IMF-assisted crisis countries Turkey, Brazil and Russia, and using them as comparators to Malaysia, which embarked on a range of strict capital and exchange controls.

By employing a time shifted difference–in-differences model, I obtain empirical evidence, consistent with the findings of Rodrik & Kaplan, which are overwhelmingly in favour of the capital controls as a provider of quicker and more successful recovery in the short-run.

When I test and correct for serial correlation using the quasi-differencing method, I find that the initial results which were highly in accord with the Malaysia capital controls, still prove to be more successful than IMF-designed orthodox programs, but are in fact a lot less successful than regression results had first implied.

Policy Responses to Financial Crises:
Capital Controls as an Alternative to IMF-Programs

By

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APPROVED BY:

Chair of Advisory Committee   **Member**

Member

For my family back home, without their constant encouragement and love I could never have been able to embark on this adventure…

BIOGRAPHY

Gözde Işık , born in Ankara, Turkey in 1978, after spending 11 years in the United Kingdom, returned back to Ankara where she graduated from Gazi Anadolu Lisesi in 1995.

She attended Ankara University, Faculty of Political Science (SBF). Upon graduation in 2001, she enrolled in the Master's program in the Department of Economics at the North Carolina State University.

ACKNOWLEDGEMENTS

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I . Introduction

The liberalization of capital accounts in many emerging markets throughout the 80's, followed in the 90's by immense developments in communications and increased access to information helped facilitate the integration of world financial markets and to create a globalized trade system.

The introduction and wide use of new financial instruments and transactions such as call and put options, derivatives, buying on margin, and hedge funds have all expanded the range of assets and created increased scope for leverage, thus expanding the possibilities of speculation. New financial instruments and transactions have extended the credit system and created new financial markets, where new bubbles can form and burst.

These developments in turn led to highly open and linked economies and markets to emerge and unprecedented amounts of cross-border capital flows, that eventually were to contribute to severe recurring periods of financial crises experienced by many developing and transition countries. Such examples of these episodes of crisis can be named as; the Mexican crisis of December 1994, the Asian crisis that started in the July of 1997, the financial crises that followed in Russia in August 1998, Brazil in January 1999, and Turkey and Argentina in early 2001.

There have been two main observed responses that these crisis-hit countries have applied into policies:

The first of these policy responses is turning to the International Monetary Fund for assistance in crisis recovery, and in return for a loan, following macroeconomic stabilization and structural reform programs designed and monitored by the IMF. These programs mainly include policies such as floating the exchange rate generally followed by currency depreciation, maintaining high interest rates, cutting down on government expenditures, privatization and closing down insolvent banks and other financial institutions.

The other policy response to financial crisis is to impose all-encompassing restrictions on capital account transactions aiming to limit the volume and/or the price of capital in order

to stem rapid outflows. This approach to overcome financial crisis takes account of such policies as fixing the domestic currency, fiscal expansion, tax levies on capital and currency exiting domestic markets, lowering interest rates and segmenting domestic markets from international and offshore currency and capital markets.

Capital controls and IMF programs are, for the purpose of this paper, assumed to be the only rational responses to overcoming crises and the exact opposite of each other; the counterfactual policy response to IMF supported programs is capital controls.

However, another policy response would be not to implement capital controls or IMF prescribed programs and maintain existing policies. In reality this is never a viable option because when experiencing financial crisis, countries are typically faced with declines in output and employment, pressure on the domestic currency, substantial increases in interest rates and inflation and a downturn in the business environment. Therefore, existing policies are proved to be non-sustainable; new policies, aimed at easing the effects of the crisis, eliminating the underlying causes and subsequently restoring confidence in domestic markets, have to be designed, implemented and enforced

Malaysia and its policy responses to crisis will be the subject of emphasis in this study. This paper aims to compare Malaysia's post-recovery performance to that of the IMF assisted countries performances.

I will be extending the study carried out by Rodrik & Kaplan[1] by introducing additional IMF-assisted countries into the time shifted difference-in-differences model, such as Russia, Brazil and Turkey, all of which were struck by crisis subsequent to the Asian crisis. And, in the context of financial crisis, make an economic evaluation of the Malaysian capital controls as opposed to its counterfactual policy response IMF designed and supported recovery programs. Rather than making valuations on the post-control performance of the Malaysian economy *per se*, this study is about *comparing* the performance of the post-control Malaysian economy to that of the countries that appealed to the IMF for assistance.

It is still too early to make any assessments on the long-term affects of the Malaysian controls on capital flows on real, monetary and financial features of the economy;

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[1] **Rodrik D. and E. Kaplan** (2001)

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however, some short-term evaluations can be made. Therefore, the one-year period following the application of the recovery program, whether it is IMF prescribed or in the form of controls on capital and exchange rates, will be taken as the period of interest for the purpose of comparison.

I will be drawing out comparisons that are related to financial and monetary aspects of the economy and the performance of the real economy.

Main emphasis shall be placed upon the post-treatment performance of the economy, reflected through indicators such as interest rates, exchange rates, international reserves, stock market index, consumer price index, and industrial production index.

The contents of this paper can be outlined as follows:

In the next section, I will be examining financial crises in the form of currency and banking crises and the economic situation prior to intervention in the countries of interest. In section III I will be providing a brief literature review on capital controls, followed by the types and underlying motives countries hold for implementing capital controls and their connections to the Malaysian experience. Finally, in section IV and V, I will be establishing the empirical framework and reporting and interpreting on regression results, followed by concluding remarks in section VI.

II . Financial Crises in Emerging Markets

Throughout the last decade, the international financial system has been characterised by financial crises in emerging markets all over the world, creating devastating effects on all aspects of the economy. The turmoil that began with the collapse of the Thai Baht in July 1997 was quick to precipitate depreciation in currencies and decline in equities in both the region and in other emerging markets.

In the words of well-cited economist Paul Krugman on the Asian Crisis[2]:

" Never in the course of economic events-not even in the early years of the Depression – has so large a part of the world economy experienced so devastating a fall from grace."

It was not just emerging markets that were hit by crises, before the Tequila Crises of 94' there was the European Monetary System crisis in 1992 and 1993. In 1992 the fixed Exchange Rate Mechanism of the European Union Countries started to crumble when the United Kingdom and Italy were forced to abandon the rigid exchange system and leave the Pound and the Lira to float freely, and later in 1993 other members of the ERM like Spain and Portugal floated their currencies with a new central parity[3].

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[2] **Krugman,** (1999b)

[3] **Kaminsky, G**.   (1999)

(A)   Definitions and Underlying Mechanisms of Financial Crisis

What exactly is a financial crisis that has led to the collapse of so many currencies and huge declines in economic activity over the last decade and what were the underlying mechanisms? There are various aspects to a financial crisis, such as a currency crisis, banking crisis, balance of payments and debt crisis. Generally **a currency crisis is believed to exist when there is an abrupt nominal devaluation in the domestic currency accompanied by a substantial real change in the exchange rate**. It is important to differentiate between nominal and real changes in the exchange rate, in order to tell apart devaluation caused by hyperinflation and a currency crisis.

All this implicitly implies that a currency crisis has to occur under a fixed or pegged exchange rate system. At the onset of crises in South East Asia, Brazil, Russia and Turkey, all countries had some form of a rigid exchange rate system in place, which was to be abandoned after realization that the peg was no longer sustainable.

Market participants, under various circumstances that will be explained below, start excessively purchasing the foreign currency that the domestic currency is pegged or linked to, usually the U.S. Dollar, because they believe that the central bank will no longer be able to maintain the fixed exchange rate. This excessive buying of foreign exchange is called a 'speculative attack'.

An economy will be exposed to this kind of attack if there are certain vulnerabilities in existence. One of these is a misaligned exchange rate system.[4] This kind of vulnerability is observed in countries that implement exchange rate–based disinflation, also known as stabilization, programs. These programs are aimed at bringing down persistent inflation, but do so at the cost of a substantial real appreciation of the domestic currency. This appreciation making exports more expensive and imports cheaper causes a widening in the current account deficit and a decline in growth, because less is being produced due to a fall in exports. The other reason for a reduction in growth is that the fall in exports also

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[4] **Dornbush** (2001)

means less foreign currency entering the economy, therefore, in order to continue financing this deficit, interest rates increase sharply, thus resulting in even more of a reduction in real economic activity. All this suggests that the program cannot be sustained forever, and at some point market participants question this situation. This is when the speculative attacks begin.

In order to maintain the fixed exchange rate authorities will attempt to fight off these speculative attacks by purchasing the domestic currency using foreign reserves, therefore, preventing the domestic currency from depreciating against the currency it is linked to. This effort to preserve a fixed exchange rate has on most occasions proved to be futile because increased interest rates and reduced reserves make it impossible to defend the fixed exchange rate against speculative attacks, and has led to the further depletion of reserves.

A substantial loss of foreign reserves may set off another form of crisis: a balance of payments crisis. A balance of payments crisis, in turn, may lead to a debt crisis, if the loss of reserves is large enough to render weak a government's ability to service debt that is denominated in foreign currency. This situation could result with a default on debt payments, like in the case of Russia in the summer of 1998.

Another form of a financial crisis is a banking crisis

Banks and other financial institutions both lend and borrow money within the financial system and do so under problems arising from imperfect information. They also have to maintain a balance sheet, that is, their assets have to equal their liabilities.

The financial sector of an economy can place itself in a vulnerable situation to a number of events that could set off a crisis. The primary sources of these vulnerabilities lay in the balance sheet, in the form of non-performing loans, currency and maturity mismatched exposures[5].

In the case where the balance sheet contains a substantial amount of non-performing loans, interest rate defence can be a vital problem. Existence of non-performing loans limit the scope for interest rate adjustment; if interest rates are increased, the loan

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[5] **Dornbush** (2001)

portfolio sinks even further, and if interest rates are decreased, there is the danger of the currency coming under attack.

Short-term public debt combined with a large budget deficit, like the financial sector, can cause balance sheet problems for the public sector. Declining real growth, that causes the budget deficit to grow further, leaves the public sector exposed to interest rate risk, thus undermining debt sustainability and raising questions about the ability to service debt. This situation results with a flight from public debt towards foreign assets, thus a funding crisis for the public sector that causes interest rates to rise sharply. Under these circumstances, if the exchange rate is fixed, reserve depletion leads to the emergence of currency risk as well. If the exchange rate is flexible, depreciation of the domestic currency follows, thus placing the foreign currency denomination sections of the balance sheet under pressure. An example of this is Brazil's crisis in January 1999, where public debt was mainly short-term and denominated in foreign currency.

A currency crisis may also set off a banking crisis or vice versa. When creditors of short-term interbank links and depositors withdraw their funds from banks and other financial institutions they believe are illiquid or perhaps insolvent, this causes fund to flow offshore, thus initiating a loss of reserves, rising interest rates and ultimately depreciation resulting with a major currency crisis. Or alternatively, when the domestic currency comes under speculative attack, eventually leading to a substantial depreciation in the real exchange rate, the financial sector, if exposed to currency or maturity mismatches or both, could be faced with a decline in lending and soaring interest rates, which may well lead to a full-blown banking crisis. An economy may also experience both a currency and a banking crisis at the same time, in the literature; this has come to be known as the 'twin crises'[6]. A fine example of this situation is the Turkish financial crisis of December 2000, when a banking crisis, in a matter of six weeks, led to the collapse of the Turkish Lira and the abandonment of the pegged exchange rate system.

Like the financial sector, the corporate sector has balance sheets too, and is vulnerable to the same kinds of risks as the banks and other financial institutions are. The larger the

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[6] **Kaminsky,** (1999)

corporate sectors short term debt in the national balance sheet, the more the economy will become vulnerable to a funding crisis, eventually leading to a currency crisis. When a certain sector appears to be suspicious to market participants, funds are drawn back causing capital outflow, which in turn may lead to currency crisis.

The corporate sectors of Korea and Indonesia during the Asian Crisis reflect this situation nicely. The corporate sectors in these countries had huge debt equity ratios and a very large amount of this debt was short-term and denominated in foreign currency, when this came into realization, massive amounts of capital outflow began to take place throwing the countries into a severe financial crisis[7].

As we have seen, all these different forms of crises go hand in hand, usually one triggers another. It is rather difficult to disentangle these crises from each other and to explain which crisis actually leads to the other.

In order to clearly understand this somewhat of a predicament, I believe it is useful to realize the fundamental problem that the financial system is faced with. The common underlying cause that brings up a potential financial crisis is the problem of imperfect information.

A financial system, through its institutions, channels funds to firms and individuals that have productive investment opportunities. Participants in financial markets within this system have to make decisions under problems arising from asymmetric information, where one side to a financial contract has less information than the other. This leads to two main problems: adverse selection and moral hazard. Adverse selection takes place before the financial transaction itself and is when a potentially risk bearing credit selection is made. Sides that give out credit will try to overcome this aspect of the asymmetric information problem by screening out good from bad credit risks, however this may lead to a reduction in credit allocation thus increasing interest rates and creating adverse effects on the real economy.

Moral hazard occurs after the financial transaction takes place, and is a situation where a borrower that has incentives to invest in projects with high risk in which the lender will

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[7] **Dornbush** (2001)

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end up bearing the risk if the project is to fail. This problem also occurs when the borrower has incentives to use the funds towards their personal use, that is, to misallocate funds. Moral hazard, like adverse selection, also leads to sub-optimal levels of lending and investment.

Definitions of the asymmetric information problem illustrated above can be used to describe what a financial crises is in *essence:*

A financial crisis is a situation where financial markets are experiencing disturbances resulting from problems of adverse selection and moral hazard, where markets are no longer capable of efficiently allocating funds to investment opportunities that are most productive, thus leading to a decline in economic activity[8].

Asymmetric information has been the principal cause that has brought about the factors promoting financial crises in our countries of interest.

Under whichever definition, Brazil, Russia, Turkey and Malaysia all experienced severe episodes of financial crisis with devastating effects on the whole of the economy.

The effects of a financial crisis reflect on all aspects of an economy, bearing very high costs. In a crisis, governments will most often bail out troubled banks and corporations. This bail out will come at the expense of a very high public debt; the burden on a government resulting from bailouts can be as large as 20-30 % or more of GDP. Increased public debt, in turn, will lead to future tax liabilities. However, since high interest rates and a fall in output, thus income, and depreciation of the domestic currency, all which are associated with a state of financial crisis, will cause an almost certain decline in tax revenues[9].

Financial crises, currency crises in particular, result with substantial amounts of reserve loss, which is usually lost in attempts to defend a fixed exchange rate or to bailout banks

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[8] **Mishkin** (2000)

[9] **Dornbush** (2001)

and companies. This could impair a countries ability to service debt and therefore deteriorate its credit rating. This would mean a high cost in terms of international capital.

A crisis also redistributes wealth and income, usually to the advantage of a minute group. Emerging market crises enrich those who are able to convert their assets into foreign currency just in time before the devaluation takes place. While the ones who are able to pull this off are a small elite with close political and financial sector relations, for the remainder of the population , financial crisis translates into a dramatic fall in real wages and employment and bankruptcy for *small* debtors, that is, banks and firms that are not considered *big* enough to bail out.

In conclusion, a financial crisis, in whichever form it shows itself, will bring on poor economic performance, reduction in real growth rates, short horizons, reductions in the standard of living and a deteriorated social and economic infrastructure.

(B) The Economic Environment Prior to the Implementation of Crisis Recovery Programs: Country Experiences with Financial Crisis

How does all this information given in the last section apply to our countries of interest? Under this heading I will be drawing out connections between the different types of financial crises and the underlying mechanisms and the individual experiences of Turkey, Brazil and Russia by providing information on the economic environment and the sequence of events leading to the onset of the financial crisis and how prevailing policies were no longer sustainable, therefore requiring some kind of intervention in the form of a crisis recovery program. The experience of Malaysia will be discussed in the next section.

i- Turkey (February 2001)

Turkey, notorious for its history of persistent inflation, had been undergoing an IMF supported, exchange rate based disinflation program, which had been implemented back

in December 1999 after signing a stand-by agreement worth $ 15 billion. This program was aimed at pulling the economy out of the deep recession it had been in throughout 1999.

Figure II.1 - Industrial Production index
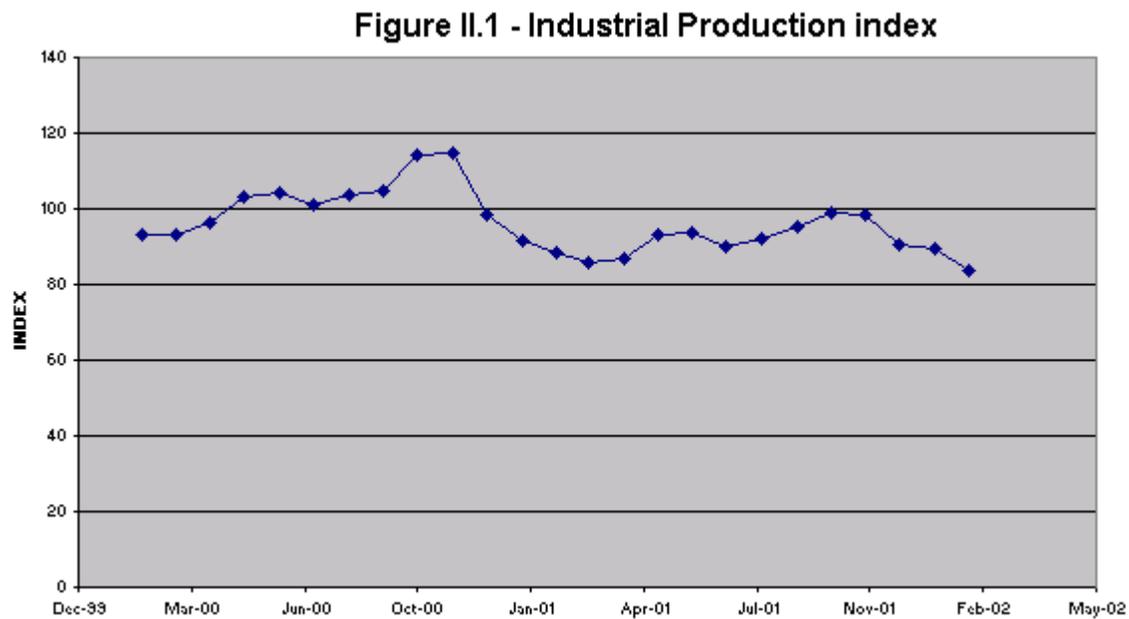
In accordance with this program authorities had modified the exchange rate arrangement to provide an anchor for monetary policy. The Turkish Lira was linked to the US Dollar and the Euro through a pre-announced crawling peg. This new arrangement together with fiscal and structural reform programs and a fall in oil prices that coincided with that period, resulted in a sharp fall in domestic interest rates and a swift recovery in domestic demand that had declined drastically during the recession.

Figure II.2 - Nominal Interest Rates
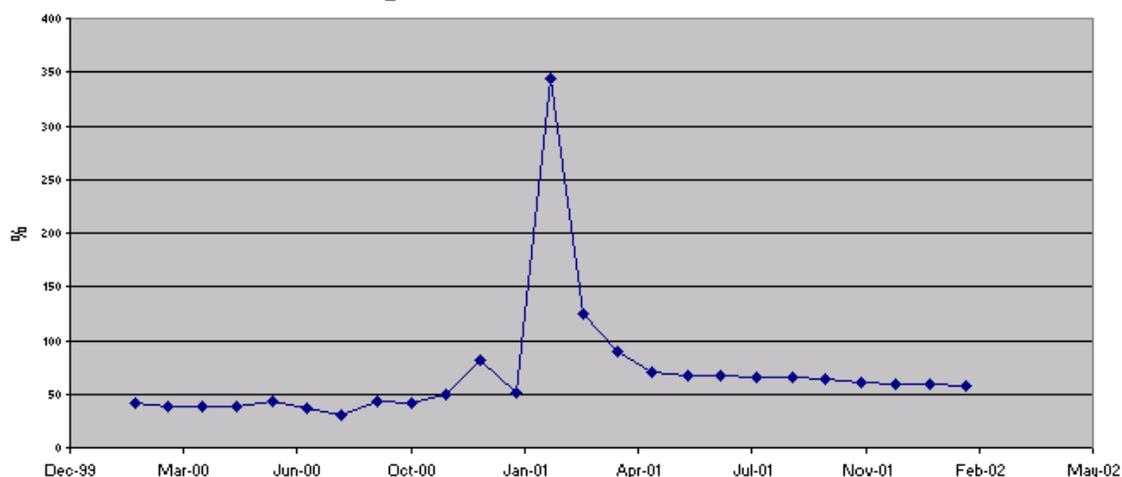
 However, this program, as mentioned above, had led to a real appreciation of the Lira, which in turn had caused a decline in growth and foreign reserves. The current account deficit increased from 1% of GDP in 1999 to around 5% in 2000[10]. The foundations for a currency and balance of payments crisis had been set.

A potential balance of payments and currency crisis were, unfortunately, not the only prospects the Turkish economy was face to face with. A serious banking crisis was becoming more and more a possibility. Despite all steps taken towards establishing a sound prudential framework, they turned out to be weak and ineffective and failed to prevent banks, including state owned banks, and other financial institutions from taking on excessive risk.[11]

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[10] **Ghosh et al,** (2002)

[11] Following the crisis of 1994, Turkish authorities put into practice policies and laws that aimed at strengthening the banking system. At the end of 1999, the Banking Law was reformed in order to strengthen the supervisory authority and to provide a proper framework for dealing with problematic banks and other financial institutes. In September 2000, BDDK was established; a fully independent supervisory authority that would adopt and enforce prudential regulations at international standards, with power to close down insolvent banks and hand them over to the Savings Deposit Insurance Fund.

