The impact of the Argentine crisis on selected emerging market currencies

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ABSTRACT

Recent years have witnessed an increase in currency crises that affected a large number of emerging and developed countries, either directly or indirectly. A number of recent financial crises, including the Argentine currency crisis, have been accompanied by episodes of financial market contagion and speculative attacks. The emerging market financial and currency crises of the second half of 1990s have changed many economists' viewpoints with regard to exchange rate policies.

A country's exchange rate system provides an important foundation for the implementation of other economic policy measures. Many economists and authorities believe that most emerging markets should either adopt a free-floating or super-fixed exchange rate regime in order to prevent the recurrence of financial or currency crises.

Pure floating and fixed exchange rate regimes are only two of the possible exchange rate regimes that a country can choose to adopt. Neither pure floating nor fixed exchange rate regimes solve all the problems arising from modern globalised financial markets. Recent episodes of currency and financial crises have led to the costs and benefits of alternative exchange rate regimes being reconsidered. In choosing the right exchange rate regime for each country, one should take into consideration the size and degree of openness of the economy, the level of inflation, the degree of price and wage flexibility, financial development, credibility of policy makers and capital mobility.

Argentina outperformed most other economies in the region until the massive collapse of the Argentine economy and the abandonment of the currency board early in 2002. Currency crises in emerging markets are often different in nature from those in mature and developed markets. Both currency crises in emerging markets and those in developed markets have triggered a variety of theories regarding the causes of speculative attacks.

In this dissertation, an empirical analysis was performed with the aim of identifying speculative attacks and contagion on selected emerging and developed markets, occurring specifically during the period of the Argentine currency crisis. Countries that operated with free-floating exchange rate regimes during the Argentine currency crisis were more affected than those countries operating with fixed exchange rate regimes. It also became apparent that speculative attacks and contagion tended to be regional and occurred in emerging markets in the southern hemisphere.

OPSOMMING

Gedurende die laaste aantal jare was daar 'n toename in geldeenheidkrisisse wat 'n groot aantal opkomende en ontwikkelde lande geraak het, op direkte of indirekte wyse. 'n Aantal onlangse finansiële krisisse, waaronder die Argentynse geldeenheidkrisis, het gepaardgegaan met episodes van finansiële besmetting en spekulatiewe aanvalle. Die opkomende markte se finansiële- en geldeenheidkrisisse gedurende die tweede helfte van die 1990s het heelwat ekonome genoop om hulle beskouinge met betrekking tot wisselkoersbeleid te verander.

'n Land se wisselkoersstelsel verskaf 'n belangrike grondslag vir die implementering van ander beleidverwante maatstawwe. Verskeie ekonome en owerhede glo dat die meeste opkomende markte òf 'n vryswewende òf 'n supervasgestelde wisselkoersstelsel moet aanvaar om sodoende 'n herhaling van finansiële- of geldeenheidskrisisse te voorkom.

Suiwer swewende en vasgestelde wisselkoersstelsels is slegs twee moontlike wisselkoersstelsels wat 'n land kan kies vir implementering. Nóg 'n suiwer swewende, nóg 'n vasgestelde wisselkoers los alle probleme op wat voorkom binne die hedendaagse globalisering van finansiële markte. Onlangse episodes van geldeenheids- en finansiële krisisse het daartoe gelei dat die koste en voordele van alternatiewe wisselkoersstelsels in heroorweging geneem is. Wanneer daar op die mees gepaste wisselkoers vir 'n land besluit word, moet die grootte van die land sowel as die mate van openheid van die ekonomie in ag geneem word, asook die inflasievlak, die mate van prys- en loonbuigsaamheid, finansiële ontwikkeling, die geloofwaardigheid van beleidsvormers en kapitale beweeglikheid.

Argentinië het 'n suksesvoller ekonomie as meeste ander in dié omgewing gehad tot en met die massiewe ineenstorting van die Argentynse ekonomie en die afskaffing van die geldeenheidsraadwisselkoersstelsel vroeg in 2002. Geldeenheidskrisisse in opkomende markte verskil van dié in ontwikkelde markte. Beide geldheenheidskrisisse in opkomende markte én in ontwikkelde markte het gelei tot die ontwikkeling van 'n aantal teorieë met betrekking tot die oorsake van spekulatiewe aanvalle.

In hierdie verhandeling is 'n empiriese analise gedoen wat gemik was daarop om spekulatiewe aanvalle en besmetting op geselekteerde opkomende en ontwikkelde markte te identifiseer, veral ten opsigte van die tydperk van die Argentynse krisis. Daardie lande wat 'n vryswewende wisselkoersstelsel gehandhaaf het ten tyde van die Argentynse geldeenheidskrisis is meer akuut geraak as lande wat gekenmerk is deur 'n vasgestelde wisselkoersstelsel. Dit het ook duidelik geword dat spekulatiewe aanvalle en besmetting tipies areagebonde is, en dat dit plaasgevind het in opkomende markte in die suidelike halfrond.

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CHAPTER 1
INTRODUCTION AND PROBLEM STATEMENT

1.1 Introduction

The financial crises in the emerging markets of Mexico, East Asia, Russia, Brazil and Argentina in the 1990s up to 2001 displayed a number of remarkable similarities (Savastano, 1999). Attracted by high domestic interest rates and a sense of stability stemming from rigid exchange rates, large volumes of foreign portfolio funds moved into Latin America, East Asia and Russia. This helped to propel stock market booms and assisted in financing large current account deficits. At some point, and for a number of reasons, these funds slowed down and/or were reserved. Massive volumes of capital left the countries in question, international reserves dropped to dangerously low levels and real exchange rates became acutely overvalued. Eventually, the pegged nominal exchange rate had to be abandoned, and the countries were forced to float its currency (Edwards, 2001).

Recent currency crises, specifically those in Latin America, Mexico, East Asia and Argentina have tended to be more profound than in the past, resulting in steep costs to the population of the countries involved. In a world of high capital mobility, even small adjustments in international portfolio allocations to emerging economies resulted in very large swings in capital flows. Sudden reductions in these flows amplified adjustments in exchange rates and interest rates (Savastano, 1999).

It is increasingly argued that the liberalisation of capital flows that occurred in several countries has been excessive and has been partially responsible for financial crises (World Bank, 1999). Financial liberalisation is a process known as the relaxation of regulatory controls on emerging market financial systems (Hallwood, 2000).

The link between capital flows and currency crises has been analysed extensively by economists. However, most of the analyses have originated from the evolution of output and of the domestic financial system in crisis episodes. Several of the crises that have occurred since 1990 up to 2001 have suggested that these elements are crucial (World Bank, 2000).

Each of these recent financial crises in Latin America (1982/3), Mexico (1994/5), East Asia (1997/8) and Argentina (2001) displayed an interaction between domestic financial weakness and international financial crisis. The main similarities between them are that they were all preceded by the following:

- Financial liberalisation
- Large-scale capital inflow. Domestic banks were allowed to diversify their sources of funds into the international interbank market
- A large-scale build-up of international indebtedness
- These financial crises occurred suddenly and deepened rapidly
- Foreign lenders made large-scale withdrawals of funds
- Domestic asset prices fell sharply
- The crisis spread to other emerging markets in similar external positions (Hallwood, 2000).

A prominent feature of currency and financial crises in emerging markets during recent years was the spread of financial difficulties from one economy to others in the same region and beyond, in a process that has come to be referred to as "contagion". Researchers have contemplated the nature of these crises, the factors responsible for their spread and whether a country with seemingly appropriate domestic and external fundamentals can experience a crisis because of contagion (Caramazza & Ricci, 2004).

1.2 Problem statement

A country's exchange rate system provides an important foundation for the implementation of other economic policy measures. For example, a floating exchange rate system is one in which the price of the currency, and hence exchange rates, are determined by competitive market forces. Under such a system, the monetary authorities of the country concerned do not attempt to influence the price at which the currency is traded or the volumes traded. On the other hand, a fixed exchange rate system is one in which the exchange rate is fixed at a particular level. While there is still a demand for, and a supply of the currency, these forces do not determine the exchange rate. Under such a system, the monetary authorities of the countries concerned intervene to fix or peg the value of the currency at a certain level relative to other currencies (Chacholiades, 1990).

Currency crises have led economists to rethink their views on exchange rate policies in emerging countries. The issue is lodged in the merits of pegged-but-adjustable exchange rates, both in the short-run and the long run. According to Edwards (2001), most emerging countries should adopt either free-floating or super-fixed exchange rate regimes in order to prevent the recurrence of a financial or currency crisis (Edwards, 2001).

South Africa, which is viewed as an emerging market in investor circles despite having a sound financial system, suffers a great deal during a financial crisis. Financial crises in emerging markets in general lead to the fall in the value of their currencies as investors transfer their portfolio investments from supposedly risky countries to the safe havens of American and European capital markets (ITRISA, 2000).

The performance of the rand/dollar exchange rate has been disappointing in recent times. Currencies perceived to belong in the emerging market asset class have been adversely affected by developments in Argentina and Turkey (Mboweni, 2001). Argentina's exchange rate has been pegged to the US dollar, which caused it to appreciate over time. This forced Argentina to run very tight monetary policies to the point of having a negative inflation rate. The country's appreciating exchange rate eroded its exports competitiveness and dragged down its domestic production levels (Mboweni, 2001). The Argentinean currency board, which had begun with overwhelming economic success, came to a sudden end in January 2002; then the period of the one-to-one peg between the US dollar and the Argentinean peso had expired and the peso depreciated dramatically. Despite the fact that Argentina had been suffering from a recession for years, the timing and severity of the recent currency crisis surprised most observers (Plata & Schrooten, 2003). Sentiment towards the rand has been clearly affected by economic problems in Argentina.

Currency crises have been the subject of an extensive body of economic literature, both technical and empirical. Yet, there remain some important unresolved issues, and each new set of crises presents new puzzles. This research focuses on an investigation of the currently fashionable view that suggests that emerging countries should freely float or adopt a super-fixed exchange rate regime. Therefore, the current research intends to analyse whether emerging markets can adopt a truly free-floating exchange rate system, or whether a true floating system is not feasible in less advanced nations.

The following hypothesis is formulated and will be tested: A currency crisis of an emerging economy has an immense affect on the economy and currencies of other emerging countries, taking into account different exchange rate regimes.

1.3 Objectives of research

The purpose of this research is to analyse the relationship between exchange rate regimes, currency crises, speculative attacks and contagion in selected emerging economies such as Argentina, Brazil, Hungary, Poland and South Africa. Exchange rates have been at the centre of economic debates in emerging economies. Issues related to fixed or floating exchange rates and the role of exchange rates in recent crises are examined (Ramisken, 2000).

The main objective of this study is to evaluate the impact of a currency crisis (the Argentine crises) on selected emerging market currencies, including the South African rand, and to shed light on the feasibility of different exchange rate regimes during currency crises. In order to achieve this objective, a full analysis must be conducted with a view to explaining currency crises by considering economic fundamentals, contagion effects, as well as speculative behaviour of investors as important determinants.

In reaching this objective, the following goals are set:

- To determine the importance of an international monetary system, in other words, when should a country follow a fixed or floating exchange rate regime?
- To determine the causes of a currency crisis, speculative attacks and contagion
- To determine the link between emerging markets and developed markets in a currency crisis
- To analyse the role of contagion and speculative attacks in periods of currency crises.

1.4 Methodology

The methodologies followed in the research are twofold, namely a literature survey and a financial market analysis.

a) Literature study

To determine the influence of currency crises on the world economy and emerging market currencies, an extensive review of the literature will first be conducted. Literature regarding different exchange rate regimes and currency crisis models will be consulted. This research relies on literature from various sources such as books, journals, newspaper reports and the internet. Most of the research relies on certain relevant research reports, completed by various international and national institutions which include:

- World Bank
- International Monetary Fund (IMF)
- South African Reserve Bank (SARB)
- National Bureau of Economic Research (NBER)
- Journal of International Money and Finance.

b) Financial market analysis

Secondly, the movements of different emerging market currencies, especially in times of financial crises, will be analysed and interpreted. The currency movement between South Africa and selected emerging market currencies will be analysed for the period 1998 up to 2003. Correlations between emerging and developed market countries will be analysed, particularly with regard to their exchange rates and asset prices in measuring contagion and speculative attacks.

1.5 Chapter exposition

Chapter One introduced and discussed the main problem to be addressed in this study. What becomes evident is that, during recent years, an increase in currency crises has affected a large number of countries, either directly or indirectly. Some similarities have been observed in the manner in which these crises unfolded, and this includes a loss of foreign exchange reserves, capital outflow and a sudden depreciation of the currency.

This study investigates the impact of the Argentine currency crisis on selected emerging markets, including South Africa, with the aim to contribute to the discourse regarding the most appropriate currency regime for developing economies.

The main aim of Chapter Two is to explain the functioning of the international monetary system. This chapter deals with the economics of the flexible exchange rate system and the continuing debate over fixed and flexible exchange rate regimes. The appropriate exchange rate regime varies depending on the specific circumstances of the country. In order to understand and evaluate how the international monetary system operates, a historical perspective will be provided in Chapter Two.

Chapter Three explains currency crises, speculative attacks and contagion. Financial and currency crises in emerging markets have triggered a variety of theories regarding the cause of speculative attacks. Models of currency crises and speculative attacks will be discussed and evaluated in Chapter Three. Chapter Three also investigates whether currency crises are linked to economic fundamentals and whether most currency crises are caused by contagion, the phenomenon in which a currency crisis in one country often seems to trigger crises in other countries

The main aim of Chapter Four is to focus on the impact and lessons learned from a currency crisis, and specifically the Argentine currency crises, on emerging markets. The collapse of the Argentine economy and the concomitant collapse of the Argentine experience with a currency board exchange rate system have affected the debate regarding the most suitable exchange rate regime for emerging markets. The main objective of Chapter Four is to arrive at an understanding, and to explain why Argentina decided to adopt the most extreme form of exchange rate peg and to what extent the Argentine currency crises is relevant for other emerging markets, including South Africa.

Chapter Five focuses on a market analysis regarding the Argentine currency crisis, on selected emerging markets which include Brazil, Poland, Hungary, Argentina and South Africa, as well as developed economies such as the Euro Zone, Great Britain and the USA. In Chapter Five, testing for contagion and speculative attacks during the Argentine crisis will be identified with regard to the countries mentioned for the period from 1998 until 2003. Identifying and measuring contagion require testing if the probability of a currency being attached in one period is influenced by the history of speculative attacks on all currencies in the sample.

Chapter Six provides a short summary of this study and conclusions are reached. It concludes with recommendations and proposes avenues for further study.

1.6 Important definitions

Certain important concepts are used in this study and are briefly explained below.

a) International monetary system (IMS)

The international monetary system is the total environment which facilitates the flow of trade-related payments and capital, the interaction of currencies, and the exchange of ideas and financial assistance at national and international level (ITRISA, 2000:124).

The main function of the international monetary system is to enable the fundamental economic processes of production and distribution to operate as smoothly and efficiently as possible.

b) Exchange rate system

A country's exchange rate system provides an important foundation for the implementation of other economic policy measures. Fixed and floating exchange rate systems are two types of exchange rate systems that are distinguished (Latter, 1996).

c) Fixed exchange rate system

A fixed exchange rate system is one in which the exchange rate is fixed at a particular level. While there are still demand for, and supply of the currency, these forces do not determine the exchange rate (Pilbeam, 1998). Under a fixed exchange rate system, the monetary authorities of the country concerned intervene to fix the value of the currency at a certain level relative to other currencies.

d) Floating exchange rate system

A floating exchange rate system is one in which the price of the currency, and hence exchange rate, are determined by competitive market forces (ITRISA 2000:120). Under such a system, the monetary authorities of the country concerned do not attempt to influence the price at which the currency is being traded or the volumes traded.

e) Optimum currency area

An optimum currency area is a region for which it is optimal to have its own currency and monetary policy (Mundell, 1968).

f) Currency crisis

A currency crisis can be defined as a situation in which a currency gets under enormous pressure, leading to a sharp depreciation and/or a strong drop in international reserves (Plata & Schrooten, 2003).

g) Speculative attacks

Speculative attacks can be defined as a period where currencies come under severe pressure to be devalued. Speculative attacks are characterised by sharp falls in reserves, depreciation of the exchange rates and an increase in interest rates (Peria, 1999). Two types of models, the first and second generation models dominate the existing literature on the determinants of speculative attacks and devaluations.

h) Contagion

Contagion is an increase in the likelihood of a crisis in a particular country, given that a crisis exists elsewhere (Eichengreen, 1996). Rigobon (2000) states that contagion can be defined as a significant increase in cross-market linkages that occur after a shock. This can be measured by anything from a correlation in financial assets to the probability of a speculative attack to the transmission of shocks.