Figure II.3 - Nominal Exchange Rate
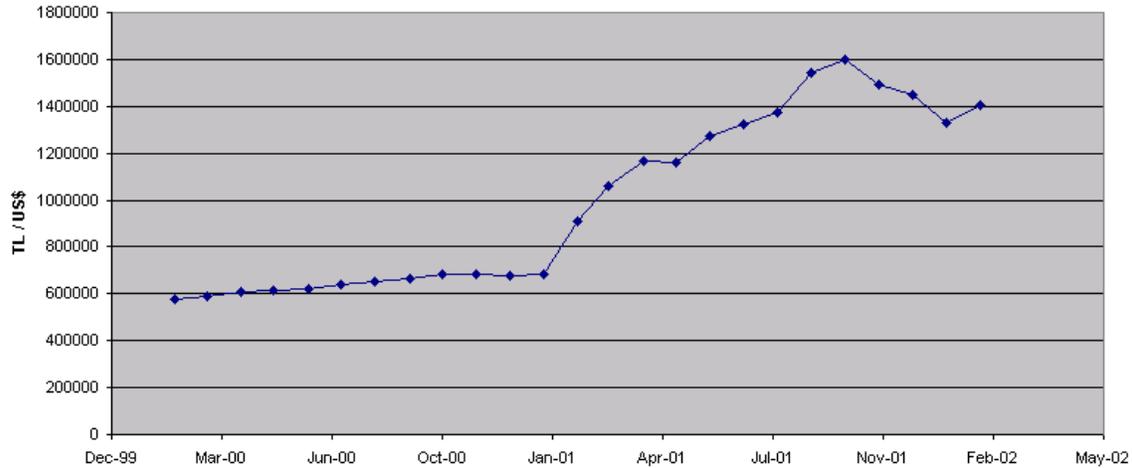
The large budget deficit and high inflation, despite a disinflation program in place, led to volatile interest rates. This volatility led to banks preferring to engage in short-term lending and arbitrage activities that were a lot more profitable than traditional banking activities.

Turkish banks were highly exposed to currency and maturity mismatches.[12] The financial sector was also exposed to credit, exchange and interest rate risks which were due to extensive forms of connected lending and borrowing through the interbank system and large open positions on foreign exchange[13]. Most of these banks in question also had weak capital adequacy ratios.

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[12] These mismatches were mainly caused by extensive investment in government securities financed with short-term external borrowing in foreign currency.

[13] Banks were able to take on large open positions due to the crawling peg, since it was depreciating daily at a pre-announced rate.

Figure II.4 - Stock Market Index
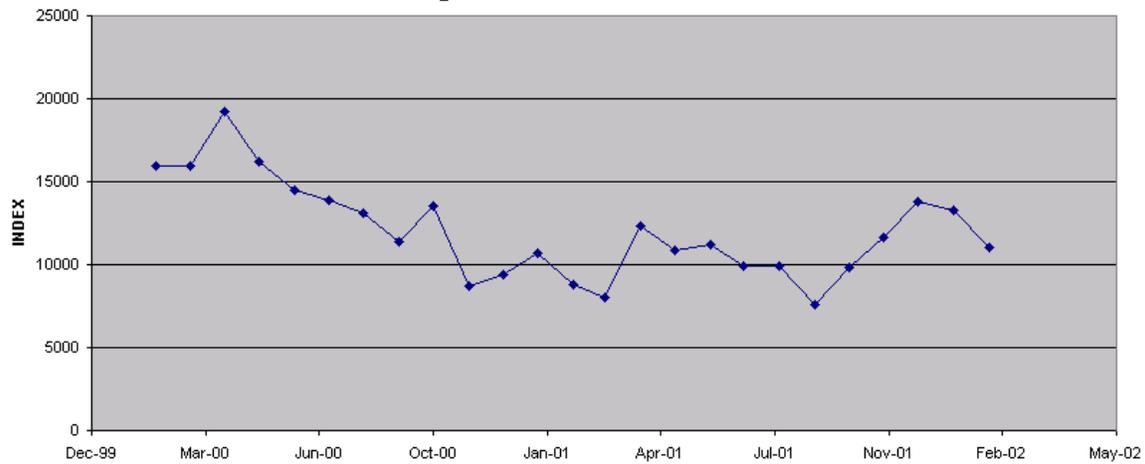
In late November 2000, two of the largest Turkish banks closed their large credit lines to three smaller banks, due to the smaller banks' high exposure to interest rate risk, but essentially to their need for liquidity to close open positions. This was a case of *good* banks closing their credit line to *bad* banks[14]. Then there was the rapid drop in the prices of government securities that many banks had been excessively investing in by borrowing short-term abroad. These developments caused panic among international investors, shortly after causing a run on banks and currency. Interest rates soared in order to prevent capital flight, but nevertheless, huge amounts of capital outflow occurred. The rigid exchange rate regime, together with capital outflow, led to a substantial decline in foreign reserves[15].

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[14] **Ozatay & Sak** (2002)

[15] **Ghosh et al,** (2002)

Figure II.5 - CPI
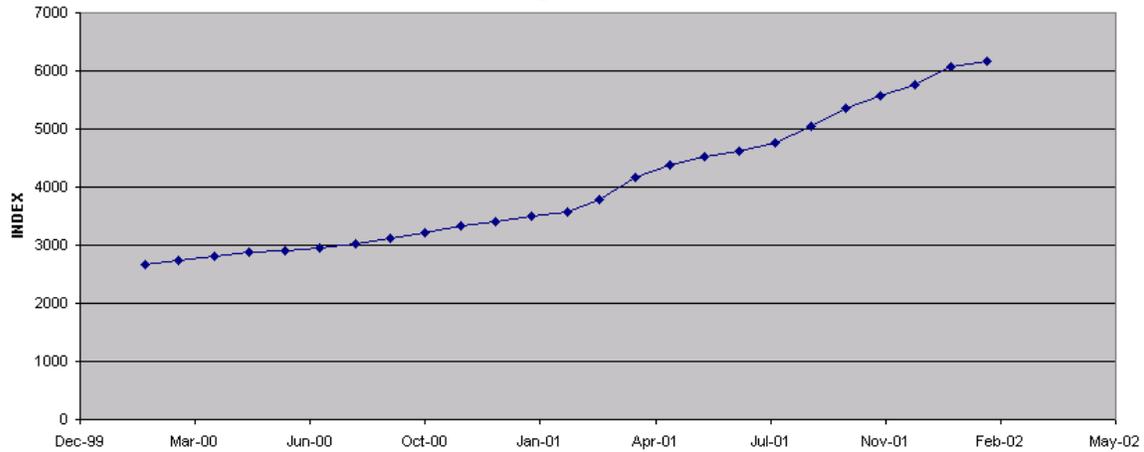
As the central bank intervened by injecting large amounts of liquidity into the market, expectations of an inevitable devaluation and the abandonment of the crawling peg increased. There was a huge inconsistency between high interest rates and the pre-announced rate of depreciation.

Figure II.6 - Capital Flows
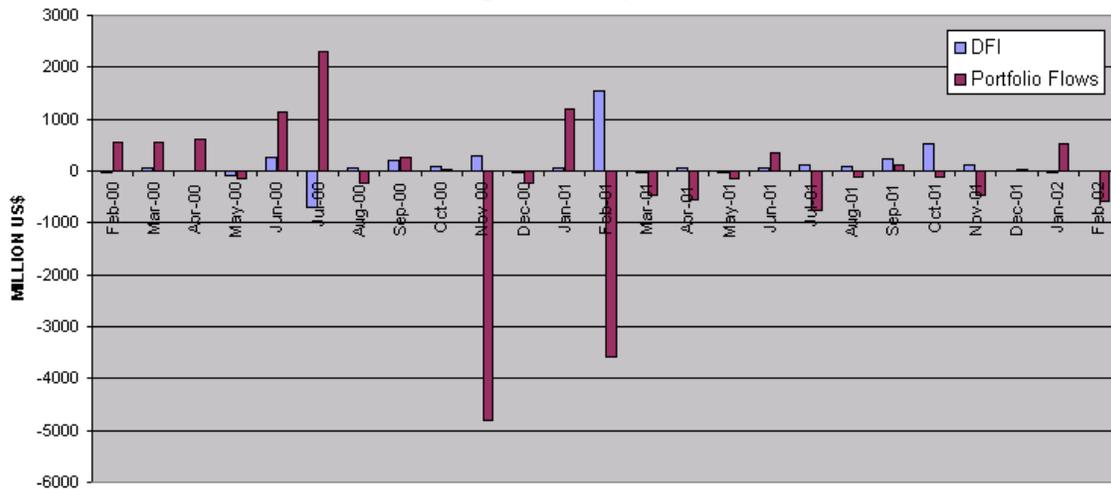
Another factor, although not a financial one, that contributed to the worsening of the economy was the devastating earthquakes that hit Turkey in August and November of 1999, claiming the lives of over 30 thousand and causing billions of dollars of damage[16]. All of these factors combined, had left Turkey highly vulnerable to a full-blown financial crisis in the event of a possible turn in market sentiment. This turn in sentiment was not

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[16] **Eichengreen** (2001)

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late to come; it was quite obvious to everyone that the program could not be sustained for much longer.

Figure II.7 - Trade Balance
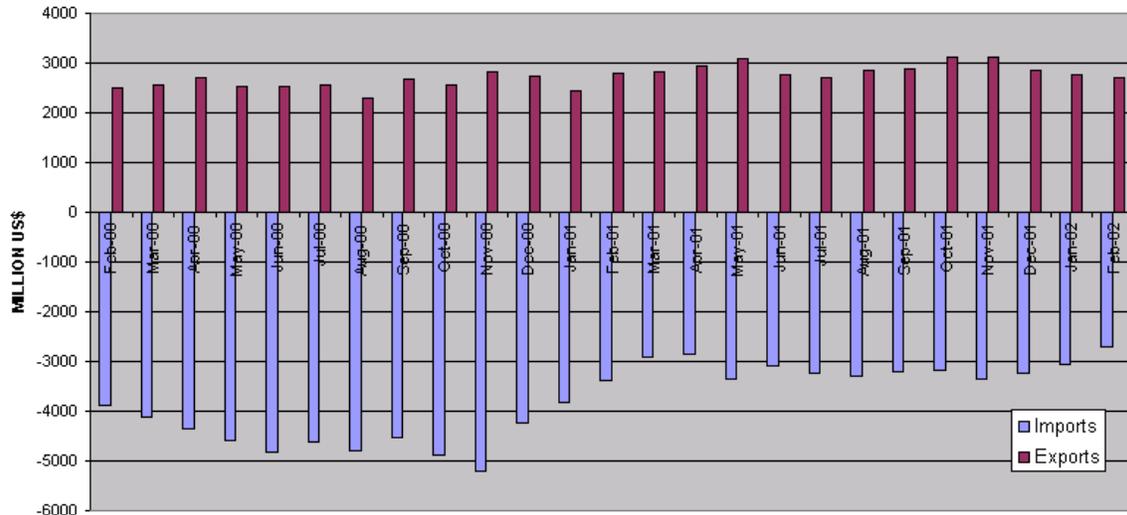
In the February of 2001, expectations turned into reality, prevailing policies were no longer sustainable; the central banks' abilities to defend the peg were almost exhausted. The Turkish economy was experiencing a full-blown financial crisis; a blend of currency, banking and balance of payments crisis all in one, which was to be triggered by an unusual event during a regular National Security Council meeting when the President threw a hardback copy of the constitution at the Prime Minister during a hot debate. That day, overnight interest rates hit a record high of 2058% that night, and 4019% the next. [17]

On February 22, 2001 the exchange rate system collapsed, the crawling peg was abandoned and the Turkish Lira was left to float freely against all currencies, followed by a huge devaluation of around 40%. The dollar jumped from 685 thousand Liras to almost 1 million in one day.

Prior to the crisis of 2000-2001, Turkey had already been undergoing an IMF – supported stabilization program. After the most recent crisis, a new 19 billion $ deal with the IMF

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[17] Luckily on that date US markets were closed and the central bank was unable to fully meet the foreign currency demand of the banking sector, therefore, avoiding a loss of $ 7,5 billion in reserves. (Ozatay and Sak, 2002)

was agreed on. In return the new board of the central bank and the treasury under the new finance minister would take additional measures to strengthen the prudential regulatory system and set up a fiscal stability program. Insolvent banks would be closed down and troubled state banks would be merged.

Figure II.8 - Foreign Reserves
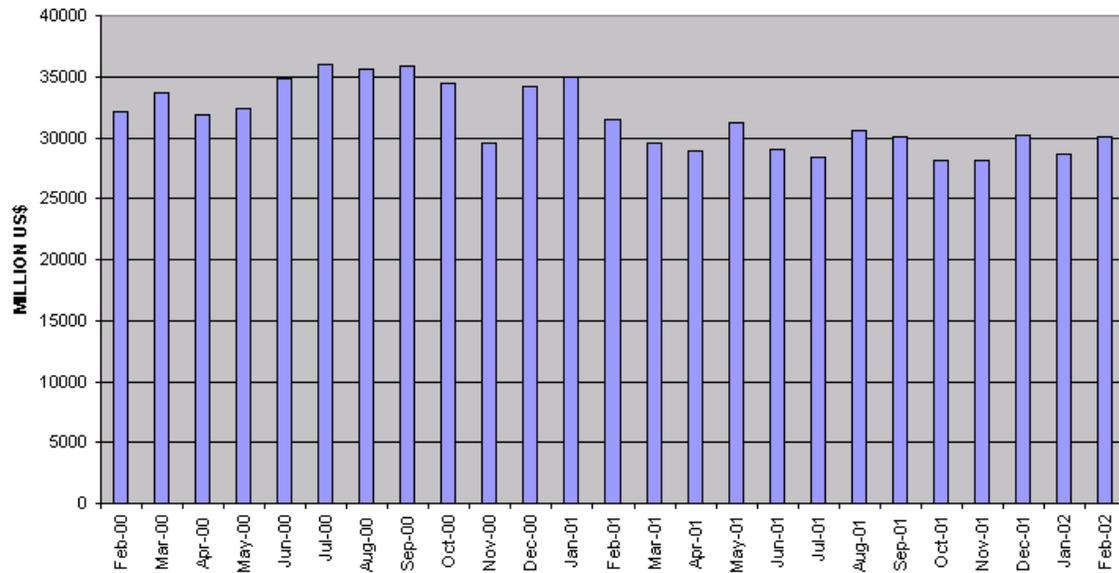
Government spending would be cut in order to strengthen the budget to accommodate the fiscal costs of bank recapitalization and privatization would be accelerated.

The emphasis in the new IMF agreement was placed on the financial sector and required measures such as merging troubled banking institutions, closing down or selling insolvent banks and privatisation of government owned banks.

ii- Brazil (January 1999)

 The Brazilian government, under the Real Plan in 1995, had set an adjustable band for the Real linked to the U.S. Dollar, and the currency was to crawl within that band. This was a similar exchange rate regime to the one that was in place in Turkey before the crisis of February 2001.

Figure II.9 - CPI
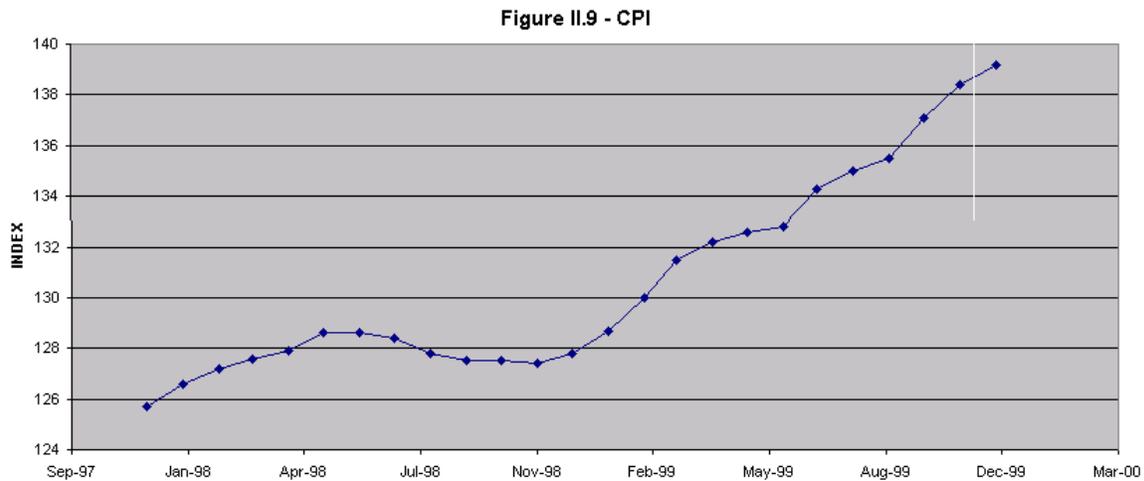
Prior to the financial crisis that resulted with the floating of the national currency, the Real, in January 1999, the Brazilian economy had placed itself in a vulnerable position to crisis, due to its increasing internal and external imbalances.

The broad availability of money up until the Asian crisis, had created opportunities for arbitrage by taking advantage of interest rate differentials through domestic markets and setting up leverage transactions with sovereign and private debt securities on the international market[18].

Brazilian banking institutions had also invested heavily in foreign currency denominated assets such as Eurobonds, which were also issued by companies, and sovereign debt in the form of Brady and global bonds. These investments were financed mostly by overnight borrowing or by issuing short-term bonds, thus leaving the economy vulnerable to mismatch problems.

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[18] **Tingas & Miguel**   (2001)

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Shortly after the Asian Crisis broke out, the Real started to come under pressure. The reason for this was that there was a general decline in the credit line to all emerging markets, this credit crunch led to the rapid liquidation of assets. This quick delevaraging, in turn, caused a high increase in the demand for foreign currency.

Capital outflows reached $ 9.7 billion at the end of 1997[19]. The central bank, at first, tried to avoid raising interest rates, attempting to restore a positive interest rate differential, it injected currency into the market. However, this attempt was unsuccessful and a sharp rise in overnight rates could not be prevented.

Figure II.10 - Industrial Production Index
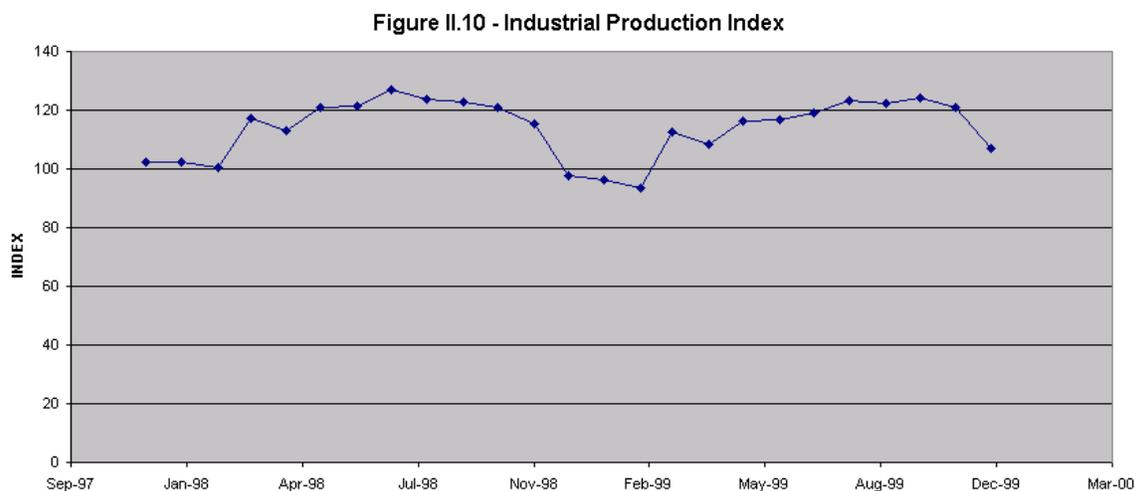
But the worst was yet to come for Brazil. In the spring of 1998, conditions in international markets were deteriorating as the situation in Russia was worsening. The condition in Russia had contractionary effects on developed country financial markets, thus causing a strong decline in capital availability to all emerging markets. This large reduction in funds increased the interest on pre-fixed government securities. In response to this, the Brazilian authorities issued short-term bonds that were indexed to high overnight rates.

When crisis eventually broke out in Russia in August 1998, with the Russian government defaulting on its bonds, Brazil's portion of post-fixed debt stood at 60% of total stock of government debt.

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[19] **Ibid.**

Figure II.11 - Stock Market index
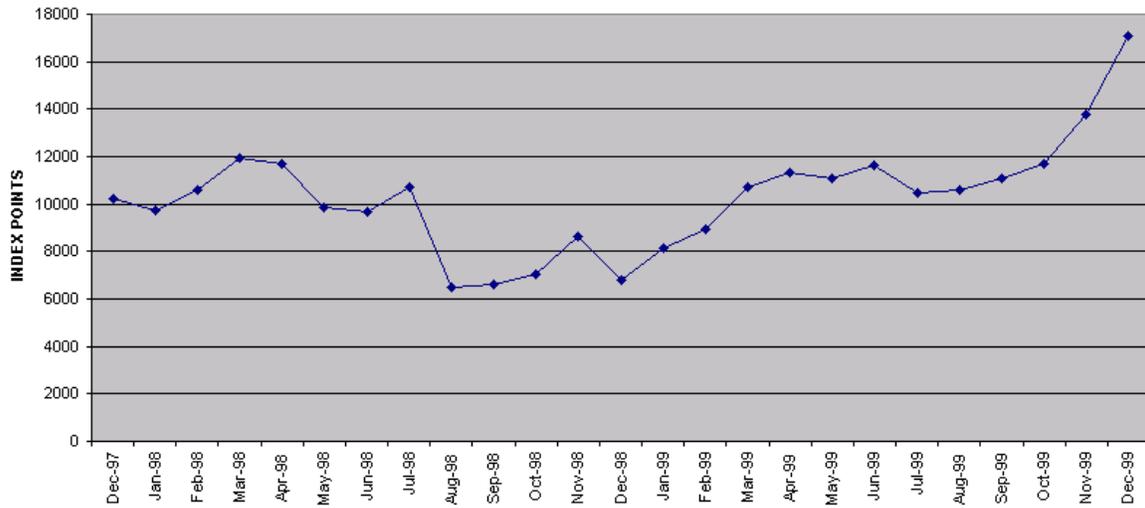
This further worsening of the economic situation in Brazil set off a speculative attack on the Real in early November 1999. This large-scale speculative attack, along with unsuccessful attempts at fiscal adjustment caused huge amounts of reserve loss. The central bank, in attempts to keep the Real within its band lost almost $ 40 billion of its currency reserves[20]. Prevailing policies were no longer sustainable. The central bank, first tried to widen the exchange rate band, failing to do so, 2 days later on January 15 1999 the existing exchange rate system was abandoned and the Real was left to float.