1.7 Demarcation of the study

This study will only focus on a selection of currencies from emerging and developed market economies. This selection includes countries from different continents with different exchange rate regimes. The continents include Latin America, North America, Africa, Europe and Asia. The emerging market countries referred to in this study include Argentine, Brazil, Poland, Hungary and South Africa. These emerging market countries all make use of different exchange rate regimes, which include either fixed or floating exchange rate systems. A discussion on fixed, floating and alternative exchange rate systems will be provided in Chapter Two.

Argentina made use of a fixed exchange rate system until 2002 when its Currency Board Arrangement came to an end, and a dual exchange rate system was introduced. Brazil, on the other hand, adopted inflation targeting after exiting from a crawling peg exchange rate system in January 1999. Brazil currently makes use of a free floating exchange rate system after the devaluation of the real in January 1999.

Poland made the conversion from a fixed exchange rate system to inflation targeting in the 1990's. In 1990, the exchange rate was fixed to the US dollar as part of an exchange rate-based stabilisation programme. Concerns over real exchange rate overvaluation prompted the switch to a fixed exchange rate against a basket of currencies in May 1991, followed soon after a shift in forward-looking crawling peg in October 1991 through mid-1995. Heavy capital inflows created tension between external and domestic price stability objectives, leading the authorities to introduce a 7 per cent band around the crawling parity to give monetary greater independence. The width of the band was gradually widened until it was abandoned in 2000. Poland currently makes use of a free-floating exchange rate system (Duttagraph & Fernandez, 2004).

Hungary adopted a crawling peg with a 2.25 per cent band in 1995 with the dual purpose of establishing a nominal anchor and maintaining external competitiveness. The rate of crawl was based on the targeted inflation rate. The authorities responded to the upward exchange rate pressure generated by capital inflows with sterilised intervention, widening the band to 15 per cent; an inflation target was also adopted in 2001 (Duttagraph & Fernandez, 2004).

South Africa exited from a fixed exchange rate system to a floating exchange rate system in the early 1980's. South Africa formally adopted inflation targeting and a freely floating exchange rate system in 2000.

Developed market countries that are referred to in this study are Great Britain, the United States of America, Hong Kong and the Euro zone. The Euro zone consists of European countries and includes Austria, Belgium, Finland, France, Germany, Italy, Ireland, Luxembourg, the Netherlands, Portugal and Spain. Each of these countries makes use of the euro currency which is a floating exchange rate system. Hong Kong is classified as a developed market country with the characteristics of emerging market

economies. The Hong Kong dollar is linked to the US dollar at a rate of HKD 7.8 to one dollar. This linked is maintained through the operation of a strict and robust currency board system. Great Britain and the United States of America make use of floating exchange rate systems. Each country's currency in this study is quoted against the US dollar.

This study will only analyse the Argentine currency crisis and will focus on the period January 1998 to December 2003.

CHAPTER 2

THE INTERNATIONAL MONETARY SYSTEM AND EXCHANGE RATE REGIMES

2.1 Introduction

The foreign exchange market has, in recent years, become a focus for pecuniary pursuits at the expense of trade and direct investments. Two of the side-effects of the increased use of exchange market operations for financial gain have been exchange rate volatility and chronic balance of payment imbalances (Chacholiades, 1990:482).

Many currencies are not free to float against each other. Exchange rates are determined within the context of an international monetary system in which many currencies' ability of float against other currencies is limited by their respective governments or by intergovernmental arrangements (Hill, 1999).

The objective of this chapter is to explain the functioning of the international monetary system. This chapter thus deals with the economics of the flexible exchange rate system and the continuing debate over fixed and flexible exchange rates. According to Chacholiades (1990), the rate of foreign exchange under flexible exchange rates is determined daily in the foreign exchange market by the forces of supply and demand.

With most countries today subscribing to a flexible exchange rate policy, the international monetary system has come to denote the total environment which facilitates the flow of trade-related payments and capital, the interaction of currencies, and the exchange of ideas and financial assistance at national and international level (ITRISA, 2000)

The appropriate exchange rate regime varies, depending on the specific circumstances of the country, which include the classis optimum currency area criteria. In order to understand how the international monetary system operates, a person needs to acquire an historical perspective to perform a systems evaluation. The current discussion will

commence with a brief overview of the Gold Standard and its break-up during the 1930's and this will be followed by the 1944 Bretton Woods conference, which established the basic framework for the post-World War II international monetary system. The Bretton Woods system called for fixed exchange rates against the US dollar. Under the fixed exchange rate system, the value of most currencies in terms of the US dollar was fixed for long periods and allowed to change only under a specific set of circumstances (Giovannini, 1993).

Two decades after the breakdown of the Bretton Woods system, the debate over what kind of exchange rate regime would be best for the countries of the world is still raging. Some economists advocate a system in which major currencies are allowed to float against each other. Other argue for a return to a fixed exchange rate regime, similar to the one established at Bretton Woods (Eichenbaum & Evans, 1993).

2.2 The international monetary system

2.2.1 Definition

According to Chacholiades (1990:482), the term 'international monetary system' refers to the framework of rules, regulations and conventions that govern financial relations among nations. The international monetary system comprises the total environment which facilitates the flow of trade-related payments and capital, the interaction of currencies, and the exchange of ideas and financial assistance at national and international level. By far the greatest number of transactions passing through the international monetary system these days are capital transactions. Unlike international trade transactions, which are subject to a large number of regulations, the movement of capital internationally is largely unregulated (ITRISA, 2000:124).

2.2.1 Characteristics of a good international monetary system

The main function of the international monetary system is to enable the fundamental economic processes of production and distribution to operate as smoothly and efficiently as possible (Chacholiades, 1990:484).

Especially during times of crises, most people become aware of the existence and significance of the international monetary system. The ultimate objectives of the international monetary system are the maximisation of total world output and employment, as well as the achievement of a desirable distribution of economic welfare among nations and among different groups within each nation (Chacholiades, 1990:485).

A well-organised international monetary system can lead to the maximisation of total world output and to an acceptable distribution of that output among the members of the world community. A good international monetary system which minimises the element of rivalry among nations can be beneficial to the entire world community, since it can preserve the joint gain that the world economy can achieve through an efficient international division of labour. A good international monetary system, furthermore, is one that reconciles the elements of cooperation and rivalry which exist among nations and provides an adequate supply and growth of reserves. In the current international monetary system, reserves consist of total official holdings of gold, convertible foreign currencies, special drawing rights and net reserve positions in the International Monetary fund (IMF). The main purpose of reserves is to render financing of external disequilibria possible (Salvatore, 1995).

The confidence needed for the smooth functioning of the international monetary system refers to the willingness of the holders of the various reserve assets to continue holding them. Confidence essentially means the absence of panicky shifts from one reserve asset to another. A crisis of confidence arises when holders of various reserve assets become discontented with the composition of their portfolios and attempt to switch from one asset to another. A good international monetary system must have safeguards against the occurrence of crises of confidence, or should at least be able to cope satisfactorily with such crises (Machlup, 1975).

2.2.3 Emerging markets and the International Monetary System

After recent financial crises – such as, for example, the Mexican crisis, the Asian crisis and the Russian crisis – it has been agreed that the international monetary system needs to be reformed. The two main reasons for reforming the international monetary system are the following:

- International capital flows to emerging markets are too volatile, and volatility subjects recipient countries to shock and crises that are both excessively frequent and excessively large.
- There is too much contagion in the system – a point that was argued by many during the East Asian crisis, but which became incontestable after the Russian devaluation and unilateral debt restructuring spread the crisis to Latin America (Fischer, 1998).

Proposals for reforming the international monetary system are that the international capital markets should operate at least as well as the better domestic capital markets. The hope is to reduce volatility in the international capital markets, to reduce the frequency and intensity of emerging markets' financial crises and to reduce the extent of contagion. At times, foreign capital inflows to some emerging market countries have been too large and spread too low. Reforms in the IMS will raise the average level of spreads and make borrowing on average more expensive for emerging market borrowers (Edwards, 2001).