Figure II.12 - Nominal Exchange Rate

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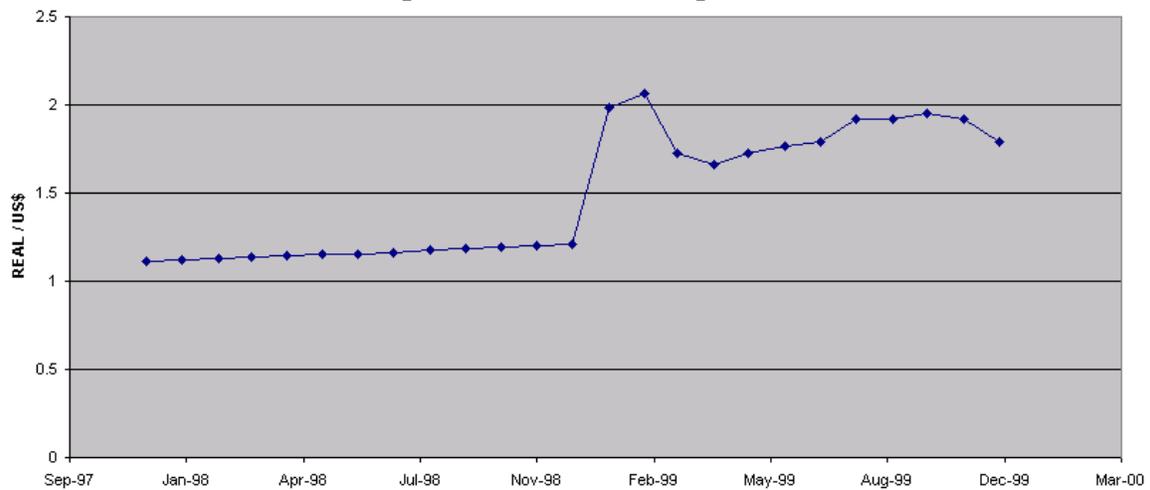
[20] **Tingas & Miguel ,** (2001)

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Figure II.13 - Nominal Interest Rate
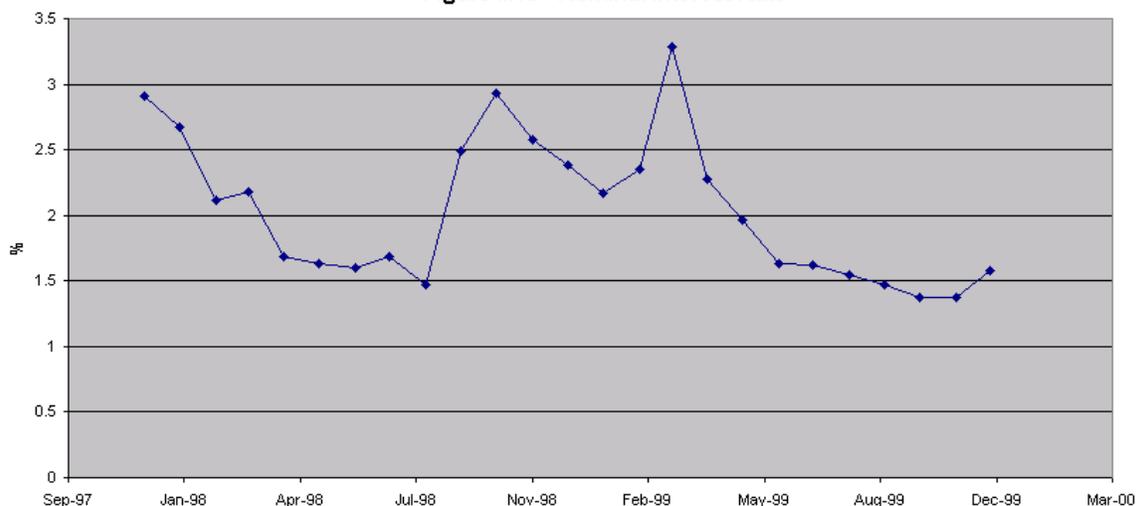
A couple of months before the collapse of the exchange rate system, authorities were finalising talks with the IMF for a rescue plan that would make $ 41.5 billion available to Brazil. In return the Brazilian government committed to stabilize net debt at less than 50% of GDP by 2001 and to achieve primary surpluses at around 3%.

Figure II.14 - Capital Flows
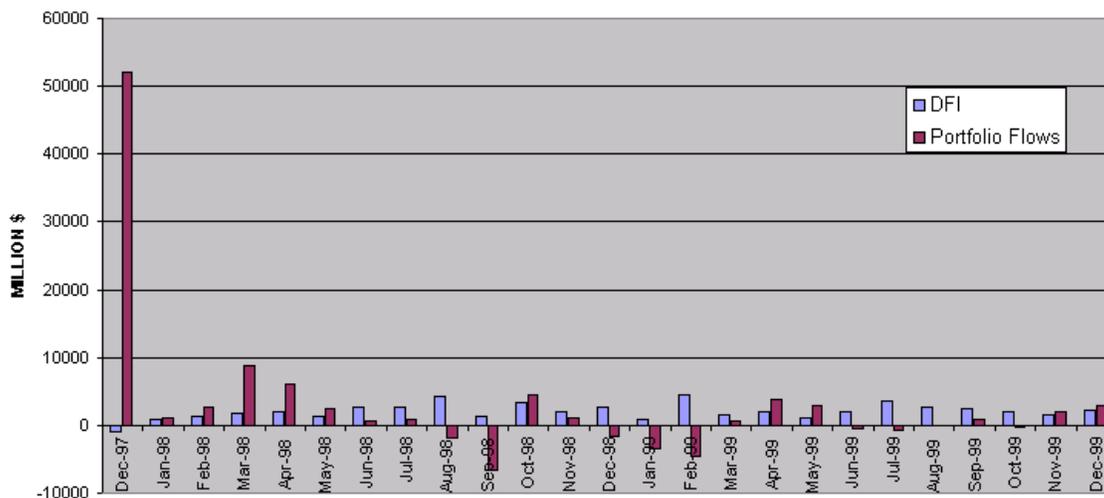
Figure II.15 - Foreign Reserves
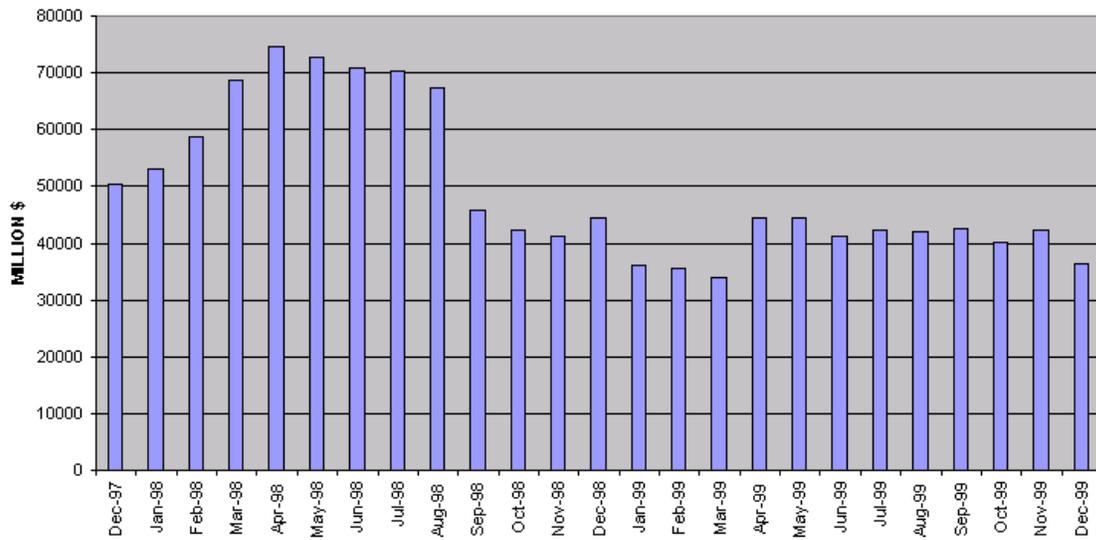
iii- Russia (August 1998)

Starting in 1995, Russia had been undergoing exchange rate-based stabilization program. The Rouble, just like the Turkish Lira and the Brazilian Real, was pegged to the U.S. Dollar and allowed to crawl within a band.

Figure II.16 - Nominal Interest Rate
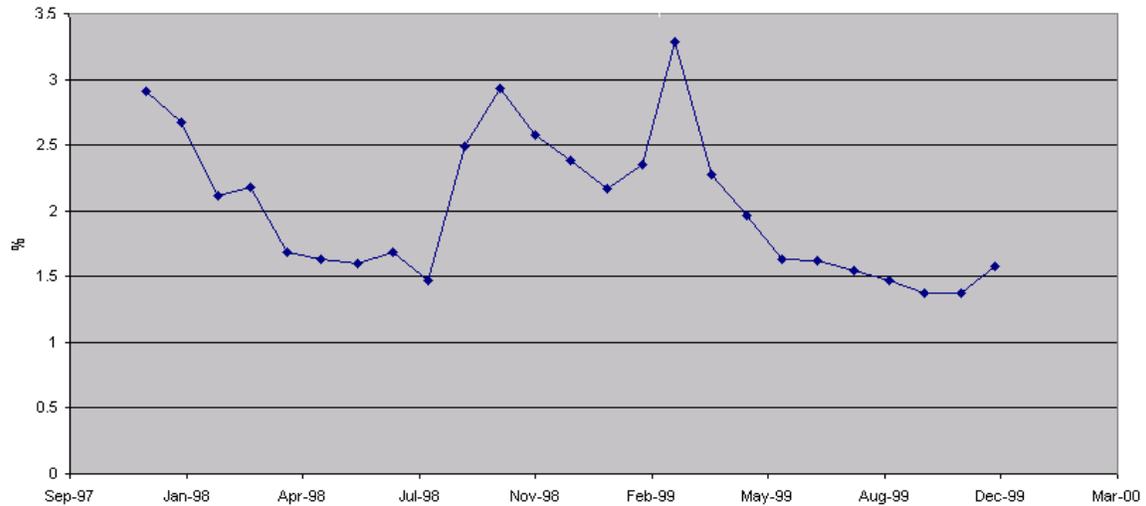
The next couple of years following the implementation of the stabilization program, Russia's budget deficit continued to grow to around 7-8.5 % of GDP[21].

Figure II.17 Industrial Production Index
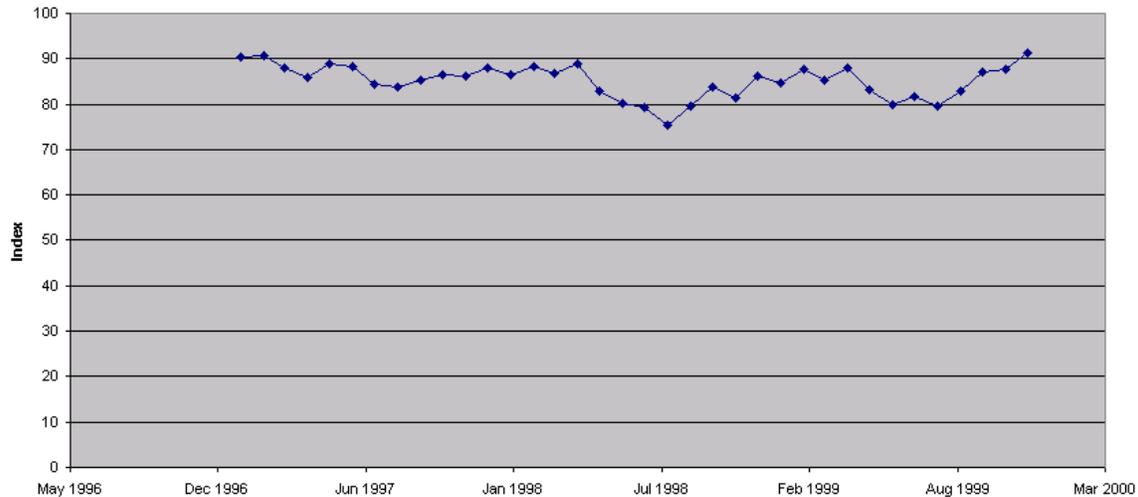
This increasing widening of the fiscal deficit resulted with a huge debt burden, most of the debt being short-term in maturity and foreign currency denominated[22].

In addition to the deficit and growing debt, external terms of trade had also been worsening which was due to a fall in international prices for Russia's primary exports[23]. Thus, adding to the current account deficit and putting the crawling exchange rate under pressure.

Interest rates were increased sharply to help cope with the weakening of the balance of payments. Until the summer of 1998, the Russian central bank managed to successfully maintain the Rouble within its band at the expense of a loss of foreign reserves.

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[21] **Goldfajn & Baig** , (2000)

[22] These short-term government bonds were known as GKO's and were officially created in 1993.

[23] Russia's external terms of trade had deteriorated by almost 18 % by mid-1998.

Figure II.18 CPI
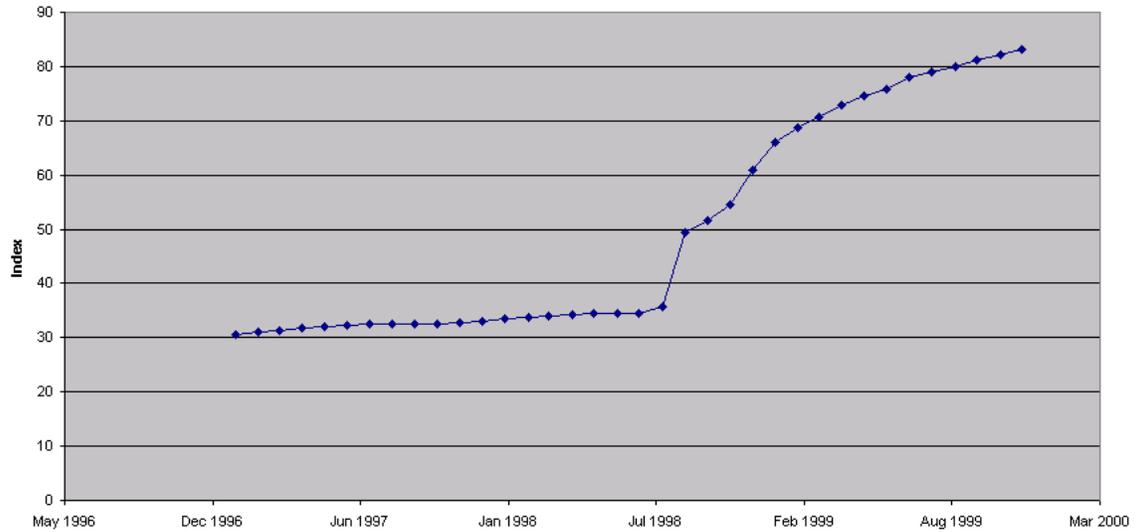
This depletion in reserves has also been associated to the Russian Government's failure to implement decisive fiscal adjustments.[24]

These factors resulted with a rapid outflow of capital as investors rushed to withdraw their funds from the country as it was becoming more and more inevitable that the Russian authorities could not keep the Rouble in its band for much longer. As market participants continued to exit the government debt market, foreign reserves dropped drastically. In addition to capital flight, a large number of banks had invested heavily in treasury bills and had exposed themselves to currency risk by borrowing in foreign currencies.

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[24] **Goldfajn & Baig** (2000)

Table II.19 Foreign Reserves
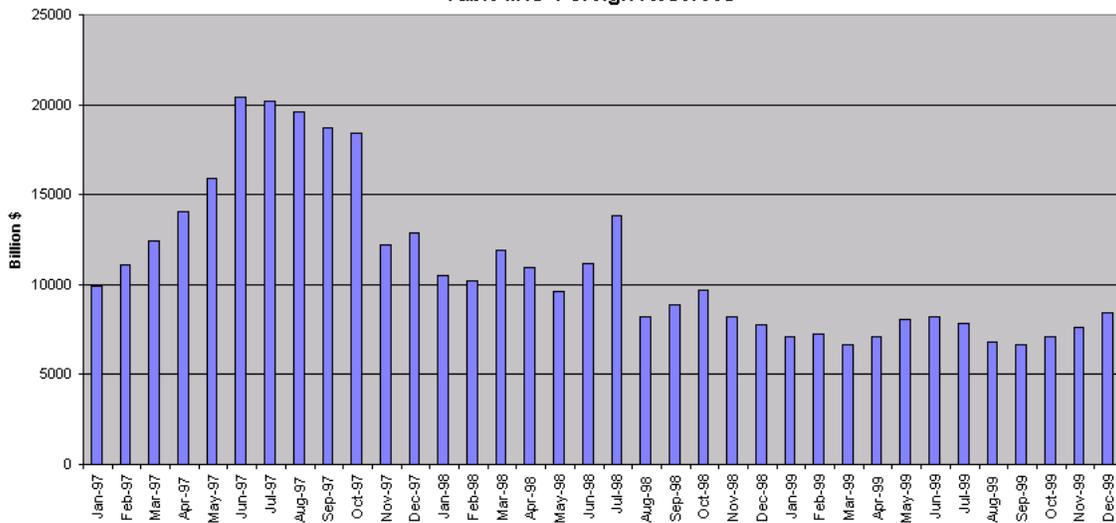
In July 1998, the situation in Russia was worsening, reserves were falling and credit availability had been declining, whereas the government had to roll over $ 1 billion a week in short-term debt. Current policies at the onset of the crisis were obviously not a valid choice and could no longer be continued. Russia's crisis recovery program came in the form of a $ 22 billion IMF-package.

Figure II.20 Trade Balance
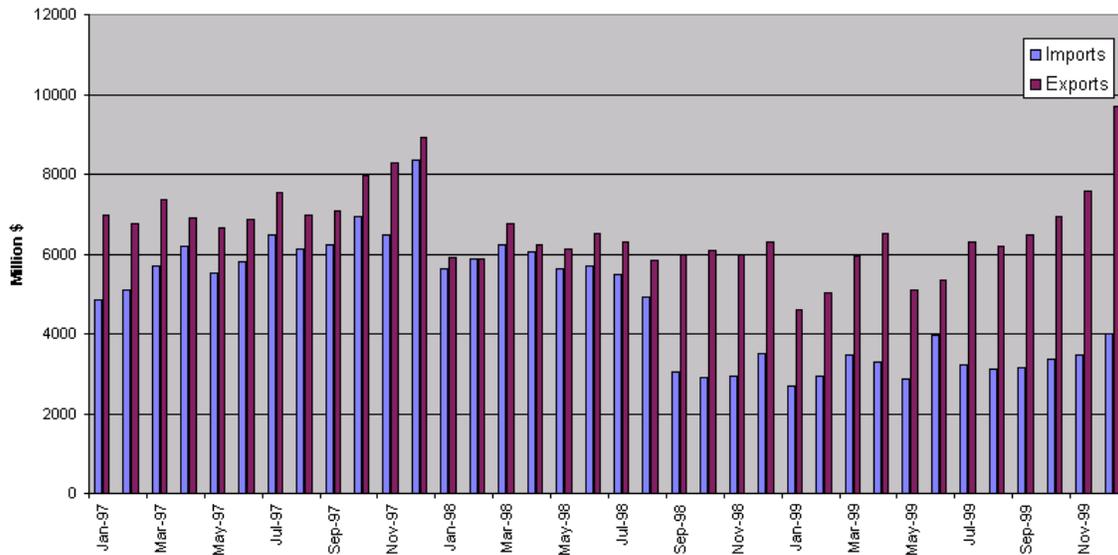
In return for the loan the Russian government would undertake major tax reforms and a voluntary debt-restructuring scheme for short-term government bond-GKO- holders to

switch to longer-term dollar obligations. But after the Duma rejected two crucial tax measures, serious doubts were raised about Russia's policy commitments[25].

The Russian government announced a restructuring of Rouble-denominated short-term government debt and a de facto devaluation by widening of the exchange rate band, which would subsequently be abandoned altogether in September 1998, allowing the Rouble to float[26].

A 90-day unilateral moratorium was imposed on the repayment of private external debt and the government started negotiations with creditors for a rescheduling of debt that was due 1999 and 2000.