The following points will focus on how emerging market countries can make the International Monetary System operate more satisfactorily:

a) Macro-economic policies, including the choice of exchange rate system

The theory of the optimal currency area indicates that, in order to choose the exchange rate regime for a country, its history – and particularly its history of inflation – is important. Recent currency crises have affected countries with fixed and flexible exchange rates. Many countries benefited from fixing the exchange rate as part of the process of stabilising inflation (Fischer, 1998).

b) Banking and financial systems

A weak banking system has been at the heart of most recent financial crises. Banking systems need to be more competitive, particularly towards foreign competition, and better regulations and supervision are needed. Countries also need to strengthen their financial systems, including equity and bank markets. Emerging market countries need to ensure that they maintain healthy financial and banking systems (Mckinnon, 1999).

c) Provision for better information

After the Mexican crisis, many argued that if they had better information on Mexico's reserves, markets would have worked much better. Better information on a country's policies and the state of the economy should make the private capital market more efficient (Fischer, 1998).

d) Dealing with potential capital flow reversals

In recent currency crises, countries with very large foreign exchange reserves have fared better in dealing with the crises than those with small reserves. Several countries, including Argentina, have put in place precautionary lines of credit from private sector lenders. This is a useful supplement to the holding of reserves, and could be cheaper than increasing reserves. The International Monetary Fund's (IMF) attitude to controls on outflows of capital has been that these should be removed gradually, as a country's macro-economy, balance of payments and financial system become stronger. While it may be tempting to impose controls on capital outflow to deal with a short-term crisis, the long-term consequences are likely to be adverse (Fischer, 1998).

Emerging market countries should regard undertaking measures to increase the efficiency of their capital markets and the resilience of their economies to external shocks as being in their own interest. The development of international standards should provide countries with the necessary information regarding what needs to be done.

2.3 Exchange rate systems

A country's exchange rate system provides an important foundation for the implementation of other economic policy measures. According to Latter (1996), an exchange rate can be defined as the price at which the national currency is valued to a foreign currency.

Two broad classifications of exchange rate systems are distinguished:

- Fixed exchange rate systems
- Floating or flexible exchange rate systems.

The types of exchange rate systems are subsequently discussed.

2.3.1 Fixed exchange rate systems

2.3.1.1 Definition

A fixed exchange rate system is one in which the exchange rate is fixed at a particular level. While there is still demand for, and supply of the currency, these forces do not determine the exchange rate (Pilbeam, 1998).

Under a fixed exchange rate system, the monetary authorities of the country concerned intervene to fix or peg the value of the currency at a certain level relative to other currencies. The more fixed a system, the less frequently parities will be changed and the bands will be narrower around the parities. Three major fixed exchange rate systems emerged during the course of the 20th century: the Gold Standard, the Bretton Woods system and the European monetary system. Before these systems are described, the advantages and disadvantages of a fixed exchange rate system will follow.

2.3.1.2 Advantages of a fixed exchange rate system

A fixed exchange rate system offers the following advantages:

- Traders and investors are able to predict prices and profits with relative certainty. This leads to an expansion of international trade and capital flows, and reduces transaction costs and exchange rate risks (Latter, 1996:9).
- Inflation is lower under a fixed exchange rate system than under a floating exchange rate system, because the price of imports is controlled (ITRISA, 2000:108).
- Fixed exchange rate regimes provide credibility, transparency, very low inflation and monetary and financial stability. These also lead to a reduction in speculation and a devaluation risk (Calvo, 1999).

2.3.1.3 Disadvantages of a fixed exchange rate system

A fixed exchange rate system has the following disadvantages:

- The monetary authorities are required to keep large stocks of foreign reserves in order to defend the fixed value of the currency. The need to hold large reserves of foreign exchange puts the domestic financial system under a great deal of pressure (ITRISA, 2000:109).
- A fixed rate may be vulnerable to speculative attack, which can lead to damaging consequences for monetary stability in the economy or for foreign exchange reserves (Latter, 1996:8).
- Maintenance of a fixed rate requires the central bank to be ready to intervene in the foreign exchange market at that rate. Decisions are needed on how to cope with ensuing domestic monetary consequences (Latter, 1996:8).
- There is no certain way to establish whether a chosen rate is optimal or sustainable. Neither the government nor the central bank can presume to know better than the market where the equilibrium lies (Latter, 1996:8).

The different fixed exchange rate systems are subsequently discussed.

2.3.1.4 The Gold Standard (1870-1914)

Although the history of the Gold Standard can be traced back many centuries, the period from 1870 to 1913 is regarded as the most prosperous period of the Gold Standard, and is referred to as the "classical Gold Standard". Many countries operated under gold convertibility as a pre-declared parity. The period is also known for displaying virtually no capital movements (Bordo, 1993:225).

Under an international Gold Standard, each country ties its money to gold and allows unrestricted import and export of gold. The central bank at each Gold Standard country stands ready to buy and sell gold freely at a fixed price in terms of the domestic currency, while its private residents are entirely free to export or import gold. The essence of an international Gold Standard is that the rates of exchange are fixed (Hill, 1999:295).

Under the Gold Standard, countries defined the value of their currencies in terms of gold. The Gold Standard therefore made provision, in principle, for a system of fixed exchange rates. In most countries, paper money was also freely convertible into gold at a fixed rate (ITRISA, 2000:128). By 1880, most of the world's major trading nations, including Great Britain, Germany, Japan and the United States, have adopted the Gold Standard (Hill, 1999:296).

The Gold Standard was designed to bring about equilibrium in countries' balance of payments by influencing price levels. A country is said to be in balance-of-trade equilibrium when the income residents earn from exports is equal to the money residents pay people in other countries for imports (Hill, 1999:296).

If a country had a trade account deficit (meaning the value of imports exceeded that of exports) individuals wishing to make further payments to foreign parties would have to convert their domestic currency into gold and ship the gold. The loss of gold would reduce the domestic money supply, which would cause a contraction effect. The subsequent tightening of credit conditions and raising of interest rates would discourage spending, and the overall price level would drop. Lower domestic prices would, in turn, lead to more cost-efficient production and a reduction in imports because of the

availability of the cheaper domestic alternatives. The current account deficit would be reduced over time (ITRISA, 2000:126).

By stabilising exchange rates, the Gold Standard also reduced uncertainty and risk, and was perceived to influence international trade performance positively (Bordo, 1993).

2.3.1.4.1 The impact of World War 1 on the functioning of the Gold Standard

The Gold Standard functioned reasonably well from the 1870s until the onset of World War I in 1914, when it was abandoned. The Gold Standard was abandoned primarily because:

- The shipping of gold under war conditions became a risky operation
- The larger trading nations had to use a sizeable proportion of their gold reserves to finance the war effort. In an attempt to conserve gold, currencies were no longer allowed to be freely converted into gold and central banks took control of gold reserves (ITRISA, 2000:127).

Most countries have experienced volatility in their exchange rates after the fall of the Gold Standard. Volatility in exchange rates led to sharp rises in inflation. After the War, countries returned to the Gold Standard. Widespread disagreement as to where currency values should be set in relation to each other was the main problem why this system did not function efficiently. After its reintroduction, most countries wanted to keep their currencies at a relatively low level so that their exports would be competitive abroad. In the absence of an agreement on relative currency values, some countries allowed their currencies to float. Other countries kept their currencies at specific levels through the intervention of the governments concerned in the foreign exchange market. As a result, some currencies were overvalued and some were undervalued, which led to a large balance of payment deficits and surpluses (Bordo, 1993).

2.3.1.4.2 The impact of the Great Depression and World War II

The onset of the Great Depression of the 1930s – precipitated by the New York Stock Exchange crash of 1929 – facilitated an orderly return to the Gold Standard. The Depression heralded an era of low prices, poor trade performance, bank failures and high unemployment throughout the world (ITRISA, 2000:128).

The onset of the Great Depression was a period of open economic warfare. As the Depression deepened, governments pursued – in vain – the game of competitive depreciations in the hope of eliminating their domestic unemployment and restoring external balance. During the period from 1931 to 1935, international cooperation reached its nadir (Van den Berg, 2004:505).

Countries suspended the convertibility of their currencies into gold. They devalued their currencies instead, with a view to encourage exports and discourage imports. Domestic economies were thought to be stimulated if there were an increase and improvement in the inflow of gold.

Throughout the 1930s, no cohesive system of exchange rates was evident, with some countries floating their currencies and other reverting to the practice of anchoring their currencies to gold. With the outbreak of World War II in 1939, the international monetary system was thrown into even greater disarray. Meaningful international monetary reforms had to be postponed until the end of the War (Van den Berg, 2004:505).