Figure II.21 - Nominal Exchange Rate
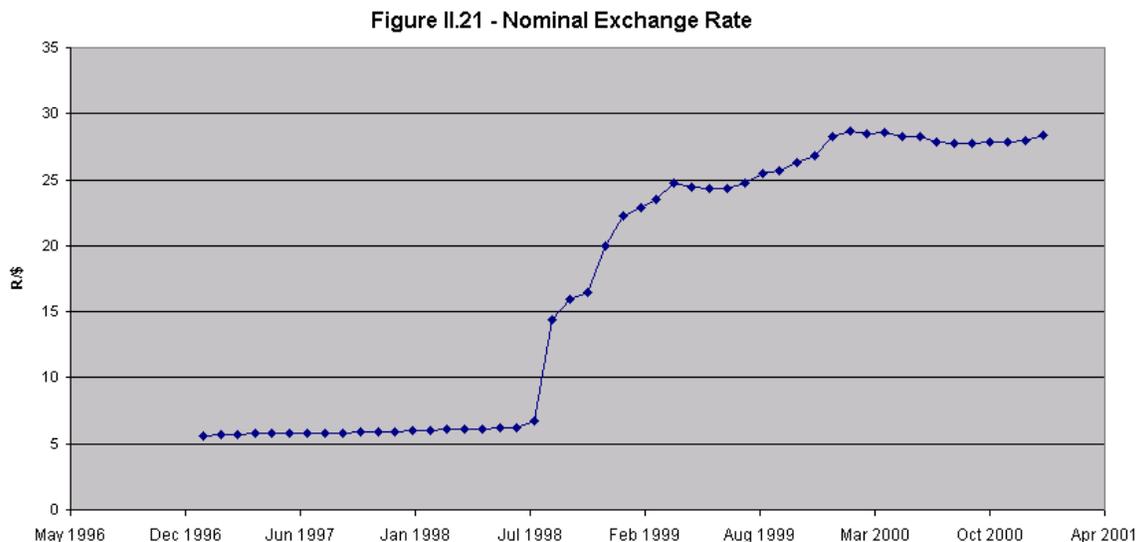
The results of the Russian crisis in comparison to those of the ones that had preceded it were somewhat different. Russia's crises, resulting with default on sovereign debt, proved to have international spillover effects on not just regional and other emerging

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[25] **Hahnel**   (1999)

[26] As a response the IMF suspended any further disbursements of the $ 22 billion deal, only to return to Russia with a new deal, since the Russia government was about to default on IMF payments as well. (Hahnel, 1999)

markets but also on developed countries[27]. The near collapse of the U.S. Long Term Capital Management hedge Fund (LTCM) in September 1998 is an example of this spill-over effect[28].

The Russian crisis was also unique in a sense that it had an impact on countries with very little in common, defying traditional explanations of contagion models that were

Figure II. 22 Stock Market Index
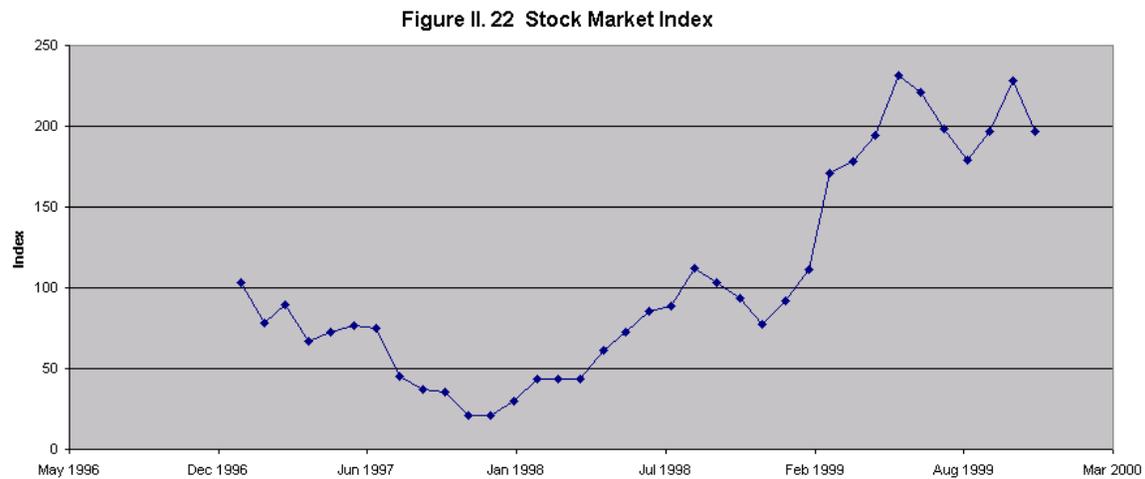
based on trade links, competitive devaluation and regional effects, opening up a whole new range of contagion literature trying to explain this phenomena[29].

In conclusion, the fundamental problems that led to a financial crisis in Russia were not in the corporate or financial sector, but more in the public sector. The crisis did not start within currency or capital markets but through the international bond market.

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[27] **Dungey et al.** (2002)

[28] The duration of the LTCM crisis was to be short-lived, lasting only a few weeks due to aggressive intervention by the Federal Reserve. The Fed came up with a huge bailout plan by cutting interest rates sharply and encouraging 14 banks to invest in the hedge fund for a stake in the firm to save it.
 (Dungey et al.   2002)

[29] **Goldfajn & Baig** (2000)

III. Policy Responses to Financial Crises: IMF- Supported Programs and Capital Controls

Counties have developed various policies to cope with crisis. As opportunities to borrow from international markets became limited, and in most cases impossible, some countries had no option but to turn to the IMF for assistance in crisis management, and in return were required to undergo IMF designed and monitored fiscal and monetary policies and structural adjustment programs.

(A) IMF-Supported Crisis Recovery Programs and Policies

IMF supported crisis-resolution packages that come under the names of stand-by arrangements and enhanced fund facility, are typically aimed at restoring confidence in markets and stemming further capital flow, involving tightened macroeconomic and fiscal policies accompanied by structural adjustment[30].

Fiscal, monetary and structural policies are instituted in way that help adjust public sector imbalances, maintain interest rates at sufficiently high levels to compensate investors for higher risk and attract new flows, and address structural issues such as weaknesses in the banking and corporate sectors.

IMF – designed stabilization and adjustment programs would prescribe the following remedies for crisis recovery[31]:

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[30] **Ghosh et al.** (2002)

[31] **Ghosh et al.** (2002) and **Hahnel** (1999)

● **Monetary Austerity:** Tightening the money supply so that it would lead to the increase of domestic interest rates, which would attract new capital into the economy and stabilize the value of the local currency. But this policy has been highly criticized on the basis that it worsens further the performance of the real sector, which, as a result of the crisis had been declining already. High interest rates do not help in boosting private consumption and investment.

● **Fiscal Contraction:** Government spending is cut dramatically and sources of tax revenue and collection are increased. This policy is also opposed to on the same basis as above.

● **Acceleration of Privatization:** State – owned enterprises are sold off to the private sector. Closing insolvent banks and merging or selling banks with liquidity and capitalization problems.

● **Financial Liberalization:** Restrictions on the inflow and outflow of cross-border capital movements and the operations of foreign corporations and banks are removed.

● **Structural Adjustment:** Establishing or strengthening the prudential and regulatory system of the financial and corporate sector.

(B) Capital Controls

Starting from the early 80's, the rapid liberalisation of capital accounts in emerging markets and transition economies all over the world have led to immense volumes of capital flows from developed countries to these emerging markets.

Many developing countries have benefited highly from the surge in cross-border capital flows. However, not all countries were able to enjoy high volumes of capital inflow; statistics show that the main recipients were amongst the rapidly industrialising economies and the middle-income countries.

Table III.1. shows the distribution of private capital inflows to these middle-income and rapidly industrialising countries, for the first half of the 90's, when cross-border capital flows were at their highest volume.

Table III . 1   Distribution of Private Capital Flows (Billion $)

country	1990	1991	1992	1993	1994	1995	1996
China	8.1	7.5	21.3	39.6	44.4	44.3	52.0
Mexico	8.2	12.0	9.2	21.2	20.7	13.1	28.1
Brazil	0.5	3.6	9.8	16.1	12.2	19.1	14.7
Malaysia	1.8	4.2	6.0	11.3	8.9	11.9	16.0
Indonesia	3.2	3.4	4.6	1.1	7.7	11.6	17.9
Thailand	4.5	5.0	4.3	6.8	4.8	9.1	13.3
Argentina	-0.2	2.9	4.2	13.8	7.6	7.2	11.3
India	1.9	1.6	1.7	4.6	6.4	3.6	8.0
Russia	5.6	0.2	10.8	3.1	0.3	1.1	3.6
Turkey	1.7	1.1	4.5	7.6	1.6	2.0	4.7
Chile	2.1	1.2	1.6	2.2	4.3	4.2	4.6
Hungary	-0.3	1.0	1.2	4.7	2.8	7.8	2.5

Source :   World Bank , Global Development Finance (1997)

Looking at Table 1, we can see that China, Mexico and Brazil were the countries that got the lion share of private capital flows throughout this period. The 12 countries listed in the table above, between themselves, accounted for almost three-fourths of total capital flows[32].

Before 1993, there was a lot more equality in the distribution of private capital among these 12 countries. And when we approach the end of the period, in 1996, we can see that China is the largest recipient of private capital, by attracting more than 50 Billion $ in private capital inflows.

There is a wide range of literature on capital controls: The economic mainstream has been divided into two about the justification and effectiveness of the use of capital controls.

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[32] **Doraisama**   (2001)

More conservative economists such as Dornbush (2000) have claimed that capital controls are not effective in recovery from financial crisis. A number of economists, such as Krugman (1999), argue that globalisation has simply gone too far and that free capital mobility has rendered the international financial system fragile and unstable. Another name with a parallel view is former World Bank Chief Economist Joseph Stiglitz (1999), who states that developing countries need to manage volatile markets by considering policies that help stabilize the economy, including Chilean style capital controls. This suggestion has also been put forward by Ito and Portes (1998) and Eichengreen (1999).

The idea of using capital controls in order to reduce macroeconomic instability is not a new concept. James Tobin (1978) suggested taxing foreign exchange transactions to help reduce speculative attacks. In the mid-90's, Tobin's proposal was discussed again after the EMS crisis broke out. Eichengreen and Wyplosz (1993) claimed that Tobin taxes could be used to discourage short-term speculators from betting against the British Pound and the Italian Lira.

However, the majority of economists conclude that open capital markets and full currency convertibility are extremely important aspects of economic development and growth, and that it is absolutely crucial to open up the capital account and make the domestic currency fully convertible in order to establish a deep and efficient financial system. The argument is that capital controls should be used when the economy is undergoing a transition process and the financial infrastructure is incomplete and markets do not function efficiently. See Eichengreen (1999a)

i- Why do Countries Use Capital Controls ?

Various forms of controls on capital account transactions have found areas of practice all over the world in the last two decades, but especially in emerging markets throughout periods of financial crises in the second half of the 90's.

Economic literature holds many arguments in the justification of capital account restrictions. These reasons are very tightly related and because they carry common characteristics, it is hard to distinguish clearly between the different motives that direct countries into imposing capital account restrictions. In a world of asymmetric information

and adverse selections, capital controls could offset the adverse effects that would be brought on by market imperfections, thus contributing to a general increase in economic welfare[33].

Many different motivations lay behind the implementation of capital controls across various countries.

One reason for using capital controls is to provide governments assistance with the management of balance of payments and macroeconomic policies. Countries, in particular, ones with weak balance of payments, have often turned to this claim to justify the usage of capital controls.

Another motivation for using capital controls as macroeconomics management is to provide governments with debt servicing facilities. When a country comes up upon a problem in financing the balance of payments or fiscal deficit, it can use capital controls to maintain its facility to finance this deficit by means of low interest rates. In this context capital controls can be used to reduce the domestic debt servicing costs by keeping domestic interest rates low by imposing some form of a ceiling.

But this is not considered to be a sustainable method, because keeping domestic interest rates artificially low will lead to a decline in domestic savings, thus making domestic assets less attractive for investors. An interest rate ceiling could also lead to the creation of an offshore market for the national currency, due to a large interest rate differential.

Capital control measures have also been used for the justification of providing governments with monetary autonomy. Controls help to reconcile conflicting domestic and external policies. Countries are faced with a dilemma while implementing domestic interest rate policies and determining exchange rate systems. If authorities were in a

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[33] Developing country economies are faced with weak financial infrastructure. Institutions in the form of banks and other financial institutions, and the prudential and supervisory system are underdeveloped; therefore financial markets cannot operate efficiently. Capital controls, when implemented during this transition or development period, can help to mitigate the adverse effects that rapid liberilization and intense capital inflows can bring on.

situation where they were required to tighten monetary policy, depress domestic interest rates, then this would lead to pressures to depreciate the exchange rate.

However, imposing capital controls could help avoid this situation. For instance, if for some reason a surge of capital outflow were to take place, this would normally lead to a loss of reserves in an attempt to preserve the exchange rate, or if reserves were not sufficient, would ultimately end up with the depreciation of the currency. But if capital controls on outflows were to be used, and then there would be no need to tighten monetary conditions, since controls would ease the outflow of foreign exchange, thus maintaining the exchange rate.

Similarly, if a country is experiencing high volumes of capital inflow, unless sterilization[34] takes place, this would lead to inflationist pressures on the economy. A rapid increase in the foreign currency base caused by capital inflows, will lead to inflation because basically the amount of money in the economy has increased, and if this money is not sterilized by the central bank it will increase the domestic inflation rate.

Also, an increase in foreign currency reserves will cause the exchange rate to appreciate, thus causing exports to decline, and creating adverse effects on the balance of payments.

The main goal for these governments is to sustain monetary and financial stability against rapid inflows or outflows of capital. Therefore, in times of rapid capital inflows, countries can use capital controls to prevent inflationist pressure and the real appreciation of the exchange rate, and when experiencing capital outflows, controls on capital account transactions can be used to avoid currency depreciation, without having to compromise control over domestic monetary conditions[35].

Capital controls have also been used in an attempt to mitigate risks involved with asymmetric information problems and herding behaviour in capital and money markets. Due to these problems, capital flows, short-term in particular, and exchange rates are prone to high volatility.

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[34] **Sterilization interventions :** Open market operations, measures to reduce the money multiplier, including increases in the statutory required reserves for banks, and transferring government banking deposits to the central bank.

[35] **Johnston & Tamirisa** (1998)

Capital control measures have been designed to control short – term inflows, especially speculative transactions on currency, in order to defend the exchange rate and prevent runs on currency. Governments, in order to protect themselves from these kinds of speculative attacks that could lead to runs on currency, huge losses in international reserves, and potentially a full-blown financial crisis, put into practice capital controls on short-term inflows.

These controls are usually in the form of direct or indirect taxation on short-term flows and transactions, usually referred to as a 'Tobin Tax'[36]. Various types of taxation will be examined in more detail further on in the paper.

Countries that maintain a fixed exchange rate system also turn to capital controls to help protect this regime. In an economy where exchange rates are not free to float, short-term flows of capital could potentially lead to volatile fluctuations in exchange rates, domestic interest rates, and international reserves, which could all contribute to the eventual collapse of the fixed exchange rate regime, and possibly ending up in financial crisis. So, countries have justified using capital controls in order to help preserve the fixed exchange rate regime[37].

Another usage of capital controls for macroeconomic policy management is preserving the value of the national currency. Under a fixed or rigid exchange rate regime, capital controls help maintain the fixed rate. In the case of rapid capital inflows, currency pours into the economy, causing an appreciation of the national currency that would lead to the exchange rate falling.

When an economy is experiencing capital outflow, the exchange rate system in practice plays a very important role; when fixed, rapid outflow could cause a depletion of foreign reserves that could lead to the eventual collapse of the currency, thus the exchange rate system. If the system is flexible, then outflow will cause the national currency to systematically depreciate, creating uncertainty amongst international market participants. Capital controls can assist governments to preserve a fixed exchange rate or prevent a flexible one from depreciating rapidly. When restrictions or absolute prohibitions are

[36] **Tobin** (1978)

[37] **Krugman** (1979)

placed on currency exiting domestic markets, in the short run, this will prevent a loss of reserves and exchange rate from raising dramatically, thus a possible currency crisis. When there is capital inflow creating real appreciation of the currency and inflationist pressure on the economy, controls limiting the amount and cost of capital entering domestic markets will prevent the exchange rate from falling, thus maintaining it at its fixed level or keeping it within its predetermined band[38].

Inadequate development in domestic financial markets and institutions is also another rationale for the use of capital controls.

The desire to protect infant industries is one example. The infant industry argument tries to justify the implementation of temporary tariffs, quotas and other barriers to trade. It argues that tariffs imposed on trade will protect the infant industry, and help it realise economies of scale and thus increase output and income. Infant industries argument also states that, by means of protection, the industry will move up the learning curve, meaning that it will lower the costs involved in the production process by learning to do so in repeated production. Protecting infant industries is most often justified in the case when the financial infrastructure is weak, where markets and institutions are unable to function efficiently. Since financial markets are not able to function efficiently and allocate funds to investment opportunities, it will be difficult to obtain the necessary funding for promoting infant industries and supporting them to become competitive on an international basis. In this sense, capital controls could help to promote infant industries by making up for market imperfections in the financial sector by allowing funds to be allocated towards these industries.

Nonetheless, it is a rather difficult task to justify protection in any economy, since the costs and benefits involved are hard to evaluate. Various studies indicate that taking measures that would directly work towards the elimination of the distortion in financial markets and institutions would be a far more effective method for supporting infant

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[38] **Johnston & Tamirisa** (1998) , **Ghosh et al,** (2002) and **Ariyoshi et al.,** (1999)

industries. Subsidization and improving the financial infrastructure would help prevent adverse effects on consumption and other domestic sectors and industries[39].

Another reason to why countries turn to capital controls is to establish or preserve the prudential framework of the financial system. In countries where the ability to sufficiently design, implement and enforce prudential measures is limited because the prudential and supervisory institutions are in the process of being developed, authorities may turn to capital controls for prudential motives.

International financial transactions involve various types of risks such as, transfer risk, sovereign risk and country risk. These risks involved in trading financial assets in international financial markets are rather different and higher in comparison to risks that are inherent in trade in goods and services. Financial transactions and flows are, in essence, uncertain. What they basically are is a whole range of promises to pay in the *future*. However, in a world where the *future* is uncertain and tightly associated with numerous risks, costs and distortions, evaluations of financial transactions, ex-ante and ex-post, can be significantly different.

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[39] **Johnston & Tamirisa** (1998)

The infant industry argument is often referred to as a 'second best solution'. In an economy, suffering from a certain distortion that is very hard to undertake directly, the addition of another distortion that would offset the initial one, could make it possible to increase welfare. The first best solution would, of course, be to implement policies that would work towards eliminating the underlying distortion. These distortions that most developing and transition countries tend to suffer from can be listed as asymmetric information and free rider problems, weak or insolvent banking systems, moral hazard and adverse selection problems due to official guarantees and insufficiently developed financial markets. These various distortions can lead to sub-optimal levels of equilibrium and herd like behaviour resulting in runs and panics.

Therefore, controls in the form of differential requirements for transactions on foreign securities in the domestic market, such as listing and trading, could be used in order to mitigate the adverse effects that different supervisory and accounting standards and difficulties in enforcement in the different national jurisdictions could potentially create.

Capital controls can help to control excessive foreign exchange exposure of domestic banks and other financial institutions, and help make their maturities on liabilities longer. Therefore, maintaining the stability of the financial system can also be considered another rationale for the use of capital controls. But restrictions on the capital account may lead to an increase in investment risk by thwarting portfolio diversification, and they can also reduce liquidity and thus the overall quality of domestic financial assets by slowing down the growth and development of financial markets and institutions.

As a result, controls that intend on limiting the volume and composition of flows and transactions could be justified in an environment where the financial system is unsound and the country faced with this problem does not have sufficient time to restructure the financial system and design, implement and enforce the required prudential measures. So, in this case capital controls can only be justified for a temporary period of time, once the financial infrastructure is established and the required prudential standards are met, restrictions on capital flows will need to be lifted in order to prevent distortions within the economy.

Countries may also turn to capital controls for reasons associated with security, domestic politics, and social and cultural related issues. The domestic political economy aspect of capital controls is a matter outside the scope of this study, therefore, will not be examined further on in the paper, when taking a look at the Malaysian capital controls.

All these various motives for imposing controls on capital account transactions have come into play in times of financial crises. Whether it is a banking crisis or a currency crisis, some countries have turned to capital controls, in an attempt to prevent capital outflows in order to alleviate attacks on the domestic currency, balance domestic interest rates, and smooth out balance of payments deficits.

Such controls are usually applied to short-term financial transactions, and are designed to hold long-term flows and direct foreign investments exempt from the imposed restrictions.

Capital controls, in this context, will be the main focus of this thesis and in the next section of the paper will be examined in further detail as a policy response to financial crises, along with the counterfactual policy response of IMF - prescribed recovery programs and various country experiences.

ii- Forms of Capital Controls

Restrictions on capital account transactions take various forms; they can be extensive and imposed on numerous aspects of the economy, as well as being limited to restrict specific activities and transactions.

There are two main types of capital controls : Administrative (direct) and Market based (indirect) controls.

Administrative (Direct) Capital Controls :

These types of capital controls are overt prohibitions, quantitative limitations and rule based or discretionary approval procedures on capital account transactions. The main purpose of administrative controls is to directly influence the volume of cross-border financial transactions and is carried out via the banking system under governmental obligations.

Because these controls are in the form of outright exclusions on capital account transactions, they have severe adverse effects on capital movements; therefore do not find a broad field of practice among countries.

Market Based (Indirect) Capital Controls :

Indirect capital controls aim at discouraging certain capital transactions and movements, rather than directly prohibiting them. Governments that intend on restricting certain capital flows and transactions of interest, do this by increasing the costs associated in engaging in such activities. The objective of indirect capital controls is to, either affect the price, or both price and volume of certain capital account transactions.