2.3.1.5 The Bretton Woods system

During the early 1940s – even before World War II had come to an end – there was growing consensus among the Western powers that the inconvertibility of currencies was hampering world trade and economic growth, and that the international monetary system needed new direction.

In 1944, at the height of World War II, representatives from 44 countries (including South Africa) held a conference in Bretton Woods in the State of New Hampshire in the

United States. The main objective of the conference was to reform the international monetary system.

With the collapse of the Gold Standard and the Great Depression of the 1930s fresh in their minds, the idea was to build an enduring economic order that would facilitate post-war economic growth. The delegates considered two plans, a British plan developed by Lord Keynes and an American plan developed by Harry Dexter White of the US Treasury (Van den Berg, 2004:506). Keynes and White proposed a new international monetary system in which restrictions on the convertibility of currencies should be lifted as well as the establishment of a permanent body to oversee this transition and to encourage international financial co-operation (ITRISA, 2000:131).

The system finally endorsed by the delegates became known as the Bretton Woods system. It served the world from 1944 to 1971, a period of 27 years that was known as the Bretton Woods era.

The most important features of the Bretton Wood system were:

a) International institutions

International monetary cooperation requires the creation of an international agency with defined functions and power. The agreement reached at Bretton Woods established two multinational institutions – the International Monetary Fund (IMF) and the World Bank. The task of the IMF would be to maintain order in the international monetary system, and that of the World Bank would be to promote general economic development (Eichengreen, 1993).

b) Exchange rate regimes

For the smooth functioning of the adjustable peg system, countries require a large volume of reserves (gold and currency reserves). The Bretton Woods agreement also called for a system of fixed exchange rates that would be policed by the IMF under the agreement that all countries were to fix the value of their currency in terms of gold, but were not required to exchange their currencies for gold (Eichengreen, 1993).

c) Currency convertibility

In the interest of political harmony and economic welfare, all countries had to adhere to a system of untitled multilateral trade and convertible currencies (Salvatore, 1995:656).

Only the dollar remained convertible into gold at a price of $35 per ounce. Gold was again given a fixed price but was expressed in US dollars only. Other currencies were assigned a fixed price in terms of dollars. This meant that the US dollar was the only currency which was directly convertible into gold; other currencies were convertible into dollars at a fixed rate (Eichengreen, 1993).

2.3.1.5.1 Weaknesses of the Bretton Woods system

The use of gold as the ultimate reserve became problematic in the 1960s and early 1970s. Gold production was not keeping abreast of the growth in international trade. During the late 1960s and early 1970s the first issues of Special Drawing Rights (SDR's) were made. SDR's were issued to all member countries in relation to their International Monetary Fund (IMF) quotas and gave countries a right to borrow in currencies in which they were short (Eichengreen, 1993:132).

With the developing of SDR's in the 1960s it became apparent that the reserves held by most countries, in the form of gold and dollars, were insufficient to sustain the prevailing rate of economic growth throughout the world. Gold, for example, could not be mined quickly enough and there were fears that the supply of dollars might dry up. In response to the growing liquidity problem under the Bretton Woods system, the IMF agreed to increase world reserves through the introduction of SDR's. SDR's are not backed by gold or any other currencies – they are simply accounting entries in the books of the IMF. An SDR is assigned an artificial value based on the average value of the world's major currencies (i.e. the US dollar, the British pound, the Japanese yen and more recently, the euro). The allocation of the SDR's to members is proportional to the members' quotas of reserves (ITRISA, 2000:133).

Although these were loans that had to be repaid, SDR's were an addition to international reserves and constituted an attempt to take some pressure off the US dollar as virtually the only source of world money (Pilbeam, 1998).

Countries began to supplement their gold reserves with substantial stocks of dollars and pounds. This meant that the United States was under increasing pressure to maintain the convertibility of such currency stocks into gold.

Britain began to experience balance-of-payment deficits in the 1960s. There were fears that the pound would be devalued as a result of the country's poor economic performance. Speculative selling of pounds made it clear that the pound was seriously overvalued. The United States also started to experience balance-of-payment deficits in the 1960s due to massive expenditure on the Vietnam War and a rise in imports of competitively priced goods from the newly streamlined countries of Europe and Japan. This was accompanied by rising inflation. A reduction in the United States' gold reserves in the late 1960s led to a loss of confidence in the United States' ability to maintain dollar convertibility and in the dollar itself. Countries began to hold important currencies, other than the dollar, as reserve, fearing the devaluation of the dollar (Giovannini, 1993).

2.3.1.5.2 The collapse of the Bretton Woods system

The system of fixed exchange rates proposed at Bretton Woods functioned well until the late 1960's, when it began to show signs of strain – as explained in the previous section. With the demand for dollars decreasing, the United States' monetary authorities concluded in 1971 that the dollar would be devalued. The Bretton Woods system finally collapsed in 1973. Each country was required to fix the value of its currency against the dollar. The US monetary authorities could not unilaterally adjust the dollar value without the agreement of other countries to revalue the currencies relative to the dollar (Eichengreen, 1993).

The rise in inflation and the worsening of the US foreign trade position gave rise to speculation in the foreign exchange market that the dollar would be devalued. In spring 1971, the US trade figure confirmed that the United States has been importing more

than it was exporting since 1945. In August 1971, President Nixon of the Unites States suspended the convertibility of the dollar into gold and announced the country's intention to devalue the currency. The result of Nixon's announcement to devalue the dollar was a speculative run against the currency. The Bretton Woods system could not function well if its key currency, the US dollar, was under speculative attack. The system could only have functioned well if the US inflation rate remained low, and if the United States did not run a balance-of-payments deficit.

The history of the breakdown of the Bretton Woods system involved two interconnected processes: the development of an increasingly global system of production and finance, and the relative decline of the US within the Bretton Woods order and its move towards a new regime, based on the free movement of capital in order to maintain its position of global hegemony (Beams, 2001).

The major financial nations of the world were yet not ready to accept the regime of freely floating exchange rates. On December 18, 1971, the group of ten (Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, the United Kingdom and the United States), reached an agreement at the Smithsonian Institution in Washington D.C. This agreement became known as the Smithsonian Agreement (Chacholiades, 1990).

The Smithsonian Agreement had the following features:

- The United States agreed to raise the official price of gold to $38 an ounce from $35, the price that had prevailed since 1934. The United States refused to restore the free convertibility of dollars into gold. The dollar was no longer to be converted into gold, but was to remain as a reserve currency with all other currencies pegged to it. This paved the way for fixed exchange rates. Therefore the system was a dollar system.
- Other nations agreed to realign their exchange rates upward in an effort to cope with the problem of the overvalued dollar. The dollar was devalued by approximately 8% against other currencies.
- The exchange rate fluctuation was expanded to 2.25 per cent from 1 per cent in recognition of the volatile demand and supply conditions in the foreign exchange market (Black, 1985).

Under the dollar standard, countries' monetary authorities held their reserves and settled their international debts in dollars. Without gold or anything else supporting the value of the dollar, the latter was vulnerable to waning demand and speculative attacks (ITRISA, 2000).

The Smithsonian Agreement did not really solve any of the fundamental defects of the Bretton Woods system. Within six months, the pound sterling had to return to a floating rate. In February 1973, the United States raised the price of gold for a second time to $42.22 an ounce, without restoring the free convertibility of dollars into gold. In March 1973, all major currencies of the world started to float again. This led to the emergence of a new exchange rate regime; a system of "managed" floating (see section 2.3.2.5) (Chacholiades, 1990).

2.3.1.6 The European monetary system (EMS)

After the breakdown of the Bretton Woods system, some European countries continued their efforts to coordinate their monetary policies and prevent intra- European exchange rate fluctuation. In March 1979, Germany, France, Italy, Belgium, the Netherlands, Luxembourg, Denmark and Ireland agreed to fix their mutual exchange rates within certain bands, and let their currencies fluctuate against the US dollar within the European Monetary System (EMS) (McDonald, 1999).

The main purpose of the EMS was to foster monetary stability in Europe. In 1994, the European Monetary Institute was created as transitional step towards establishing the European Central Bank (ECB) and a common currency. The ECB, which was established in 1998, was responsible for setting a single monetary policy and interest rates for the adopting nations.

At the beginning of 1999, European countries (i.e. Austria, Belgium, Finland, France, Germany, Italy, Ireland, Luxembourg, the Netherlands, Portugal and Spain) adopted a single currency, the euro. The European Currency Unit (ECU), which was established in 1979, was the forerunner of the euro. Derived from a basket of varying amounts of the

currencies of the EU nations, the ECU was a unit of accounting used to determine exchange rates among the national currencies (Salvatore, 1995:663).

The euro was formally established on 1 January 1999 and trading in the currency commenced on 4 January 1999. Although the euro was a fully established currency from January 1999, euro notes and coins were not to be issued until 1 January 2002. For most consumers and firms, the introduction of the euro had the effect of establishing a fully fixed system of exchange rates (McDonald, 1999).

2.3.2 Floating/flexible exchange rate systems

The floating exchange rate regime that followed the collapse of the fixed exchange rate system was formalised in January 1976 when IMF members met in Jamaica and agreed to the rules for the international monetary system that are in place today. The purpose of the Jamaica meeting was to revise the IMF (International Monetary Fund) Articles of Agreement to reflect the new reality of floating exchange rates. The main elements of the Jamaica agreement included the following:

- Floating rates were acceptable. IMF members were permitted to enter the foreign exchange market to even out "unwarranted" speculative fluctuations.
- Gold was abandoned as a reserve asset. The IMF returned its gold reserves to members at the current market price, placing the proceeds in a trust fund to help poor nations. IMF members were permitted to sell their own gold reserves at he market price.
- Total annual IMF quotas (the amount member countries contribute to the IMF) were increased to $41 billion (Hill, 1999:301).

The key feature of the Jamaica conference was the agreement that countries were free to choose the type of exchange rate system that best suited their own individual needs. Pegged and floating exchange rates were given equal legal status. Countries were no longer compelled to maintain specific par values for their currencies, but instead they were urged to pursue domestic economic policies that would be conducive to economic and financial stability (Chacholiades, 1990).

Since March 1973, exchange rates have become much more volatile and less predictable than they were between 1945 and 1973. This volatility has been partly due to a number of unexpected shocks to the world monetary system, including:

- The oil crisis in the 1970s, when OPEC (oil producing countries) quadrupled the price of oil. The oil price was raised fivefold between 1973 and 1974, placing enormous strain on the economies of oil-importing countries. The harmful effect of this on the US inflation rate and trade position resulted in a further decline in the value of the dollar.
- The loss of confidence in the dollar that followed the rise of US inflation in 1977 and 1978.
- The oil crisis of 1979, when OPEC once again increased the price of oil dramatically; this time it was doubled.
- The unexpected rise in the dollar between 1980 and 1985, despite a worsening balance of payments picture (Black, 1985).

The advantages, disadvantages and different varieties of floating exchange rate systems are subsequently reviewed.

2.3.2.1 Definition

A floating exchange rate system is one in which the price of the currency, and hence exchange rates, are determined by competitive market forces (ITRISA, 2000:120). Under such a system, the monetary authorities of the country concerned do not attempt to influence the price at which the currency is being traded or the volumes traded. The quantities traded and the exchange rates between the domestic currency and other currencies are determined entirely by the forces of demand and supply.

2.3.2.2 Advantages of a floating exchange rate system

The advantages of a floating exchange rate system are the following:

- Any surplus or deficit on the balance of payments is automatically corrected. As the balance of payments essentially becomes self-adjusting, countries do not need to keep large stocks of foreign reserves in order to defend their domestic currencies (ITRISA, 2000:110).
- The rate is determined principally by market forces. Markets are successful if they allocate resources efficiently (Hill, 1999:305).
- If markets operate efficiently and the exchange rate floats freely, there will be no opportunities for speculators to make profits at the expense of the central bank (Hill, 1999:305).
- The demand and supply for domestic currency against foreign currency will be balanced in the market. There is no obligation for the central bank to intervene. Therefore domestic monetary aggregates will not be affected by external flows, and a monetary policy which is independent of monetary policy in other countries can be pursued (Latter, 1996).

2.3.2.3 Disadvantages of a floating exchange rate system

A floating exchange rate system has the following disadvantages:

- The freedom to operate an independent domestic monetary policy may be abused. The government, not being compelled to prevent the exchange rate from depreciating, may be tempted into inflationary budgetary and monetary policies (Latter, 1996:12).
- The future path of the exchange rate is uncertain, which may create difficulties for businesses insofar as planning and pricing are concerned. As exchange rates fluctuate on a daily basis, a potential foreign investor cannot predict the future value of local shares or other assets with any certainty, and intended profits could easily turn into losses (Latter, 1996:12).

Broadly stated, floating exchange rate systems can be divided into two groups, namely free-floating exchange rate systems and managed floating systems.

2.3.2.4 Free-floating exchange rate systems

After the collapse of the Bretton Woods system, almost all major currencies began to float freely in the foreign exchange market. Under a free-floating exchange rate regime, the central bank does not intervene in the foreign exchange market, but rather allows private supply and demand to clear by themselves. The values of the foreign exchange rate are freely determined in the market. The advantages of such a regime include that the changes in nominal exchange rate should adjust to foreign and domestic shocks, and high international reserves are not required. The main shortcomings of a free-floating exchange rate regime are that high nominal exchange rate volatility may distort resource allocation, and monetary policy needs to be framed in terms of nominal anchors different from the exchange rate. Virtually no country has a free-floating exchange rate regime, but the United States is the closest to a pure example of a free float (Salvatore, 1995:655).

2.3.2.5 Managed floating exchange rate systems

According to Frankel (1999), a managed floating exchange rate system is one in which the price of the currency, and hence the exchange rate, are largely determined by market forces, but the monetary authorities "merge" the degree of flexibility of the exchange rate. The authorities intervene only if they feel that the exchange rate is rising or falling too much.

Under a managed floating exchange rate system, the monetary authorities are able to smooth out short-term fluctuations while the underlying adjustment process takes effect. The managed floating exchange rate system also permits intervention by the monetary authorities when they perceive that prevailing exchange rate movements will have an adverse effect on employment, inflation, international competitiveness and other matters of official concern. This exchange rate system is a guide to the underlying strengths or weaknesses of an economy and a tool to correct temporary imbalances. The industrial countries as well as some of the larger developing countries (including South Africa) operated under a managed floating exchange rate system (ITRISA, 2000:110)

Managed floating exchange rate systems, also known as "dirty float" can be described as possessing a readiness to intervene in the foreign exchange market, without defending any particular parity. Most intervention is aimed at buying the currency when it is rising and selling the currency when it is falling (Frankel, 1999).

Managed floating has had different meanings from one country to another and between different time periods. Sometimes intervention has been very slight, but at other times there has been coordinated action by a number of central banks to attempt to change the direction in which exchange rates were heading. A government's ability to manage its exchange rate depends on the following:

- The government's reserves of foreign currency
- The ability to distinguish reversible short-term influences from more fundamental ones
- The extent to which it uses indirect actions to influence foreign borrowing and to control the flow of capital in and/or out
- The extent to which it is prepared to use monetary policy to influence the rate of exchange, rather than to pursue domestic policies such as the control of inflation (Pilbeam, 1998).