One way of creating such effects is through dual or multiple exchange rates. In these exchange rate systems, different transactions are subject to different exchange rates, rather than the one official exchange rate. Dual or two-tier foreign exchange markets come about in economies where authorities are trying to prevent speculative activities motivated by high short-term interest rates. The authorities attempt to divide the domestic currency market into two by requiring domestic financial institutions to discontinue lending to speculators. By doing so, the cost of speculative activities are increased, thus these kinds of undesired flows and transactions are reduced. Speculators' access to domestic credit required to create a net short domestic currency position, is made more costly, while at the same time, demand for domestic credit, which is of a non-speculative nature, can have access to it at the prevailing market rates[40].

Another effect that two-tier exchange rate systems create is that it can thwart the exchange rate from overshooting for current account transactions by helping the economy cope with excessive capital inflows.

While dual exchange rate systems help to reduce the volume of speculative capital flows and transactions, they allow foreign exchange transactions related to trade flows, foreign direct investments and equity investments to take place without being adversely affected, by holding these activities exempt from the two-tier market rates.

Other forms of indirect capital controls are direct and indirect taxation of cross-border movements.

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[40] **Ariyoshi et al.,** (1999)

Direct taxation discriminates between foreign and domestic assets and between residents and non-residents by imposing direct taxes and levies on international financial transactions, income in the form of foreign financial assets held by residents and income created by the holding of domestic financial assets owned by non-residents. These tax rates can be differentiated in order to discourage specific types of transactions and maturities, they aim at reducing the return on certain assets subject to controls and increasing their cost, thus causing a decrease in the engagement in such transactions.

Indirect taxation has been the most widely practiced form of capital controls on cross-border flows. These, in the form of non-interest bearing compulsory reserve requirements are referred to as unremunerated reserve requirements (URR). Under the URR, banks and other non-bank financial institutions are obliged to deposit a certain percentage of their inflows or net positions in foreign currency at a zero percent interest rate with the central bank.

URRs can also be differentiated to discourage certain undesired transactions and maturities. It aims to limit capital inflows by reducing their return. URRs increase the sensitivity of capital to domestic interest rates, thus can also help to control capital outflows when there is downward pressure on the local currency, because the URR percentage imposed can be increased at times like these, therefore increasing the cost of for banks to switch from domestic to foreign currency.

Not all types of capital controls aim directly at affecting the volume or price of capital account transactions in order to control capital movements. Some forms of capital controls aim at establishing a prudential framework. Such controls include; certain credit rating requirements to borrow abroad, provisions for net external positions of commercial banks, asymmetric open position limits discriminating between residential status and maturities, and reporting requirements for certain transactions such as derivative and non-trade related transactions with non-residents.[41]

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[41] **Ariyoshi et al.,** (1999)

(C) The Malaysian Capital and Exchange Rate Controls:

Under this heading I will examine the events leading up to financial crisis, and the subsequent capital account restrictions that Malaysia imposed as a recovery program. These restrictions came mostly in the form of direct and indirect controls on the outflow of capital, rather than restrictions to limit the volume and affect the price of cross-border capital inflows. Controls were aimed to put an end to attacks on the ringgit and eliminate the offshore ringgit market.

Although there have been, and still are, various countries other than Malaysia to have imposed capital account restrictions such as Chile, India, China, Russia, Romania and Thailand, however, none of them have been able to implement wide-ranging strict controls, particularly on outflows for the purpose of crisis recovery in a sense that Malaysia was able to.

Countries like Chile, India and China practice capital controls which are long-lasting and targeted to control capital inflows, thus not designed as temporary policy responses to financial crisis, so the controls that these countries have imposed are outside the scope of this study[42].

Other countries like Russia, Romania and Thailand have imposed temporary controls on capital account transactions in the context of financial crisis but, nonetheless, the experience of these countries will also not be included in this paper because these countries, did not carry out these controls until the end of the recovery program, at some point during the crisis, they abandoned the controls and turned to the IMF for assistance, therefore, they cannot be considered as implementing the counterfactual policy response to IMF-supported recovery programs, which in this study, is assumed to be capital controls

Malaysia's experience is unique in a way that it is considered to be the only country to apply wide-ranging capital controls, producing successful results in the recovery process;

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[42] Chile does actually have restrictions on capital outflows also, however, they were not designed in the context of financial crisis.

the controls implemented by the other listed countries were limited in scope, and only able to achieve partial, if any, success.

As a result, the only country among these to be included in the empirical section as a comparator to IMF designed recovery programs will be Malaysia.

Starting from the early 90's, the countries of South East Asia experienced a surge in private capital flows to the region in the form of portfolio and foreign direct investment.

These countries, often referred to as the *'Asian Tigers',* were hailed as the biggest success stories among developing countries by international markets.

In the summer of 1997, however, came the downturn as crisis broke out in Thailand, soon after spreading to Korea, Indonesia, Malaysia, and the Philippines. So-called contagion effects were not limited to the countries of South East Asia, this huge financial crisis was soon to hit a whole line of emerging economies and causing turmoil in domestic and international financial markets all over the globe.

One country took an alternative route to recovery:

Following the onset of the Asian crisis, Malaysia embarked on a wide-ranging policy of strict controls on capital flows and exchange rate transactions.

Instituting the complete opposite policies of IMF designed recovery packages included, rejecting the orthodox path by fixing the exchange rate followed by a 10% appreciation, imposing exit levies on capital, cutting interest rates and increasing government spending.

The controls were aimed to limit, directly or indirectly, the volume and/or the costs associated with various operations and flows such as; Bank and banking system transactions, portfolio and other investments, real estate transactions, stock market transactions, offshore ringgit market transactions, export and import of ringgit and foreign currencies, borrowing and lending in ringgit and foreign currencies, and swap and forward transactions.

i- The Build up to the Crisis and Underlying Vulnerabilities

When the capital control package was introduced on September 1 1998, the ringgit had come under extreme pressure and existing policies were believed to be unsustainable.

At the onset of the Asian Crisis, Malaysia's economic fundamentals looked to be relatively strong; its short-term external debt proportion was low in comparison to other countries in the region[43]. Low short-term debt that was well below its foreign reserves would make Malaysia less vulnerable to potential bank and currency runs.

Malaysia's overall indebtedness, however, was very high. As a result of the boom years, equity prices had increased immensely, which in turn had led to a lending surge. By mid-1997 Malaysia's domestic debt/GDP ratio stood at 170%, which happened to be one of the largest in the world[44]. Therefore, Malaysia was actually in a rather vulnerable position to a change in market sentiment because it had exposed itself to interest rate and credit risk through excessive borrowing.

When the Asian crisis broke out with the collapse of the Thai Baht, in response to the reversal of capital inflows to the region, Malaysian authorities, at first, embarked on an orthodox adjustment policy that was very similar to the IMF policies put into practice in neighbouring countries. According to this program, Malaysia carried out a contractionary fiscal policy by cutting government spending, and in order to prevent the ringgit from depreciating, increased interest rates and announced that it was committed to exchange rate flexibility.

However, these policies failed to succeed and the stock market hit record lows, the interest rate differential continued to grow, thus increasing the pressure on the ringgit, and consumption and investment demand declined dramatically, causing a decline in output and employment[45].

Meanwhile, offshore banks and other financial institutions, concentrated in Singapore, had been opening deposits for ringgit at rates that were a great deal higher than the prevailing rates in domestic markets, and used these funds to purchase foreign currency

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[43] This low short-tern debt ratio was a result of prior capital controls, imposed on inflows in 1994 in response to a surge of speculative inflows. The Malaysian authorities had imposed restrictions on the sale of short-term securities to foreigners. (Ariyoshi et al., 1999)

[44] **Rodrik & Kaplan** (2001)

[45] **Dornbush** (2000) and **Rodrik & Kaplan** (2001)

to speculate against the ringgit. Offshore ringgit deposits paid up to 20% to 40 %, in comparison to domestic rates that were prevailing at 2.5% due to the interest rate ceiling. This large rate differential led to substantial capital outflows. These speculative activities and the credit crunch brought on by capital flight were working towards the collapse of the ringgit.

Stemming capital outflows were of vital importance, because Malaysia had the world's largest stock market capitalization ratio at 310% of GDP (whereas the U.S. had a rate of 116%)[46]. Therefore, the markets that were facilitating speculative transactions on the ringgit and causing capital flight were precisely what the Malaysian authorities sought to eliminate.

At the onset of the implementation of capital controls, Malaysia's attempts at mitigating the effects of crisis were proving to be unsuccessful, therefore a new range of policies were at need. Since the orthodox program that mimicked an IMF program had been failing, turning to the IMF for assistance did not seem to be a viable option.

At this point, if Malaysia were to take no action, speculative attacks on the ringgit would have continued, eventually resulting with the collapse of the national currency, meaning a large devaluation.

This would have been an inevitable outcome because the central bank, as explained in section II, in defending the currency pumps in foreign currency into the market by buying the national currency using its foreign reserves, however, reserves are limited since it is in another country's currency; the central bank cannot simply print more money.

The deteriorating situation in international markets, further worsening with the Russian and LTCM crises breaking out in the summer of 1998, caused a serious decline in credit availability, which Malaysia was unable to overcome by increasing interest rates. The interest rate differential was also growing and more and more currency was leaving the domestic markets towards offshore markets, therefore, speculative attacks were also increasing. Thus, there was no evidence that the attacks would be subsiding soon. All this meant that the Malaysian government had no option but to modify its prevailing policies.

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[46] **Rodrik & Kaplan** (2001)

This modification came in the form of an absolute change in fiscal and monetary policy: All encompassing capital and exchange rate controls.

ii- The Control Package:

On September 1, 1998, Malaysia introduced a number of selective capital and exchange control measures along with polices of reflation, specifically targeting the segmentation of domestic financial markets from offshore ringgit markets, which authorities believed was the main source of the speculative attacks taking place against the national currency[47].

These measures were aimed at limiting short-term flows and at the same time not scaring off long-term flows and foreign direct investments, by keeping these desired transactions and flows exempt from these controls.

The capital controls of September 1, 1998 were continued throughout the remainder of 1998 and eventually eased and lifted through 1999 to 2000.

Capital Control Measures Introduced:

● Bank Negara Malaysia decreased the 3-month intervention rate from 9.5% to 8 %, and the liquid asset ratio from 17% to 15% of total liabilities.

● The exchange rate, ringgit, was fixed at 3.80 RM = 1 US$

● All amounts of ringgit held in offshore accounts was required to be repatriated by October 1998, through Bank Negara Malaysia (BNM) approval subsequently. Approval requirements were introduced to transfer funds between external accounts and for non-permitted funds such as the purchase of ringgit assets. Ringgit assets that had previously been allowed up to a certain limit were now prohibited to even licensed offshore banks.

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[47] **Meesook et al.** (2002)

● A previous limit on residents granting or receiving credit facilities to and from non-resident stock broking companies and correspondent banks was changed to a total prohibition.

● Also, export and import of ringgit was by resident and non-resident travellers was restricted. Residents were prohibited from taking more than RM 10,000 out of the country in the form of banknotes or travellers checks. Non-residents were forbidden to take out more than RM 1000. These controls were enforced by random searches at airports.

● All settlements regarding imports and exports were required to be resolved in foreign currency.

● Measures were taken to make all purchase and sales of financial assets in ringgit to be effected solely through authorized depository institutions. Trading in Malaysian shares on the Singapore market was prohibited. This measure was to enforce more effectively the existing law that required Malaysian shares to be registered on the Kuala Lumpur Stock Exchange (KLSE) prior to trade.

● Non-residents were required to convert all amounts of ringgit held in external accounts into foreign currency. The purchases of ringgit assets, conversions of profits, dividends, interest, and other permitted purposes were excluded from this restriction.

● Non-residents were required to wait 12 months to convert ringgit proceeds from the sale of Malaysian securities held in external accounts. Foreign direct investment, repatriation of interest, dividends, fees, commissions, and rental income from portfolio investment were held exempt.

Capital Control Measures Eased and Lifted :

On February 1999, the 12-month waiting period required for repatriation of portfolio capital was replaced with a two-tier exit levy system. This was done in order to prevent a potential outflow in September 1999 when the holding period would expire, and to attract new inflows :

● A graduated tax was levied on the repatriation on the principal of capital investments like shares, bonds and other financial instruments, that were made before February 15, 1999. This tax decreased over the duration of the investment. The tax was 30% if repatriated less than 7 months after entry, and 20% if repatriated in seven to nine months, 10 % if repatriated in 9 to 12 months, no tax if repatriated after 12 months.

● A graduated tax was applied to the repatriation of profits from investments made after February 15, 1999 in shares, bonds, and other financial instruments. This was also a decreasing tax, 30% if repatriated in less than 12 months after the profit was realized, and 10% if repatriated after 12 months, no tax was imposed on capital repatriation.
Investors in the technology and growth stock market MESDAQ were exempt from these exit taxes.

● This two-tier exit levy was replaced with a flat 10 % tax rate on repatriation of profits on portfolio investments in the September of 1999.

● Also in September 1999, controls on lending in ringgit to foreign stock broking companies was eased. Domestic commercial banks were now allowed to make short-term currency swap arrangements with non-resident intermediaries.

● In September 2000, licensed offshore banks were allowed to invest in ringgit assets and instruments in Malaysia, but only for their own accounts and not for their clients.

● In February, 2001The exit levy on profits repatriated after one year was lifted. Portfolio profits that were repatriated within one year remained to be subject to a 10% exit tax.

● In May 2001, this 10% tax was altogether abolished.

iii- The Post-Treatment Environment: Results of the Controls

The capital control package introduced in September 1998 was a policy response to currency crisis that had started as intense speculative attacks against the national currency. The controls were of a temporary nature and were eased and eventually lifted within a year or so.

Early reactions to the control package of September 1998 indicated that it did not go down well among international markets and all rating institutions downgraded sovereign credit ratings.

Figure III.1 Industrial Production Index
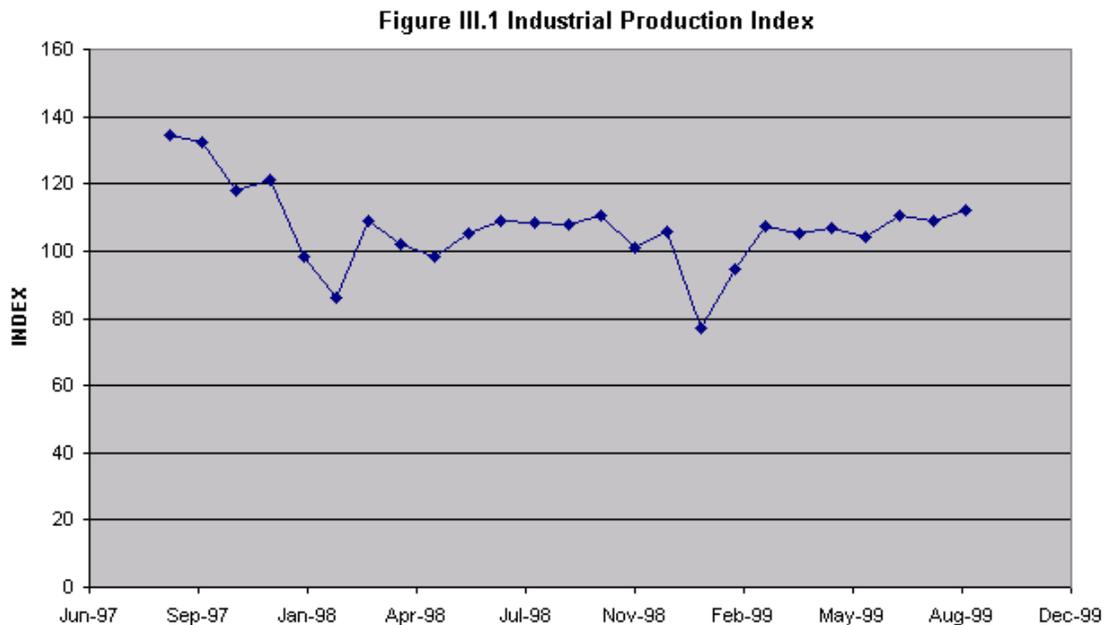
Table II.2 shows sovereign credit ratings by Standard & Poor's and Moody's for the time period of interest.

Table III . 2 : Sovereign Credit Ratings

Period	Standard & Poor's	Moody's
1998-Q1	A	A2
1998-Q2	A-	A2
1998-Q3	BBB-	Baa3
1998-Q4	BBB-	Baa3
1999-Q1	BBB-	Baa3
1999-Q2	BBB-	Baa3
1999-Q3	BBB-	Baa3
1999-Q4	BBB	Baa3
2000-Q1	BBB	Baa3
2000-Q2	BBB	Baa3
2000-Q3	BBB	Baa3
2000-Q4	BBB	Baa2

Source : Meesook, Kanitta et al.,   IMF Occasional Paper 207

Looking at Table II.2 , we see that Malaysia outlook and credit rating was downgraded with the institution of the controls. In the third quarter of September 1998, S&P downgraded Malaysia's credit note from A- to BBB- , and Moody's changed it from A2 to Baa3.

Figure III.2 - Nominal Interest Rate
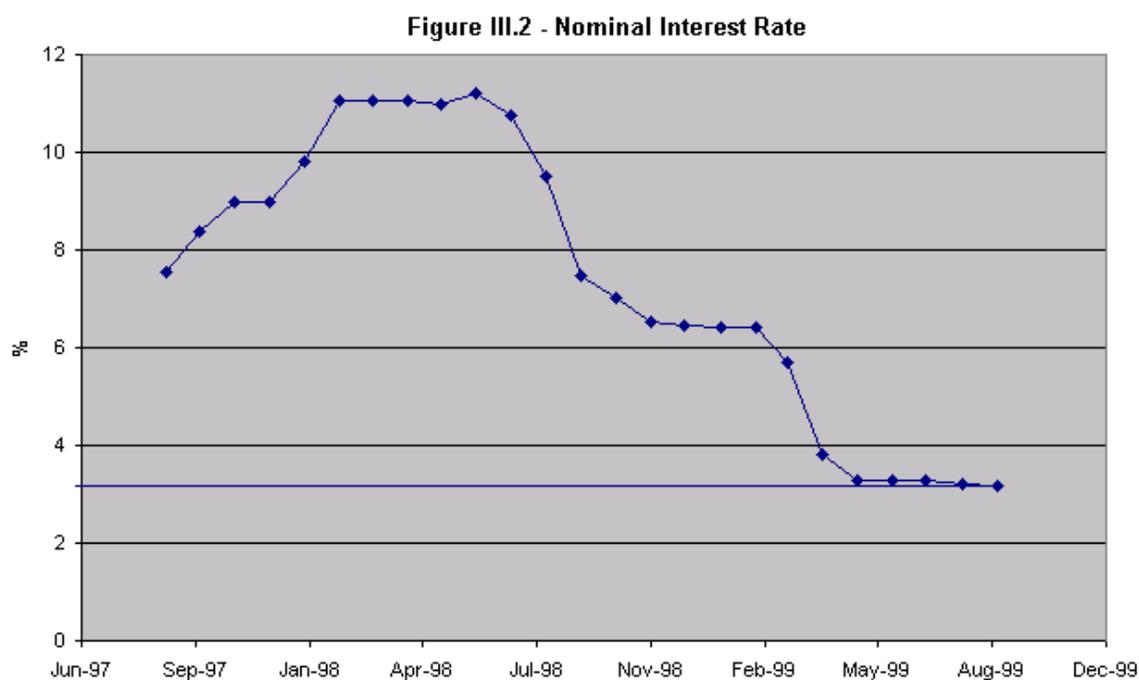
Following the easing of controls in 1999 and a general return of confidence to the region, rating agencies started to upgrade Malaysia's outlook and ratings. International money and capital markets were once again opened up for Malaysia; In May 1999, the government, in order to test investors' sentiment and to establish a sovereign benchmark in international financial markets, issued a 10-year global bond of $ 1 billion[48].

As a result, the controls only had a temporary adverse effect on Malaysia's access to international financial markets and short-term borrowing. After the controls were eased and the economy had started to show signs of recovery, access to international markets was granted.

Figure III.3 - Nominal Exchange Rate
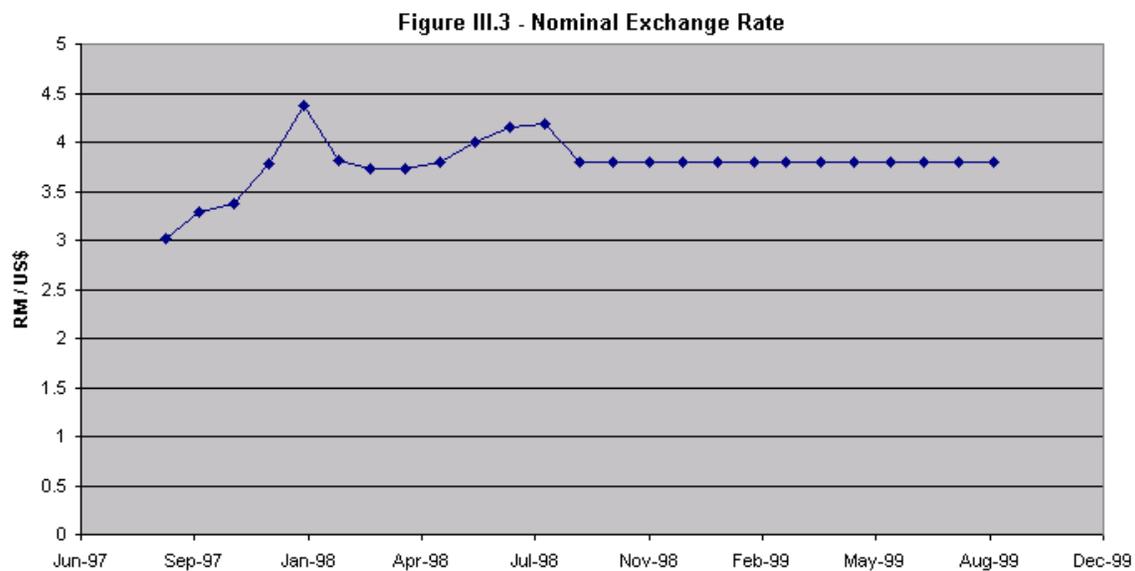
Data on economic performance following September 1998 shows that Malaysia's choice of crisis management proved to be a successful one. Malaysia's post-treatment economic performance in comparison to other countries that were subsequently hit by crisis and embarked on totally different crisis recovery programs than capital controls is, however, is another question and will be answered in the next section of this paper.