2.3.2.5.1 Intervention in the foreign exchange market

Under any exchange rate regime other than a completely free-floating exchange rate system, the central bank intervenes in the foreign exchange market. The extent of such intervention depends upon the particular circumstances. The following points state how central banks intervene in the foreign exchange market:

a) Passive intervention

For those countries with a fixed rate regime, operations in the foreign exchange market are largely passive, with the central bank automatically clearing any excess demand or supply of foreign currency to maintain a linked rate against the US dollar. It purchases local currency against the US dollar if there is pressure on the exchange rate to weaken and sells the local currency for US dollars when there is an increase in the demand for local currency assets. Interest rates in the interbank market adjust

to clear the market. Under a currency board system, both the stock and the flow of the monetary base must be fully backed by foreign reserves. Hence, any change in the monetary base must be matched by a corresponding change in reserves and the central bank is passive in intervening in the market (Boge, 2001).

b) Active intervention

Central banks in countries which have adopted flexible exchange rate regimes have all retained the discretion to intervene in the foreign exchange market. Some are relatively more active than others, but there is general consensus that intervention may be warranted to:

- Stabilise the exchange rate and provide liquidity to the market
- Correct an overshoot, in either direction, in the exchange rate (Latter, 1996).

c) Minimising overshooting

Intervention is not intended to prevent the exchange rate from adjusting to a new equilibrium level. Rather, it is regarded as a tool used in the short term to smooth the transition in the exchange rate by minimising overshooting when economic conditions are changing, or when the monetary authority believes that economic signals have been misinterpreted by the market. In the latter instance, movements in the exchange rate are not consistent with economic fundamentals and the monetary authority can play a role in managing market sentiment to correct this, but must be careful not to find itself defending an inappropriate exchange rate. When in doubt, it is better to allow the exchange rate to adjust (Boge, 2001).

d) Limiting volatility

Limiting the volatility in the exchange rate is important due to the adverse effects it can have on sentiment, both within financial markets and the economy. This is particularly true where management of the exchange rate is the major tool for the implementation of monetary policy, as excessive short-term volatility can erode that market's confidence in the regime. Even if the currency has not departed significantly from its "fundamental" value, but remains excessively volatile, foreign exchange intervention may be appropriate to calm markets. This is not to say that less volatility is preferable in all situations. A degree of volatility is useful in discouraging

"excessive" short-term capital inflows, because it imparts some risk into the market (Boge, 2001).

e) Stabilising effect

The extent to which a "misalignment" of the exchange rate can be tolerated is largely determined by the objectives of the monetary authority. In broad terms, these could be summarised as maintaining price stability and promoting sustainable non-inflationary growth. Thus, where the exchange rate's departure from fundamentals threatens these objectives – such as moving the inflation rate outside of a target range – it may be appropriate to consider intervening in the market. The stabilising role that a central bank can bring to the market may be sufficient to alter investors' sentiment and move the exchange rate back towards equilibrium (Boge, 2001).

f) Co-ordinated intervention

Evidence suggests that coordinated intervention is more effective than individual intervention. Where the monetary authorities for both the "under"-and "over-" valued currencies participate, the coordinated signals offered by the intervention may be viewed by the market as being more credible (Boge, 2001).

2.3.2.5.2 Sterilised and non-sterilised foreign exchange rate intervention

Under a managed floating exchange rate system, active intervention (both sterilised and non-sterilised intervention) results in changes in international reserves. Indirect intervention (through changes in interest rates, liquidity and other financial instruments) does not result in changes in reserves (Edwards, 1999).

Through foreign exchange intervention, the central bank sells foreign reserves to the public and this leads to a reduction in the money supply and a concomitant increase in domestic interest rates. Non-sterilised intervention means that the central bank allows the intervention to affect the equilibrium level of the money supply in the domestic economy. Another type of intervention is sterilised intervention. Suppose, for example, that intervention in the foreign exchange market takes place. If such an intervention is not sterilised, it would lead to a reduction in the money supply and an increase in domestic interest rates. High domestic interest rates might lead the economy into a

recession. To sterilise the intervention, the central bank intervenes again in the foreign exchange market to bring back the money supply to its previous level via an open market purchase of domestic bonds, so that the money supply returns to the level it had been before the original foreign exchange market intervention (Edwards, 1999).

Sterilisation policies may have negative consequences. In times when the domestic currency is subject to devaluation pressures, sterilised intervention does not eliminate the original cause for a pressure on the exchange rate. When a currency is subject to devaluation pressures under a fixed rate regime, the only way to defend the currency is to perform non-sterilised intervention. Non-sterilised intervention reduces the money supply and increases interest rates, so that the incentive to dump domestic assets is eliminated. If the intervention is sterilised, it does not allow the intervention to affect the money supply and interest rates. Sterilised intervention leads to further losses of foreign reserves, as the original cause of the initial pressure on the exchange rate is not eliminated through higher domestic interest rates. The only way to avoid persistent and continuous losses of foreign reserves is to allow the foreign exchange interventions to affect the money supply and interest rates. Therefore the central bank makes use of non-sterilised intervention. A continuous fall of foreign exchange reserves will follow if sterilised intervention continues. This will mean that there are no more reserves available to defend the currency, and the fixed exchange rate collapses. A speculative attack on a country's currency leads to a loss of foreign exchange reserves and the collapse of the fixed exchange rate regime (Roubini & Backus, 1998).

Fixed and floating exchange rate systems are only a broad classification of exchange rates, but these are not the only two options regarding exchange rate regimes. In the following section alternative exchange rate regimes will be discussed.

2.3.3 Alternative exchange rate regimes

As previously mentioned, the choice of a country's exchange rate regime depends on that country's individual circumstances. Modern literature on exchange rate regimes has emphasised the existence of important trade-offs between credibility and flexibility (Frankel, 1995; Edwards, 1996). Most theoretical analyses consider two exchange rate

regimes, namely a fully flexible (floating) exchange rate with minimal central bank intervention, and an irrevocably (credibly) fixed nominal exchange rate.

A flexible exchange rate regime allows a country to have an independent monetary policy, providing the economy with flexibility to accommodate domestic and foreign shocks, including changes in external terms of trade and interest rates. A flexible exchange rate system usually comes at the cost of some loss in credibility and tends to be associated with higher inflation. Fixed exchange rate regimes reduce the degree of flexibility of the system, but import a higher degree of credibility to policy-making. Under a fixed exchange rate regime, the primary goal of monetary policy is to preserve the exchange rate parity through moderate wage and price expectations, thus allowing the economy to attain a lower rate of inflation.

Pure floating and fixed exchange rate regimes are only two of the possible exchange rate regimes that a country can choose. In reality there are many layers between these two extremes (Edwards, 1999). Neither pure floating nor fixed exchange rate regimes sweep away all the problems that came with modern-day globalised financial markets. Countries have to trade off the advantages of more exchange rate stability against the advantages of more flexibility (Frankel, 1999).

The proper assessment of costs and benefits of alternative exchange rate regimes has been a hotly debated issue. Recent episodes of currency and financial crises have led to renewed interest on the topic, by introducing the question of which exchange rate regime is better suited to deal with increasing instability in world markets. When choosing the most appropriate exchange rate regime for each country, one should take in consideration the size and degree of openness of the economy, the level of inflation, the degree of price and wage flexibility, financial development, credibility of policy-makers and capital mobility.

There are nine alternative exchange rate regimes, including floating with a band, sliding band, crawling band, crawling peg, adjustable peg, currency board and full dollarisation, ranked according to the degree of flexibility that they import to the economy and the relative stability they afford to the nominal exchange rate. The most flexible exchange rate regime is the free-floating exchange rate system (as discussed in section 2.3.2.4),

followed by the managed floating exchange rate system (as discussed in section 2.3.2.5). The regimes that have not been discussed previously are subsequently reviewed.

a) Floating with a band - target zone

In this instance, the nominal exchange rate is allowed to fluctuate within a band. The centre of the band is a fixed rate, either in terms of one currency or a basket of currencies. The exchange rate mechanism (ERM) of the European monetary system (EMS) is the best-known example of this type of regime, where a number of European countries followed a range of plus-or-minus 2.25 per cent (see section 2.3.1.6). The key parameters (bands or midpoints) help to guide the public's expectations and the system combines the benefits of some flexibility with some credibility. In some instances (especially where the band is too narrow and when domestic macro-policies are not consistent with a horizontal band) the system can be destabilising and prone to speculative attacks (Salvatore, 1995:666).

b) Sliding band

Under the sliding band regime there is no commitment by the authorities to maintain the central parity "indefinitely", but instead the central parity will be adjusted periodically. The system is an adaptation of the band regime to be applicable in high inflation economies. The main benefit of such a regime is that the system allows countries with an ongoing rate of inflation higher than world inflation to adopt a band without having to experience a severe real appreciation. One drawback of this system is the fact that the timing and size of central parity adjustments are unknown. This introduces considerable uncertainty, which often leads to high interest rate volatility. The uncertainty and volatility associated with this system make it less attractive than other alternative exchange rate regimes, such as the crawling band. Countries strongly committed to maintaining a sliding peg usually back the currency with unspecialised intervention (Edwards, 1999:5).

c) Crawling band

The crawling band exchange rate regime is a band system whereby the central parity increases slowly over time. Different rules can be used to determine the rate of crawl. The backward-looking crawl is based on past inflation differential where the

forward-looking crawl is based on the expected or target rate of inflation. Choosing the criteria for setting the rate of crawl entails serious risks. A backward-looking approach can introduce considerable inflationary inertia into the system. On the other hand, a forward-looking approach that sets the wrong inflation target can produce overvaluation and give rise to speculative pressures. An advantage of this regime is that such a system allows high inflation countries to adopt a band system without having to undertake large adjustments of the central parity (Edwards, 1999:5, Table 1).