By the summer of 1999, industrial production had risen to its pre-crisis level, nominal interest rates dropped, foreign reserves began to consistently build up again, the stock

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[48] This bond issue was the first in almost ten years for the Malaysian government.

market index went up from 370 points at the time the controls were imposed to 850, 10 months later, and the trade balance also improved.

What was it that had led to such an improved economic environment? Was it the control measures themselves, or could it be attributed to a general improvement in the international economic situation and a return of confidence to the area? The latter reflects the mainstream view; economists have stated that it is difficult to attribute such success to the controls since countries that had implemented IMF recovery programs such as Korea and Thailand had also shown recovery at around the same time[49]. Rodrik and Kaplan, however, argue that upon taking into account the timing of the implementation of recovery programs, Thailand and Korea's modification of prevailing policies had been 9 to 15 months before Malaysia's September 98 package, therefore, to argue that these countries recovered at just the same speed as Malaysia did makes no sense. In addition, Malaysia had missed out on the huge amount of capital injections made with IMF loans, so, Korea and Thailand had a rather significant advantage over Malaysia when the controls were put into practice.

Figure III.4 - Stock Market Index
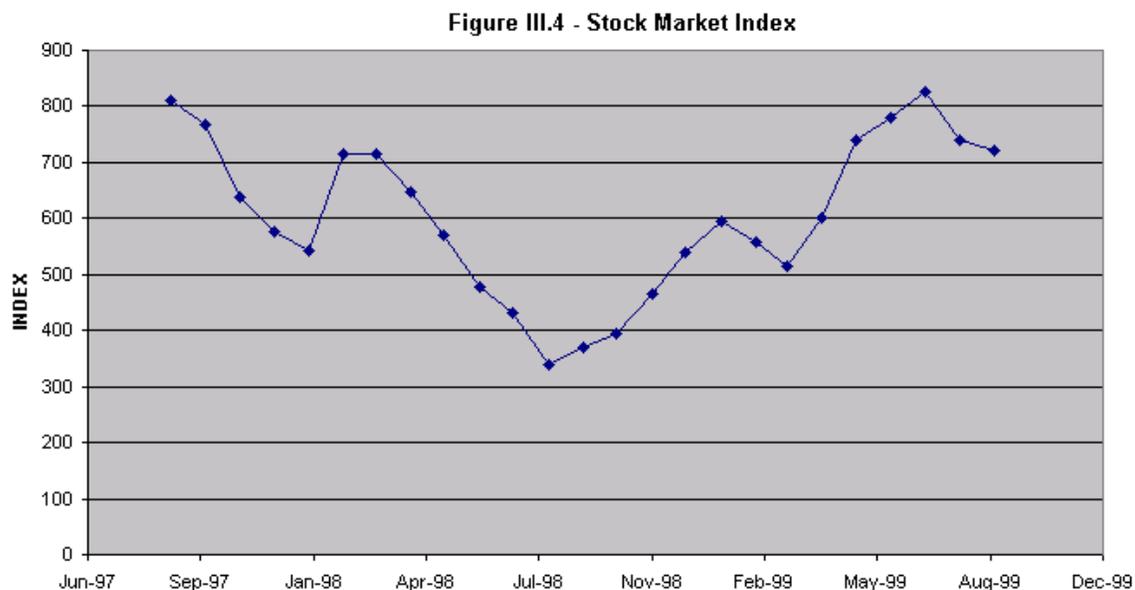
Even economists that had previously seemed to be supporters of capital controls were hesitant about the success of Malaysia's controls, and claimed that the controls came at a

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[49] **Lim**   (1999)

time when effects of the Asian Crisis were beginning to subside[50]. Again, Rodrik and Kaplan make a counter argument by claiming that in the September of 1998 financial crisis in Malaysia was not at all abating, on the contrary, pressure on the ringgit remained to be high even months after the Baht and the Won had began to consistently appreciate[51].

Therefore, it is arguable that the situation that Malaysia was faced with in September 1998 was very similar to that Korea and Thailand faced more than a year earlier. This is the basis that I will compare Malaysia to countries that experienced crisis after September 1998. The situation Russia, Brazil and Turkey were up against were similar to that of Malaysia's.

So, what aspects of these capital controls made them successful in helping Malaysia overcome a severe financial crisis?

Figure III.5 - Imports-Exports Growth Rates
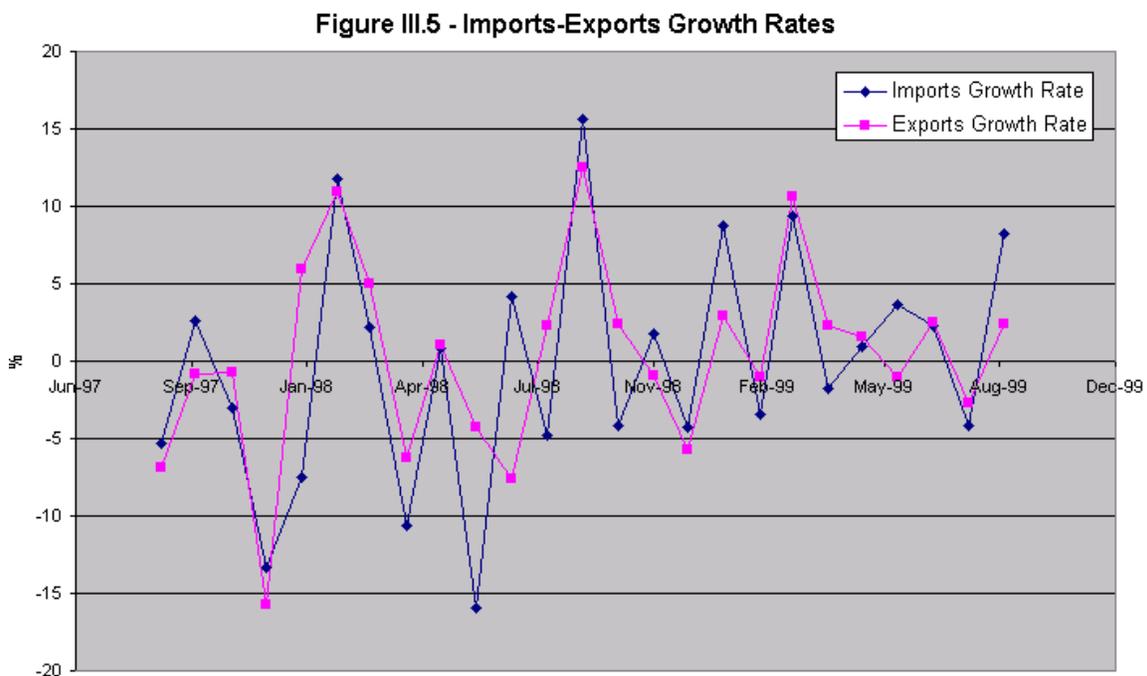
The controls were implemented and practiced to full effect. There is no evidence implying that these controls were circumvented on a major scale. They also did not lead

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[50] **Krugman** (1999) and **Jomo** (2001)

[51] **Rodrik & Kaplan** (2001)

to the creation of a black-market for currency, nor did they cause the forward market to become non-deliverable[52].

The design of the controls helped prevent circumvention. The control package of 1998 was selective in a way that it targeted the offshore ringgit transactions and portfolio flows, but at the same time exempted current account transactions, foreign direct investment and long-term investments. So, for transactions regarding trade and direct investments, there were really no outright incentives for circumvention[53].

Also, the controls were designed to close all channels for leakage of ringgit offshore and the non-residents access to ringgit by making them comprehensive. Another reason why the controls were not circumvented was that strict monitoring and regulation of the Bank Negara Malaysia was able to enforce them very effectively.

Figure III.6 - CPI
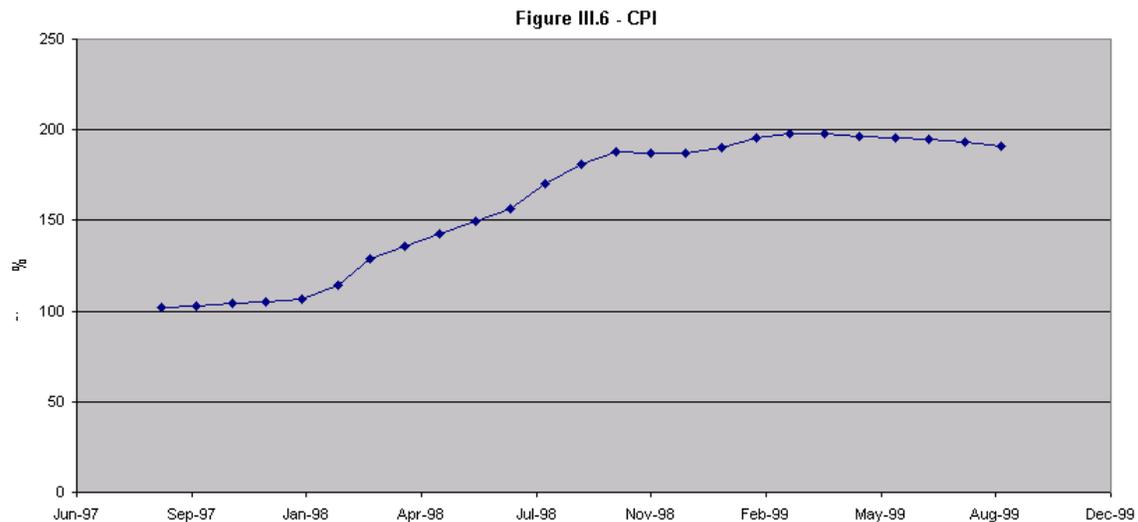
The Malaysian government succeeded in lowering domestic interest rates and maintaining the fixed exchange rate without encountering reserve loss. This was because the capital controls contributed to ending the speculative attacks on the ringgit by segmenting domestic and offshore markets and putting an end to offshore activities. All

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[52] **Meesook et al.** (2002)

[53] **Ibid.**

amounts of ringgit held in offshore accounts were to be repatriated by October 1998, through central bank approval; this restrictive measure was successful in halting speculative activities that were taking place in offshore markets for ringgit.

Since the controls enforced strict restrictions and outright prohibitions on taking certain amounts of currency outside of the country, it was no longer possible to channel ringgit funds into offshore deposit accounts, where these funds had been used in excessively purchasing of foreign currency and causing the ringgit to depreciate.

In conclusion, falling domestic interest rates and embarking on expansionary fiscal policies caused an increase in government purchases, consumption and investment demand, therefore, reviving production and increasing employment and the exchange rate which was fixed at a competitive level, helped reduce uncertainty by eliminating expectations of devaluation, allowing a return of confidence to markets.

IV. Empirical Considerations

In this section of the paper, I will first establish the methodological foundation by introducing the time-shifted difference in differences model and state some relevant information on the dependent and independent variables which will be used in the regression process for obtaining coefficient estimates by ordinary least squares.

Second, I discuss the underlying assumptions that this model holds.

And finally, I will give information on the monthly data used in the regressions.

(A)The Model: Time Shifted Difference-in-Differences Model

In attempting to make an assessment of the Malaysian capital controls as a response to financial crisis, we need another policy response by other crisis-hit countries. In order to actually compare the capital controls in Malaysia with policies implemented in other countries and make an evaluation, this other policy response has to be the counterfactual to the capital controls.

So, I shall be using the individual experiences of Turkey, Russia, and Brazil as the counterfactual of capital controls. The common policy response experience of these three countries is IMF assisted recovery programs. Therefore, in this paper, IMF programs will be considered the alternative policy response to capital controls in the context of financial crisis[54].

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[54] Authors like Rodrik & Kaplan (2001) , Krugman (1999) , Jomo (2001) , Liu (2000) all use IMF programs as the counterfactual policy response to capital controls.

(1) $\quad y_{it} = \beta_0 + \beta_1 d_{t>\tau i} + \beta_2 d_M d_{t>\tau i} + \gamma tr + \sum_j \lambda_j X^j_{it} + \sum_k \phi_k Z^k_t + u_{it}$

y_{it} = Measure of economic performance in country i :

i = Malaysia, Turkey, Russia, Brazil

(y= CPI, interest rates, exchange rates, stock market index, …)

$\beta_1 d_{t>\tau i}$ = Country specific treatment dummy:

(1 if it is the 12 month period following start of treatment, 0 otherwise) .

β_1, captures the effects of an undergoing treatment during crisis, compared to normal times. The term $d_{t>\tau i}$ indicates that the treatment method was introduced in different countries at different times.

$\beta_2 d_M d_{t>\tau i}$ = Interaction Term:

β_2, captures the differential effect of the Malaysian capital controls in comparison to IMF treatment. So, β_2 picks up effects of an undergoing capital controls application compared to the effects of an IMF program in place during a period of crisis.

d_M, in this term, is the Malaysia Dummy which equals 1 if country is Malaysia , 0 if not. This binary variable is included in here to create an interaction effect.

γtr = Linear trend term:

γ indicates if the data exhibit any trending behaviour over time.

X^j_{it} = Set of country specific time varying variables:

 (Country specific quarterly dummies)

Z^k_t = Set of time varying external environment variables:

(US interest rates, US industrial production index)

$\mathbf{u_{it}}$ = The error term, which is independently and identically distributed around a zero mean and a constant variance. $[\ u_{it} \sim N\ (0, \sigma^2)\ ]$

The model in equation (1), is a slightly modified version of the one that Rodrik and Kaplan use. The difference in (1) is the addition of γtr ; a linear trend term.

The term $\beta_3 d_M$ is not included as a term on its own because it does not actually contribute to this study in a sense that it allows us to estimate coefficient results that we are interested in for inference purposes, the interpretation of the coefficient β_3 is of no interest to us.

The omission of a trend term in a model hat uses time series data can lead to biased results because if a trend term is not included the data will not be detrended, therefore y_t might seem to be related to one or more of the independent variables simply because each variable is actually trending over time. When we include a trend term, then the data is automatically detrended, thus preventing this kind of bias[55]. In the model stated in equation (1) it is vital to include a trend term because the dependent variable y_t will most definitely be trending along with the- Z_{it}'s – U.S. interest rates and industrial production values.

The intercept term in equation (1), is also different from the one that Rodrik and Kaplan use in their model. What they did was include a dummy term d_i , that took the value 1, if the country was i, thus forcing the model to have a country specific intercept by running regressions with a no intercept command. In the model above the intercept term is not forced to be country specific because running a model without an intercept causes a redefinition of the coefficient of determination, thus causing R^2 values to be misleading.

The timing of the application of treatment methods in each country is of fundamental importance in this model. The starting point of the treatment period is assumed to be the date that policy configurations are modified. The binary variable $d_{t>\tau i}$ begins to take the value 1 once the authorities in that country change prevailing policies, in the context of currency crisis- since all countries suffer from this common crisis- the modified policy would be the exchange regime. In Malaysia September 1998 is the date that the controls

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[55] **Wooldridge** (1999)

were introduced including the fixing of the national currency. The counterfactual policy response to this in Russia, Brazil and Turkey would be the abandonment of the fixed exchange system and the floating of the currency. For these countries the post-treatment dummy would take the value one following the 12-month period starting, July 1998, January 1999 and February 2001 respectively.

This aspect of the paper is also different from Rodrik and Kaplan's study. They assumed that the starting point of the treatment for the comparator countries was that country's first appeal date to the IMF. But in my view, this does not reflect the exact timing in the modification of prevailing policies. The aim of this study is to compare the short-term post treatment period performance of countries that followed different methods in recovery. Therefore, it is essential to capture the right moment that these different recovery programs were implemented in order to make an accurate comparison. The timing of the appeal to the IMF differs significantly from the realization that existing policies had to be changed since they were no longer sustainable in coping with crisis.

So, in my opinion, the date of the change in the exchange rate system marks the beginning of the recovery program much accurately than the date of appealing to the IMF. Since the floating of the exchange rate is central in all IMF supported recovery programs, taking the change of the exchange rate system as the beginning of the treatment period, will be consistent with an IMF intervention.

By setting the model up as in equation (1) , we can control for country specific and time varying effects that otherwise could be attributed to the capital controls in Malaysia. In other words the time shifted difference- in- differences model, allows us to time shift across different countries to match the timing of treatment.[56]

This model allows us to estimate the effects of a difference within another difference, hence the name difference-in-differences. We can get estimates of the effects of the Malaysian capital controls while the other countries are undergoing IMF treatment, regardless of the difference in timing.

The estimation model is set up in this specific way in order to avoid biased coefficient estimates. For instance, if the model was not time shifted in a sense that the term $d_{t>\tau i}$

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[56] **Rodrik & Kaplan** (2001)

was not country specific, that is, it was in the form $d_{t>\tau}$, then we would be landed with biased regression results. Because, then this term would reflect that the treatment was **not** applied in different countries at different times.

If this were to be the situation, β_1 would capture a time varying but **common** effect. In this case the counterfactual policy response to capital controls would be the post-September 1998 performance of the comparative countries in normal times opposed to post- date of policy modifications in comparator countries.

Estimation results obtained by an OLS procedure, would undoubtedly lead to biasness. If we were to ignore the fact that the timing of crisis was different in each country by using the term $d_{t>\tau}$, then, we would be attributing the change in the difference of post-treatment performance to the treatment that Malaysia underwent in the form of capital controls, and not the IMF program. The coefficient that gives us this result, β_2 would be biased. Results obtained by the estimation model would be biased and make no sense whatsoever, because at the time that Malaysia implemented its capital controls, Russia had already started undergoing its treatment, Brazil had not even changed its prevailing policies, and Turkey was yet to experience a currency crisis, let alone implement a recovery program. Therefore, making the post-treatment dummy $d_{t>\tau}$ a time-varying variable, that is, allowing it to take the value 1 at different times that would be consistent with each country, prevents a kind of bias that would make the effects of the capital controls appear better or worse than in reality.

The time shifted difference- in-differences model carries another potential bias. It may well be argued that there is a correlation between the timing of the treatment and the external economic conditions prevailing at that specific time.

One might claim that Malaysia introduced its capital controls at a period when the economic conditions in international markets were much more favourable in comparison to the time when one or more of the other countries appealed to the IMF for assistance. For instance, in the months following September 1998, interest rates in the US may have been lower compared to the period when, say, Turkey implemented an IMF prescribed recovery program, therefore, Malaysia would have been able to recover with less capital

outflow, attributing effects to β2 that in reality are related to conditions in the external economic environment, meaning that β_2 is in fact a biased estimate.

Although it is not possible to rule this probability out completely, the model in equation (1) , attempts to control for running into this kind of bias by including a set of time varying indicators related to the external economic environment, which are US interest rates, and US industrial production indices, reflecting the performances of both the real sector and the monetary economy.

Included in the model is also a set of quarterly dummies to control for seasonal effects. There are three seasonal dummies X_1 X_2 X_3 to seasonally adjust the model. These quarterly dummy variables are also country specific. Another way of controlling for seasonality would have been to use monthly dummy variables instead of quarterly dummies. However, due to data deficiencies, the data sets I work with for each country are not large sample sizes. Therefore, in order not to use up degrees of freedom, seasonality effects are controlled for by quarterly dummy variables.

(B) Underlying Assumptions:

What this study is attempting to do is evaluate the performance of the post- treatment Malaysian economy in comparison to the post-treatment economies of the other countries of study, by examining some key macroeconomic indicators.

In order to be able to make such a comparison, some assumptions have to be made. The main underlying assumption this model holds is that, Malaysia imposed capital controls at the same stage during financial crisis that the other countries altered their policy configurations by floating their currencies and adopting an IMF program.

What this assumption means is that, had Malaysia not turned to capital account restrictions, then it would have had to apply the alternative policy for crisis recovery: An IMF designed stabilization and adjustment program. So, Malaysia's post-treatment economic performance would have gone through a similar path that the IMF assisted countries went through.

Another fundamental assumption is that financial crises experienced within these different countries were alike, although not the same. That is, the Asian Crisis

experienced by Malaysia, is comparable in fundamentals leading up to the crisis , during the crisis and measures taken to recover from crisis, to the state of financial crisis experienced by Brazil, Russia and Turkey. As it has been explained in section II, these different crises were not identical in terms of causation and the general situation of the economy before and at the onset of crisis, however they did have very similar effects on the real, monetary, fiscal and external economy of each country that went through crisis. This assumption, stating that the effects of crises taking place in different countries at different times were similar, allows this study to draw out a comparison between the post-treatment performances of Malaysia and countries that are not located in the same region that suffered from a crisis other than the Asian Crisis. This assumption is one that is not mentioned in the Rodrik & Kaplan study and is brought in by this study for the purpose of extending the Rodrik & Kaplan paper to include additional IMF-assisted countries into the time shifted difference- in- differences model.

(C) The Data :

The data I use in this thesis are obtained from various sources. These include; the central banks and official statistics departments, online databases of international financial institutions like the IMF, World Bank, Asian Development Bank and OECD and various other online resources.

Rodrik and Kaplan, in their study, include quarterly as well as monthly regressions. Because I wanted to contain a data set, large enough to yield accurate estimates, I only include in the regressions dependent variables that were available on a monthly frequency.

I have also had to rule out employment and wage effects, due to data unavailability on a monthly frequency.

In the monthly regressions, for each country (i) and indicator of economic performance within a specific period (y_{it}), I have around 80 to 130 observations, so when I stack the two data sets vertically and run joint regressions to compare the performance of a country against Malaysia, I have roughly in total 170 to 250 observations.

V . Empirical Results

Reporting and Interpreting an OLS Procedure

In this section of the paper, I shall be reporting the regression results obtained from an ordinary least squares procedure and interpreting on coefficient estimates and some test results.

(A)   Turkey vs. Malaysia

Here, I will be reporting the regression results from the comparison of the post-treatment economic performances of Turkey and Malaysia.

The treatment period for Turkey starts in February 2001 and ends February 2002; the data used in this regression starts in January 1992 and continues to the present date.

For Malaysia the treatment begins in September 1998 ending September 1999. The data set starts in September 1992 continuing into the second half of 2002.

Table V.1 . OLS Joint Regression Results :   Turkey vs. Malaysia

	β_1 (Pr > t)	β_2 (Pr > t)	R^2	AR(1)	n
Interest Rate	0.24464 (0.0115)	-1.09753 (<.0001)	0.9055	0.876	238
Exchange Rate	0.19585 (0.6134)	-2.8879 (<.0001)	0.9098	0.975	237
Consumer Price Index	0.40686 (0.035)	-0.90276 (0.0005)	0.6888	0.980	225
Foreign Reserves	-0.03367 (0.4644)	0.07595 (0.2248)	0.4407	0.945	237
Industrial Production Index	-0.13393 (<.0001)	0.07938 (0.0081)	0.7424	0.778	237
Stock Market Index	0.11587 (0.4618)	-0.52270 (0.0152)	0.7666	0.959	198

Table V.1 summarizes the joint regression results for Turkey and Malaysia. In the above table, I report the coefficient estimates on the variables of interest; the effects of a treatment program during crisis in comparison to **normal times**, β_1 **,** and the effects of the Malaysian capital controls compared to an IMF program **in times of crisis**, captured by β_2. All results, hereafter, are obtained by regressing the logarithmic value of the dependent variable on the logarithmic value of the independent variables, except for the trend term, which is left in its original linear form. I run regressions in logarithmic form for inference purposes: It is easier to interpret estimates as percentage changes.

Table V.2 . OLS Single Regression Results : Turkey

	β_1 (Pr > t)	γ (Pr>t)	R^2	AR(1)	n
Interest Rate	0.31682 (0.0012)	-0.00184 (0.0330)	0.0925	0.675	117
Exchange Rate	0.03701 (0.5231)	0.04552 (<.0001)	0.9885	0.920	117
Consumer Price Index	-0.12698 (0.0024)	0.04569 (<.0001)	0.9928	0.890	104
Foreign Reserves	-0.23223 (<.0001)	0.00838 (<.0001)	0.8221	0.867	117
Industrial Production Index	-0.11851 (<.0001)	0.00248 (<.0001)	0.4528	0.542	116
Stock Market Index	-0.56232 (<.0001)	0.05186 (<.0001)	0.9460	0.865	117

Table V.2 gives the OLS results from a single regression on Turkey. β_1 reports the effect of an IMF program compared to normal times **only** in Turkey and γ indicates whether or not the data are trending over time.

● **Interest Rate:** In the joint regressions, for a sample size of 236, the estimated value of β_1 implies that the nominal interest rate on the 1-month interbank market, on average, went up 24.46% in **both** Malaysia and Turkey after the imposition of capital controls and an IMF program, compared to non-crisis periods. β_2 tells us that the increase in interest rates during the 12-month treatment period in both countries was 109.75% **less** in Malaysia compared to Turkey.

The R-squared value is rather high at 0.9055 meaning that 90.55 % of the variation in the variables is able to be explained by this model.

(All results are statistically significant at the 5% level.)

The joint regression results tell us that the Malaysian capital controls were more successful at keeping interest levels low than the IMF program that Turkey followed. The controls in Malaysia specifically aimed at lowering domestic interest rates, the empirical results I have obtained are consistent with this purpose.

The AR(1) value indicating serial correlation is 0.876. However, since the regression is run jointly, that is, the data set, when stacked vertically, does not represent a temporal ordering because the data belongs to two different countries. In essence, this is a panel regression; two time series data sets from two different countries are run together making it a panel regression. Under the random sampling assumption, the error terms from the data set for the first country and the error terms from the second country's data set are uncorrelated[57]. Therefore, this result, implying that there could be serial correlation between the error terms from the estimation model, does not mean anything and will be ignored.

However, this does not mean that serial correlation can be ruled out altogether. The errors terms in the individual data sets may be correlated. If this is the case, then even when the two different sets of data from two different countries are run together, the estimation results can be misleading due to serial correlation in the error terms[58]. Therefore, in order to obtain accurate coefficient estimates we must examine the AR(1) results yielded by the Durbin-Watson statistic from a regression involving a single data set from one country

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[57] **Wooldridge**, (1999)

[58] The effects of serial correlation on parameter estimates are explained in detail in the appendix.

In a single regression using the data set for Turkey alone, the nominal interest rate, on average, was 31.68% higher during the 12 months following the implementation of an IMF program compared to normal times. And γ implies that nominal interest rates in Turkey have been exhibiting a downward trend between 1992 and 2002 by falling 0.184% on average over time. (Both results are significant at the 5% level)

These results from a single regression tells us that throughout the short-term recovery period following the financial crisis that hit Turkey in February 2001, modified policies in the form of an IMF program could not prevent the interest rate from being 31% higher than other times in the ten year period that the data cover.

The AR(1) result, which shows the rate of correlation between the error term from period t and the lagged error term from period t-1, is 0.675 , which could mean that there is the problem of serial correlation. Unlike the AR(1) result for the joint regression, the result obtained here from a single regression does make sense and cannot be ignored, since it comes from a single data set containing data from a single country [59].

Now that we have found that serial correlation could be affecting a single data set, in order to obtain accurate coefficient estimates it is crucial that we correct for this problem. An effective method for correcting serial correlation is separately quasi-differencing the data for each country before running joint regressions[60]. After each data set is quasi-differenced we can than run a joint regression. The coefficient estimates obtained from this regression are called feasible generalized least squares estimates (GLS) and are accurate.

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[59] Problems arising from serial correlation and correcting for this problem is presented in the appendix.

[60] See appendix for detail on the quasi-differencing procedure.

● **Exchange Rate:**

We see that the nominal exchange rate in terms of $ US, went up 19.58% on average in both countries during the 12-month treatment period. However, this increase that occurred in both countries was 288,79% less in Malaysia. The Turkish Lira suffered a 288% more loss against the $US in comparison to the ringgit. (The result for β_1 is not significant at any level, whereas, β_2 is highly significant at every level.)

Since the ringgit was fixed in September 1998 at 3.8R=1$US, and the rigid exchange rate system was abandoned by allowing the Lira to float in February 2001, it is only natural to end up with these results that are overwhelmingly in favour of the capital controls as a more successful recovery program in terms of reducing exchange rate appreciation.

In the single regression for Turkey, it is seen that the exchange rate was 3.7% more in the 12 months following the floating of the exchange rate and adopting an IMF designed recovery program in comparison to exchange rates at other times.

Exchange rates in Turkey appear to have followed an upward trend by increasing 4.52 % on average over time.

(The estimate on the treatment dummy is not significant at any level; the trend estimate is highly significant)

● **Consumer Price Index:** CPI in both countries went up 40.68 % after prevailing policies were modified in order to pull the economy out of crisis. This increase in CPI during the 12-month recovery period was 90.27% less in Malaysia. We see that inflation, in terms of CPI, soared in Turkey following the floating of the Lira and adoption of an IMF program when compared to inflation in Malaysia. Inflation-wise, we see that the capital controls yielded much more successful results than the IMF program did. Taking into account Turkey's historic struggle with high inflation, this result is hardly surprising, so it is questionable how much of this success can be attributed to the capital controls.

(Both results are significant at the 5% level)

In Turkey alone, CPI in the 12-month recovery period was on average 12.69% less when compared to the CPI at other times. CPI has followed a positive trend between 1992 and 2002 by increasing 4.56% on average over time. (Both results are highly significant)

● **Foreign Reserves:** In both countries subsequent to the implementation of a recovery program, reserves decreased by 3.36 %. This fall in foreign reserves was 7.59 % more in Malaysia than it was in Turkey throughout the treatment period. These results imply that in the very short run, the Malaysian capital controls were less effective in preventing the depletion of reserves than the IMF program in place in Turkey was. The reason for this could be that Malaysia had to fight back speculative attacks with a fixed exchange rate, where as Turkey had floated its currency, therefore, possibly causing Malaysia to lose more of its reserves.

(Both results are not statistically significant)

In the single regression for Turkey, foreign reserves seem to have been 23,22 % during the treatment period as opposed to normal times. Reserves have exhibited an upward trend over time by increasing at 0.24% on average.

(Both results are highly significant)

● **Industrial Production Index:** The Industrial production index fell on average 13.39 % in both Malaysia and Turkey following treatment. However, this decline was 7.9% more in Malaysia. Therefore, according to these results, after introducing capital controls, Malaysia's real economy performance, represented by the industrial production index, suffered a worst decline than did Turkey's subsequent to adopting an IMF program.

(Both results are highly significant)

In Turkey alone, during the 12-month treatment period, industrial production was 11.85% less, on average, compared to other times and followed an upward trend by increasing 5.18% on average throughout the 10 year period covered by the data.

(Both results are highly significant)

● **Stock Market Index:** The results tell us that during the treatment period the stock market index went up on average 11.58% in both countries combined, when compared to normal times. This rise in the stock market was 52,27% less in Malaysia.

We can say that the introduction of a new set of policies, both capital controls and the IMF program, brought in to help the economy recover from financial crisis, led to better

performance in capital markets. The reason behind this improvement could be that a change in prevailing policies helped to boost confidence among investors by proving that the government was taking credible measures to fight crisis and, in general, and led to less uncertainty. However, statistical results are indicating that Malaysia's treatment method was not as helpful as was Turkey's. This result, in my opinion is not too surprising, since controls on capital account transactions have never gone down well among investors. (First result is not significant, the second one is)

In Turkey alone, the stock market index was 56.23% less during the 12-month treatment period in comparison to normal time. The stock market index has followed an upward trend by increasing by 5% over time on average.

(Both results are highly significant)

Table V.3 . OLS Single Regression Results: Malaysia

	β_1 (Pr > t)	γ (Pr>t)	R^2	AR(1)	n
Interest Rate	0.07702 (0.4269)	-0.00872 (<.0001)	0.4875	0.975	121
Exchange Rate	0.12939 (<.0001)	0.00471 (<.0001)	0.7545	0932	121
Consumer Price Index	0.02617 (<.0001)	0.00259 (<.0001)	0.9776	0.917	121
Foreign Reserves	0.02653 (0.7016)	0.00228 (0.0002)	0.1192	0.947	121
Industrial Production Index	-0.06962 (0.0055)	0.00640 (<.0001)	0.8866	0.881	121
Stock Market Index	-0.34190 (<.0001)	-0.0056 (<.0001)	0.3539	0.901	81

Above are single regression results for Malaysia.

● **Interest Rate:** The results show that during the 12 month treatment period nominal interest rates on the 1-month interbank market on average, were 7,7% higher than rates in

other times. Nominal interest rates have been trending downwards over the 10-year period from 1992 to 2002.

(First result is not significant, while the second one is)

● **Exchange Rate:** During the 12-month period following the imposition of capital controls, the exchange rate in terms of $US was 12.93% higher than other times. The fixed rate that was put into practice with the control package was almost 13% higher than the average rates prevailing at periods before and after the 12-month treatment. Exchange rates in Malaysia in terms of the $US, exhibit an upward trend and have increased on average 0.47% over time.

(Both results are highly significant)

● **Consumer Price Index:** CPI has been 2.6% higher in the treatment period when compared to normal times. CPI in Malaysia has been following a positive trend and has increased by 0.25% over time.

 (Both results are highly significant)

● **Foreign Reserves:** Foreign reserves throughout the treatment period have been on average 2.6% higher than reserves that prevailed at normal times. Reserves have been trending upwards by increasing 0.28% over time.

(Estimate on treatment dummy is not significant, estimate on the trend term is)

● **Industrial Production Index:** The regression results reported in TableV.3. Indicate that the industrial production index in Malaysia following the imposition of capital controls went down by 6.9% when compared to the industrial production index in normal times. The data for industrial production index exhibits an upward trend and has gone up by 0.6% over time. (Both results are significant)

● **Stock Market Index:** We can see that stock market performance has fallen by 34.19 % on average during the 12-month treatment period when compared to normal times. The stock market index has followed a negative trend in Malaysia and has decreased by 0.5% over the 10-year period in hand.

(Both results are highly significant)

When we look at the AR(1) values for Malaysia, we see that they are rather high for every dependent variable, strongly suggesting that the error terms could be correlated. In order to obtain accurate estimates from a joint regression using data sets from Malaysia and Turkey, I quasi-difference the data from each country separately and then run a joint regression. The GLS results that this regression yields are significantly different than the ones from an OLS procedure. Our parameter of interest β_2 , with the exception of foreign reserves, takes on much smaller values for all y_{it}'s[61]. These results imply that the post-treatment performance of the Malaysian economy was not as successful as the initial results had suggested.

Subsequent to correcting for serial correlation, the Malaysian capital controls still provided a quicker recovery than the Turkish IMF-program, however, this recovery was not as quick and successful as the results from an OLS regression had implied.

(These results , except for foreign reserves are not statistically significant)

When we look at the AR(1) results yielded from the GLS regression we see that they range between 0.043 and 0.885. However, as I mentioned before, these results do not indicate that serial correlation remains to be a problem, since they come from two different data sets, therefore breaking the sequence in the time series.

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[61] Refer to appendix for full results from the GLS procedure.

(B)   Brazil vs. Malaysia

Here, I will be reporting the regression results for the comparison of the post-treatment economic performances of Brazil and Malaysia.

The treatment period for Brazil starts in January 1999 and ends January 2000; the data used in this regression starts in January 1992 and continues to the present date.

For Malaysia the treatment begins in September 1998 ending September 1999. The data set starts in September 1992 continuing into the second half of 2002.

Table V.4 . OLS Joint Regression Results :   Brazil vs. Malaysia

	β_1 (Pr > t)	β_2 (Pr > t)	R^2	AR(1)	n
Interest Rate	-0.56010 (0.0140)	-0.50196 (0.0268)	0.6407	0.920	248
Exchange Rate	0.01590 (<.0001)	-0.29304 (<.0001)	0.8200	0.936	218
Consumer Price Index	-0.06933 (<.0001)	-0.07191 (<.0001)	0.8221	0.929	219
Foreign Reserves	0.17930 (0.0068)	0.47141 (<.0001)	0.4212	0.888	250
Industrial Production Index	0.03137 (0.5959)	0.09616 (0.1034)	0.3164	0.196	250
Stock Market Index	0.28794 (0.0035)	0.10470 (0.2869)	0.9390	0.684	204

Table V.5 . OLS Single Regression Results :   Brazil

	β_1 (Pr > t)	γ (Pr>t)	R^2	AR(1)	n
Interest Rate	-0.06195 (0.8081)	-0.04638 (<.0001)	0.8206	0.833	129
Exchange Rate	0.14027 (<.0001)	0.01306 (<.0001)	0.9311	0.736	99
Consumer Price Index	-0.00975 (0.5639)	0.00612 (<.0001)	0.9136	0.899	98
Foreign Reserves	-0.0545 (0.6004)	0.00320 (<.0001)	0.097	0.935	129
Industrial Production Index	-0.04669 (0.0566)	0.00219 (<.0001)	0.5155	0.625	129
Stock Market Index	-0.0269 (0.8844)	-0.01145 (<.0001)	0.3327	0.751	123

● **Interest Rate:**   The regression results above in Table V.4. show that the nominal 1-month interest rate on the interbank market went down on average 56.01% in both Brazil and Malaysia following the implementation of treatment methods. This fall in interest rates was 50% more in Malaysia compared to Brazil during the 12-month treatment period. We see that, the Malaysian capital controls produced better results in terms of lowering interest rates than did Brazil's IMF program.

(Both results are significant at the 5% level)

The R-squared value in this joint regression is 0.920 meaning that 92% of the variation is explained by the model.

In Brazil alone, the fall in the nominal 1-month interbank interest rate, on average, was 6.19% less during the treatment period in comparison to normal times. Nominal interest rates have exhibited a downward trend in Brazil by falling by 4.6% over time.

(First result is not statistically significant, the second one is)

Concluding by these results, the IMF program was effective in reducing interest rates.

● **Exchange Rate:** We see that the nominal exchange rate in terms of $ US , went up 1.59% on average in both countries during the 12-month treatment period. However, this increase that occurred in both countries was 29.3% less in Malaysia. The Real suffered an almost 30% more loss against the $US in comparison to the ringgit.

(Both results are highly significant at any level.)

Since the ringgit was fixed in September 1998 at 3.8R=1$US , and the rigid exchange rate system was abandoned and the Real was floated in January 1999, like in the Turkish experience, it is rather normal to end up with these results that are in favour of the capital controls as a more successful recovery program.

In the single regression for Brazil, it is seen that the exchange rate went up 14.02% more in the 12 months following the floating of the exchange rate and adopting an IMF designed recovery program in comparison to increase in the exchange rate in other times. Exchange rates in Brazil appear to have followed an upward trend by increasing 1.3 % on average over time. (Both results are highly significant at any level.)

● **Consumer Price Index:** CPI, on average, in both countries went down 6.9 % after prevailing policies were modified in order to pull the economy out of crisis. This reduction in CPI during the 12-month recovery period was 7.9% more in Malaysia.

We see that the imposition of capital controls in Malaysia played a more effective role in lowering inflation than did the IMF program in Brazil.

(Both results are highly significant at any level)

In Brazil alone, CPI in the 12-month recovery period fell 0.975% when compared to the change in CPI at other times. CPI has followed a positive trend between 1992-2002 by increasing 0.612% on average over time.

(The result on the treatment dummy is not significant but the trend estimate is significant)

● **Foreign Reserves:** In both countries, subsequent to the implementation of a recovery program, reserves increased by 17.93 % on average compared to normal times. This rise in foreign reserves was 47.14 % more in Malaysia than it was in Brazil throughout the treatment period. These results imply that in the very short run, the Malaysian capital

controls were more effective in preventing the depletion of reserves than the IMF program in place in Brazil was.

(Both results are statistically significant)

In the single regression for Brazil, foreign reserves seem to have declined 5.4 % during the treatment period as opposed to normal times. Reserves have exhibited an upward trend over time by increasing at 0.32% on average.

(The estimate on the treatment dummy is not significant, the trend estimate is significant)

● **Industrial Production Index:** Industrial production went up on average 3.13 % in both Malaysia and Brazil following treatment compared to normal times. However, this increase was 9.6% more in Malaysia during the 12-month period. Therefore, according to these results, after introducing capital controls, Malaysia's real economy performance, in terms of the industrial production index, was more successful than Brazil's performance subsequent to adopting an IMF program.

(Both results are not significant)

In Brazil alone, during the 12-month treatment period, industrial production fell by 4.6% on average compared to other times and followed an upward trend by increasing 0.22% on average throughout the 10 year period covered by the data.

(Both results are significant at the 10% level)

● **Stock Market Index:** The results tell us that during the treatment period the stock market index went up on average 28.79% in both countries combined, when compared to normal times. This rise in the stock market was 10.47% more in Malaysia.

Statistical results are indicating that Malaysia's treatment method was more effective in increasing stock market trading. The reason behind this situation could be that when Brazil implemented its treatment program, international markets were still hesitant in investing in emerging markets due to the lingering effects of the Russian default, which had taken place five months before. Therefore, market participants may have been reluctant to invest in Brazilian capital markets.

(First result is significant; the second one is not)

In the single regressions, we see that the stock market index went down by 2.6% on average during the treatment period when compared to non-crisis recovery periods. The Brazilian stock market index has followed a downward trend by decreasing 1.14% over time. (First result is not significant; the second estimate is highly significant)

When we look at the AR(1) values for Brazil alone, we see that they are rather high for all dependent variables, ranging from 0.625 to 0.935. This strongly suggests that the error terms could be correlated.

In order to obtain accurate estimates from a joint regression using data sets from both Malaysia and Brazil, the data from each country is quasi-differenced separately and then a joint regression is run. The GLS results that this regression yields are also significantly different than the ones from an OLS procedure.

This time, our parameter of interest β_2 , results with much smaller values for each and every y value. These results imply that the post-treatment performance of the Malaysian economy was not as successful as the initial results had suggested.

Subsequent to correcting for serial correlation, the Malaysian capital controls still provided a quicker recovery than the Brazilian IMF-program; however, this recovery was not as quick and successful as the results from the OLS regression had implied.

(None of these results are statistically significant)

(C) Russia vs. Malaysia:

In this part of the section regression results for the comparison between the post-treatment economic performances of Russia and Malaysia will be reported and interpreted on.

The treatment period for Russia starts in August 1998 and ends August 1999; the data used in this regression starts in January 1992 and continues to the present date.

For Malaysia the treatment begins in September 1998 ending September 1999. The data set starts in September 1992 continuing into the second half of 2002.

Table V.6 . OLS Joint Regression Results: Russia vs. Malaysia

	β_1 (Pr > t)	β_2 (Pr > t)	R^2	AR(1)	n
Interest Rate	-0.04349 (0.7311)	-0.47675 (0.0073)	0.6863	0.833	214
Exchange Rate	0.49235 (0.0044)	-0.86605 (<.0001)	0.5719	0.972	244
Consumer Price Index	0.59996 (0.0488)	-0.71985 (0.0831)	0.4571	0.974	240
Foreign Reserves	-0.07036 (0.4248)	0.38600 (0.0013)	0.6208	0.944	225
Industrial Production Index	-0.02699 (0.6527)	0.28318 (0.0007)	0.1249	0.966	245
Stock Market Index	-0.56179 (0.0021)	0.24026 (0.3513)	0.7174	0.932	176

Table V.7 . OLS Single Regression Results: Russia

	β_1 (Pr > t)	γ (Pr>t)	R^2	AR(1)	n
Interest Rate	0.22903 (0.1949)	-0.02784 (<.0001)	0.6430	0.699	93
Exchange Rate	0.5395 (<.0001)	0.0356 (<.0001)	0.9117	0.902	123
Consumer Price Index	0.3169 (0.257)	0.04886	0.8092	0.954	129
Foreign Reserves	-0.72137 (<.0001)	0.01676 (<.0001)	0.6822	0.873	104
Industrial Production Index	-0.11004 (<.0001)	-0.00659 (<.0001)	0.7526	0.932	124
Stock Market Index	0.25017 (0.4196)	0.01412 (0.0007)	0.0701	0.978	176

● **Interest Rate:** The regression results above in Table V.6. shows that the nominal 1-month interest rate on the interbank market went down on average 4.3% in both Russia and Malaysia following the implementation of treatment methods. This decline in interest rates was 47.7 % more in Malaysia compared to Russia during the 12-month treatment period. We see that, throughout the 12-month post- treatment period, the Malaysian capital controls produced better results in terms of lowering interest rates than did Russia's IMF program.

(First result is not statistically significant, the second one is)

The R-squared value in this joint regression is 0.6863 meaning that 68.63% of the variation is explained by the model.

In Russia alone, the nominal 1-month interbank interest rate, on average, was 22.9% higher during the treatment period in comparison to normal times. Nominal interest rates have exhibited a downward trend in by falling by 2.7% over time.

(First result is not statistically significant, the second one is)

Concluding by these results we can say that the IMF program was effective in reducing interest rates.

● **Exchange Rate:** We see that the nominal exchange rate in terms of $ US, went up 49.23% on average in both countries during the 12-month treatment period. However, this increase that occurred in both countries was 86.6% less in Malaysia. The Rouble suffered 87% more loss against the $US in comparison to the ringgit.

(Both results are highly significant at any level.)

Taking into consideration that the ringgit was fixed in September 1998, and the Rouble was floated in August 1998, as was the case in Turkey and Brazil, it is normal to end up with these results that are highly in favour of the capital controls as a more successful recovery program.

In the single regression for Russia it is seen that the exchange rate went up 53.95% more in the 12 months following the floating of the exchange rate and adopting an IMF designed recovery program, in comparison to the change in the exchange rate in other times.

Exchange rates in Russia appear to have followed an upward trend by increasing 3.5 % on average over time. (Both results are highly significant at any level.)

● **Consumer Price Index:** CPI, on average, in both countries went up 59.99 % after prevailing policies were modified in order to pull the economy out of crisis. This rise in CPI during the 12-month recovery period was 71.9% less in Malaysia.

We see that the imposition of capital controls in Malaysia played a much more effective role in lowering inflation than did the IMF program in Russia. However, if we take into account Russia's fight against high inflation after the foundation of the federation, it is arguable how much of this achievement can be attributed to the capital controls.

(Both results are significant at the 10% level)

In Russia alone, CPI in the 12-month recovery period went up by 31.69% when compared to the change in CPI at other times. CPI has followed a positive trend between 1992 and 2002 by increasing 4.8% on average over time.

(The result on the treatment dummy is not significant but the trend estimate is significant)

● **Foreign Reserves:** In both countries, subsequent to the implementation of a recovery program, reserves decreased by 7.03 % on average. This decline in foreign reserves was 38.6 % less in Malaysia than it was in Russia throughout the treatment period. These results imply that in the very short run, the Malaysian capital controls were more effective in preventing the depletion of reserves than the IMF program in place in Russia was.

(The estimate on the treatment dummy is not significant; the parameter estimate on the interaction term is significant)

In the single regression for Russia, foreign reserves are 72.13 % lower in the treatment period as opposed to normal times. Reserves have exhibited an upward trend over time by increasing at 1.6% on average.

(Both results are significant)

● **Industrial Production Index:** Industrial production went down on average 2.6 % in both Malaysia and Russia following treatment compared to normal times. However, this

fall was 28.31% less in Malaysia during the 12-month period. Therefore, according to these results, after introducing capital controls, Malaysia's real economy performance, in terms of industrial production, was more successful than Russia's performance subsequent to adopting an IMF program.

(The estimate on the treatment dummy is not significant; the parameter estimate on the interaction term is significant)

In Russia alone, during the 12-month treatment period, industrial production was 11% less on average compared to other times and followed a downward trend by falling 0.6% on average throughout the 10 year period covered by the data.

(Both results are highly significant at any level)

● **Stock Market Index:** The results tell us that during the treatment period the stock market index fell on average 56.17% in both countries combined, when compared to normal times. This decline in the stock market was 24.06% less in Malaysia.

Statistical results are indicating that Malaysia's treatment method was more effective in boosting stock market trading. The reason behind this situation could be Russia's default. At the time Russia had implemented its treatment program, only a month had passed over the default and cross-border capital was fleeing the domestic market rapidly. Therefore, it is difficult to attribute this decline to the IMF program in place.

(First result is significant; the second one is not)

In the single regressions, we see that the stock market index during the treatment period was on average, 25% higher than other times. The Russian stock market index has followed an upward trend by increasing 1.4% over time. (First result is not significant; the second estimate is highly significant)

Again, looking at the AR(1) values for Russia alone, we see that they are rather high for every dependent variable, ranging from 0.699 to 0.978, strongly suggesting that the error terms could be correlated.

When quasi-differenced, the GLS results that this regression yields are also significantly different than the ones from an OLS procedure.

This time, our parameter of interest β_2, with the exception of foreign reserves, results with much smaller values for y.

These results imply that the post-treatment performance of the Malaysian economy was not as successful as the initial results had suggested. Subsequent to correcting for serial correlation, the Malaysian capital controls still provided a quicker recovery than the Russian IMF-program; however, this recovery was not as quick and successful as the results from an OLS regression had implied.

(None of these results are statistically significant)

(D) Pooled Regressions :

In this part of the section, I pool together the data for each dependent variable for all countries and run a joint regression with four data sets. I do this in order to draw out a comparison between the post-treatment performance of the Malaysian capital controls and the **combined** performance of the IMF-designed programs in Brazil, Turkey and Russia.

Table V.8. OLS Joint Regression Results: Pooled

	β_1 (Pr > t)	β_2 (Pr > t)	R^2	AR(1)	n
Interest Rate	0.18309 (0.2756)	-0.65498 (0.0048)	0.6852	0.944	460
Exchange Rate	0.68156 (0.0366)	-3.15279 (<.0001)	0.8208	0.982	460
Consumer Price Index	0.08951 (0.4445)	-0.32192 (0.0369)	0.6529	0.971	367
Foreign Reserves	-0.29247 (0.0001)	0.43151 (<.0001)	0.2830	0.970	471
Industrial Production Index	-0.05387 (0.1856)	0.10800 (0.0501)	0.0724	0.616	490
Stock Market Index	-0.23491 (0.4687)	0.34831 (0.4249)	0.2494	0.975	416

● **Interest Rate:** The regression results above in Table V.8. show that the nominal 1-month interest rate on the interbank market went up on average 18.3% in Malaysia, Brazil, Turkey and Russia combined, following the implementation of treatment methods. This combined rise in interest rates was 65.9% less in Malaysia compared to the three IMF countries during the 12-month treatment period. We see that, throughout the 12-month post- treatment period, the Malaysian capital controls produced better results in terms of lowering interest rates than did IMF programs in Brazil, Turkey and Russia combined.

(First result is not statistically significant, the second one is)

The R-squared value in this joint regression is 0.6852 meaning that 68.52% of the variation is explained by the model.

● **Exchange Rate:** We see that the nominal exchange rate in terms of $ US , went down 23.49% on average in all countries during the 12-month treatment period. However, this fall in the stock market was 315% less in Malaysia. The national currencies of Brazil, Turkey and Russia, combined, suffered on average 315% more loss against the $US in comparison to the ringgit.

(Both results are significant at the 5% level.)

When, once again, we take into account that, as a central modification in policies, the ringgit was fixed and the Real, Lira and Rouble were all floated, it is rather normal to end up with these results that are overwhelmingly in favour of the capital controls as a more successful recovery program.

● **Consumer Price Index:** CPI, on average, in all countries went up 8.9 % after prevailing policies were modified in order to pull the economy out of crisis. This average increase in CPI during the 12-month recovery period was 32.19% less in Malaysia. We see that the imposition of capital controls in Malaysia played a more effective role in lowering the level of increase in consumer prices than did the IMF programs combined.

(First result is not statistically significant, the second one is)

● **Foreign Reserves:** In all countries, subsequent to the implementation of a recovery program, reserves went down by 29.24 % on average compared to normal times. This decline in foreign reserves was 43 % less in Malaysia than it was in Brazil, Turkey and Russia throughout the treatment period. These results imply that in the very short run, the Malaysian capital controls were more effective in preventing the depletion of reserves than were the IMF programs in place.
(Both results are highly significant at any level)

● **Industrial Production Index:** Industrial production index went down on average 5.38 % in all countries combined following treatment. However, this decline was 10.8% less in Malaysia during the 12-month period. Therefore, according to these results, after introducing capital controls, Malaysia's real economy performance, reflected by the industrial production index, was more successful than the performances of Brazil, Turkey and Russia combined subsequent to adopting an IMF program.
(First result is not statistically significant, the second one is)

● **Stock Market Index:** The OLS results tell us that during the treatment period the stock market index went up on average 28.79% in all countries, when compared to normal times. This fall in the stock market was 34.83% less in Malaysia in comparison to the comparator countries combined.
Statistical results are indicating that Malaysia's treatment method was more effective in increasing stock market trading during financial crisis.
(Both results are not statistically significant)

When the data from each country is quasi-differenced, the GLS results from the pooled regression, once again, are significantly different from estimates yielded by an OLS procedure.
In the pooled GLS regression, our parameter of interest β_2 , results with much smaller values for each and every y value. These results imply that the post-treatment

performance of the Malaysian economy, relative to the IMF countries combined, was not as successful as the initial results had suggested.

Subsequent to correcting for serial correlation, the Malaysian capital controls still provided a quicker recovery than IMF-programs; however, this recovery was not as quick and successful as the results from an OLS regression had implied.

(None of these results, except for exchange rates, are statistically significant)

As for the rest of the independent variables, the seasonal dummies, X's, and the external economic environment variables, Z's, in almost all results reported above, there seem to be no seasonality to the data. On the other hand, U.S. interest rates and industrial production index contribute significantly towards explaining the dependent variable. This implies the U.S. real and monetary sector could have affected the post-treatment performance in the countries of interest. Therefore, by including these variables in the model, a potential bias has been controlled for.

These results have shown that, for the majority of the regressions, the capital controls imposed in Malaysia have yielded better results in short-term crisis recovery than IMF-designed programs adopted by Brazil, Russia and Turkey.

Compared to the IMF program in Turkey, the controls were less effective in preventing the depletion of foreign reserves and in increasing industrial production, but were more successful in reducing interest rates and consumer prices, stemming currency depreciation and stock market decline.

In comparison to Brazil's recovery program, the control package was more successful in reducing interest rates and inflation, boosting the stock market, increasing industrial production and preventing reserve depletion and currency depreciation.

When we compare the outcome of the capital controls to the post-treatment performance of the Russian economy we see again that Malaysia's recovery was much speedier in terms of all the indicators in question.

In conclusion, when attempting to make an assessment of the Malaysia capital controls by comparing its very short-run crisis recovery period to the post-treatment performance of countries which also experienced an equally severe financial crisis, based on the above results, we see that the control package was more effective as a treatment method in providing assistance in recovery.

VI. Concluding Remarks

The purpose of this study has been to extend the context of the Rodrik and Kaplan paper by applying the difference-in-differences model they used to compare the very short-term recovery period of Malaysia to the performance of crisis-hit countries outside the region of East Asia.

The question in hand was, in the very short run, were the capital controls in Malaysia a more effective treatment method than IMF programs in relieving the economy from a financial crisis? Was Malaysia's post –treatment period more successful relative to Turkey, Brazil and Russia's ?

Whichever way the question is phrased, empirical results are in favour of Malaysia;

Results imply that, in the short-run recovery period, Malaysia was better off than all the comparator countries.

These results are consistent with Rodrik and Kaplan's findings from a comparison of Malaysia to Korea, Thailand and Indonesia. They concluded that Malaysia had recovered much quicker and stronger relative to Korea, Thailand and Indonesia, all of which had undergone IMF programs.

However, what Rodrik and Kaplan seem to have ruled out of their study was to test and correct for serial correlation. In my study I test for serial correlation and find that, indeed, the error terms are highly likely to be correlated. When I correct for this problem using the quasi-differencing method, I find that the capital controls in Malaysia was not that overwhelmingly more successful in overcoming financial crisis than IMF programs were. The controls still proved to provide a quicker recovery process, however, it was not as quick as Rodrik and Kaplan claimed it was.

When serial correlation is corrected for, we are landed with another problem. The estimation results that the quasi-differenced model yields are not statistically significant. But the magnitude and sign of the estimates , when economic intuition is put into use, are

indeed significant. As a results we are faced with a typical case of *economist's dilemma*, we have statistically insignificant, but on the other hand economically significant results. I have provided estimation results from both, OLS and GLS regressions, and have interpreted on all of these results. Which version of these interpretations to believe depends on the level of emphasis one places on statistic or economic significance; I leave the decision to the reader.

In conclusion, the mainstream view on capital controls seems to agree that, in emerging markets where financial infrastructure is underdeveloped and the prudential and supervisory framework have not completely been established, when used temporarily, effective controls which do not make room for circumvention, can prove to be useful in the short-run.

In this context, this study provides affirmative evidence in favour of this view. Capital controls may well serve the purpose of assisting governments in the short-run to overcome financial crisis, in a way that proves to be more effective than IMF designed recovery programs.

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Appendix

In section V, when reporting the OLS results, it is seen that AR(1) values are almost always higher than 0.6, more often closer to 1.

This brings on a potential problem: Serial correlation in the error terms. Serial correlation will result in a violation of fundamental Gauss-Markov assumptions.

Under the Gauss-Markov assumption time series regressions:

Conditional on the independent variables, the error terms in two different periods are uncorrelated with each other. **[Corr $(u_t, u_s / X) = 0$ for all $t \neq s$] (1)**

When this assumption fails to hold the error terms in the estimation model suffer from serial correlation or autocorrelation; they are correlated across time. Serial correlation is a problem in time series data, since data with temporal ordering is not random sampling.

Under the Gauss-Markov assumption of homoskadasticity for time series regressions:

Conditional on the independent variables, the variance of the random error term is constant for all observations **[Var $(u_t / X) = $ Var $(u_t) = \sigma^2$ for all $t = 1,2,\ldots,n$] (2)**

and Var (u_t) is the smallest possible estimate of the variance in the error terms obtained by OLS. Serial correlation will lead to inefficiency, meaning that the sample does not have a minimum variance, thus ordinary least squares estimates are not best linear unbiased estimates. The sample variance, σ^2, will not be minimum because, when we have serial correlation, the variance of the coefficient estimate will be biased:

$$(3) \quad \text{Var} (\beta) = \sigma^2/SST_X + 2 (\sigma^2/SST^2) \sum_{t=1}^{n-1} \sum_{s=1}^{n-1} \rho^s . X_t . X_{t+s}$$

If $\rho = 0$, then the estimate variance would simply be equal to σ^2/SST_X, which is the unbiased estimator for Var(β). However, in our results, we have correlation coefficient, ρ, values that are significantly different from zero, therefore, looking at equation (3), we can see that, under serial correlation variance estimates for coefficients are going to be biased.

Not having a minimum variance will cause standard error estimates to be misleading, therefore, effecting inference. Since, this whole study is based on the inference of certain coefficients, it is absolutely crucial to correct for serial correlation and eliminate these problems.

However, serial correlation will not lead to inconsistent estimators, the coefficient estimates will still converge to their true population value when the probability limit of the sample size is going to infinity. But it is still of great importance to resolve serial correlation because consistency does not necessarily mean unbiasedness. Therefore, if not corrected, serial correlation could also cause parameter estimates to appear larger or smaller than they really are, thus again affecting inference.

Below are, regression results obtained by correcting for serial correlation by means of quasi-differencing the model and obtaining generalized least squares estimates, GLS.

The way I have set up this quasi-differenced model is by first running single regressions for each country and obtaining the ρ values. The second step is to subtract this ρ value from the first lagged value of each and every variable, including binary variables and intercept, and obtaining a feasible generalized least squares equation. Finally, I run this GLS model using OLS with no intercept.

(3) $\text{int}^* = 1 - \rho_i$

(4) $y^*_{it} = y_{it} - \rho_i \cdot \text{lag1}(y_{it})$

(5) $d^*_{t>\tau i} = d_{t>\tau i} - \rho_i \cdot \text{lag1}(d_{t>\tau i})$

(6) $d_M{}^* d_{t>\tau i} = d_M \, d_{t>\tau i} - \rho_i \cdot \text{lag1}(d_M \, d_{t>\tau i})$

(7) $\sum_j{}^* X^j{}_{it} = \sum_j X^j{}_{it} - \rho_i \cdot \text{lag1}({}_i \sum_j X^j{}_{it})$

(8) $\sum_k{}^* Z^k{}_t = \sum_k Z^k{}_t - \rho_i \cdot \text{lag1}(\sum_k Z^k{}_t)$

(9) $tr^* = tr - \rho_i \cdot \text{lag1}(tr)$

(10) $y^*{}_{it} = \beta_0 + \beta_1 d^*{}_{t>\tau i} + \beta_2 d_M{}^* d^*{}_{t>\tau i} + \gamma tr^* + \sum_j{}^* \lambda_j X^j{}_{it} + \sum_k{}^* \phi_k Z^k{}_t + u^*{}_{it}$

Appendix Table. 1 . GLS Joint Regression Results: Turkey vs. Malaysia

	β_1 (Pr > t)	β_2 (Pr > t)	R^2	AR(1)	n
Interest Rate	0.22412 (0.3458)	-0.05172 (0.8268)	0.9773	0.156	209
Exchange Rate	0.00226 (0.9850)	-0.15265 (0.3679)	0.9671	0.665	237
Consumer Price Index	0.01301 (0.7963)	-0.05828 (0.4125)	0.9822	0.885	224
Foreign Reserves	0.07109 (0.0278)	0.10399 (0.0230)	0.9980	0.218	237
Industrial Production Index	-0.06373 (0.0103)	0.02112 (0.58000	0.9990	0.043	236
Stock Market Index	0.22412 (0.3458)	-0.05172 (0.8268)	0.9773	0.156	209

Appendix Table. 2. GLS Joint Regression Results: Brazil vs. Malaysia

	β_1 (Pr > t)	β_2 (Pr > t)	R^2	AR(1)	n
Interest Rate	-0.04866 (0.7586)	-0.02319 (0.8831)	0.6462	0.186	249
Exchange Rate	0.13154 (0.0001)	-0.03012 (0.2626)	0.9034	0.318	219
Consumer Price Index	-0.00858 (0.3217)	-0.00855 (0.3226)	0.9995	0.607	218
Foreign Reserves	0.05943 (0.1349)	0.05939 (0.1346)	0.9959	0.284	249
Industrial Production Index	-0.02710 (0.1972)	0.01405 (0.5001)	0.9996	0.428	248
Stock Market Index	0.16897 (0.2258)	-0.05180 (0.7084)	0.9912	0.024	203

Appendix Table. 3 . GLS Joint Regression Results: Russia vs. Malaysia

	β_1 (Pr > t)	β_2 (Pr > t)	R^2	AR(1)	n
Interest Rate	0.08799 (0.4840)	-0.07037 (0.7098)	0.8643	-0.013	213
Exchange Rate	0.16198 (<.0001)	-0.02027 (0.7249)	0.7079	0.558	243
Consumer Price Index	0.06199 (0.5062)	0.00109 (0.9934)	0.9306	0.935	249
Foreign Reserves	0.05698 (0.6795)	-0.03049 (0.8760)	0.9802	0.745	224
Industrial Production Index	-0.02704 (0.3379)	0.02601 (0.5094)	0.9962	0.562	244
Stock Market Index	0.07844 (0.3941)	0.11728 (0.3669)	0.9488	0.440	175

Appendix Table. 4 . GLS Joint Regression Results: Pooled

	β_1 (Pr > t)	β_2 (Pr > t)	R^2	AR(1)	n
Interest Rate	0.27053 (0.0189)	-0.06869 (0.6969)	0.8721	0.161	457
Exchange Rate	-0.29659 (0.0760)	-0.93671 (<.0001)	0.5473	0.903	457
Consumer Price Index	-0.07305 (0.0317)	-0.02726 (0.5653)	0.9916	0.806	367
Foreign Reserves	-0.01725 (0.6583)	0.06687 (0.2272)	0.9941	0.446	468
Industrial Production Index	-0.05615 (0.1420)	0.02451 (0.5754)	0.9970	0.232	487
Stock Market Index	0.08446 (0.5051)	-0.15773 (0.3478)	0.9764	0.633	413