d) Crawling peg

Under a crawling peg regime, the nominal exchange rate is adjusted periodically according to a set of indicators and is not allowed to fluctuate beyond a narrow range. The benefit of this regime is that it allows countries with high inflation to avoid real exchange rate overvaluation. The shortcoming of this system is that a pure backward-looking crawling peg (where the nominal rate is mechanically adjusted according to past inflation differentials) introduces inflationary inertia and may cause monetary policy to lose its role as nominal anchor. In countries with high inflation, the peg can be reset regularly (as often as weekly) in a series of mini-devaluations. A prominent example in this regard is Chile. The rate of crawl may be set lower than the rate of forecasted inflation, in an effort by a country to work its way out of the inflation cycle (Salvatore, 1995:670).

e) Fixed-but-adjustable (adjustable peg)

"Fixed but adjustable" was the description of exchange rate pegs under the Bretton Woods system. This was the most popular regime of the century. As indicated in section 2.3.1.5, most developing countries held on to this system after the formal collapse of the Bretton Woods agreement in 1973. Under a fixed-but-adjustable exchange rate regime, the nominal exchange rate is fixed, but the central bank is not obliged to maintain the parity indefinitely. No tight constraints are imposed on the monetary and fiscal authorities, and adjustments of the parity are a powerful policy instrument. This system provides macroeconomic discipline by maintaining tradable good prices in line with foreign prices in a context of relatively low uncertainty. Under this system, devaluations have typically been large and disruptive, introducing

uncertainty and inflationary pressures, rather than smooth and orderly events (Edwards, 1999:5).

f) Currency board

A currency board is a monetary institution that only issues currency that is fully backed by foreign assets. Its principal attributes include the following:

- An exchange rate that is fixed by policy and law
- A reserve requirement stipulating that each dollar's worth of domestic currency is backed by a dollar's worth of foreign reserves
- A self-correcting balance-of-payments mechanism, in which a payment deficit automatically contracts the money supply, resulting in a contraction of spending (Frankel, 1999).

A currency board can help to create a credible policy environment by removing from the monetary authorities the option of printing money to finance government deficits. Argentina, for example, has benefited from such credibility (see section 4.2.1, Chapter 4). Argentina was prompted to adopt a currency board because of a dramatic hyperinflation in the 1980's and the absence of a credible monetary authority (Frankel, 1999:18).

g) Full dollarisation

Full dollarisation is a generic name given to an extreme form of a currency board system where the country completely gives up its monetary autonomy by adopting another country's currency. Dollarisation will be applicable in countries that have small and dependent economies with a history of hyperinflation. Dollarisation is therefore a surrender of monetary independence (Wagner, 2000). See section 4.2.4.3, Chapter 4, on dollarisation.

2.3.4 Fixed versus floating exchange rate systems: a currency perspective

To conclude the discussion on exchange rates, it should be stated that currency crises have led many economists to question the merits of fixed-but-adjustable exchange rates, both in the short and the long run. It is often said that, in order to prevent the recurrence of financial and currency crises, most emerging countries should adopt either free-floating or super-fixed exchange rate regimes. One of the most controversial issues of our time in terms of economic policy has been the choice of exchange rate regimes (Hausmann & Stein, 1999:11).

According to Fischer (2001), the so-called "two corners" perspective on exchange rate regimes has become increasingly popular. An increasingly large number of analysts agree that in a world of high capital mobility and poorly informed market participants, emerging markets are subject to currency crises (Calvo, 2000). The perspectives on fixed versus floating exchange rate regimes are discussed in terms of their influence on speculation, economic policies, balance of trade and economic shocks.

a) Speculation

An attractive feature of fixed exchange systems is the reduction of speculation and devaluation risk. Domestic interest rates will be lower and a greater degree of stability normally prevails than under alternative exchange rate regimes (Calvo, 1999; Hausmann & Stein, 1999). Critics of a floating exchange rate system also argue that speculation can cause fluctuations in exchange rates. A pure floating exchange rate regime has the attraction of its ability to withstand an attack (or large volatile capital flows) without the exchange rate regime collapsing (Grenville, 2000).

A negative aspect of a fixed exchange rate system is that, if it lacks credibility, it might be vulnerable to speculative attacks. Speculative attacks could have damaging consequences for monetary stability in the economy and speculation may force the abandonment of the fixed rate system.

Speculation also adds to uncertainty surrounding future currency movements that characterise floating exchange rate regimes. The unpredictability of exchange rate movements makes business planning difficult and makes exporting, importing and

foreign investment risky activities. Under a fixed exchange rate system, this uncertainty is limited, and it therefore promotes the growth of international trade and investment (Hill, 1999).

b) Economic policies

Supporters of a fixed exchange rate, including currency boards and dollarisation, have argued that these exchange rate systems provide credibility, transparency, very low inflation and monetary and financial stability. As mentioned in section 2.3.1, under a fixed exchange rate system, monetary expansion can lead to high inflation, which puts downward pressure on a fixed exchange rate. Countries are limited in their ability to use monetary policy to expand their economies in order to maintain exchange rate parity under a fixed exchange rate system. Under a floating exchange rate system, the removal of obligation to maintain exchange rate parity would restore monetary control to the government. Monetary expansion might lead to inflation and a depreciation of the country's currency (Calvo, 1999; Hausmann & Stein, 1999).

c) Balance of trade

Under a fixed exchange rate system, if a country developed a permanent deficit on its balance of trade (imports exceeds exports) that could not be corrected by domestic policy; it would require the IMF to agree to a currency devaluation. Those in favour of a floating exchange rate advocate that the exchange rate helps to adjust trade imbalances. On the other hand, it is often perceived that a depreciating exchange rate will not boost exports and reduce imports, but would rather boost price inflation (Hill, 1999).

d) Economic shocks

Discussions have often focused on the role of the exchange rate in enabling the economy to sustain output in the face of various sorts of shocks. It has been suggested that a floating exchange rate system best copes with internal shocks to the real economy, because a movement in the rate may then be the most effective way of restoring output to its equilibrium path. A fixed exchange rate system copes with internal monetary disturbances, because inflows or outflows of reserves can serve as a cushion. It has also been argued that a highly open economy is best served by a fixed exchange rate system. Under a floating exchange rate system, there may be

considerable volatility in the nominal rate and feedbacks from the exchange rate to cost and prices may be so strong that no significant changes in the real exchange rate could be engineered. An open economy needs a floating rate in order to insulate itself from the monetary system consequences of the many external shocks to which an open economy is certain to be exposed (Latter, 1996).

2.4 Optimum currency area

As illustrated above, the choice between fixed, floating or other exchange rate regimes depends on a country's individual circumstances (Frankel, 1999). Whether a country should adopt a super-fixed or a floating system will depend on its specific structural characteristics, including the degree of dollarisation of the financial system, the extent of labour market flexibility, the nature of the pass-through coefficient and the country's inflationary history (Calvo, 1999).

A fundamental issue for virtually all countries within the international monetary system (IMS) concerns the choice of an optimal exchange rate regime. The United States and Japan, for example, must decide whether to stabilise their exchange rates, or whether it would be preferable to allow the exchange rate to float, largely independent of central bank intervention (Mundell, 1968).

Many of a country's characteristics that are most important to the fixed-versus-floating question are closely related to the size and openness of the country. This observation highlights the theory of the optimum currency area. Countries that are highly integrated with each other are more likely to constitute an optimum currency area. According to Salvatore (1995), an optimum currency area or bloc refers to a group of nations whose national currencies are linked through permanently fixed exchange rates and the conditions that would render such an area optimum.

An optimum currency area is a region for which it is optimal to have its own currency and monetary policy. According to Mundell (1968), a currency area can be defined as a domain within which exchange rates are fixed. Frankel (1997) defines the optimum currency area as a region that is neither so small nor open that it would be better off pegging its currency to a neighbour, nor so large would that it is better off splitting into

sub-regions with different currencies. Argentina does not fit well into the traditional optimum currency area criteria, because of its small and open economy, high labour mobility and close correlation with the US economy (Frankel, 1999:19).

2.4.1 Determinants of an optimum currency area

The choice between fixed and flexible exchange rate systems should take into consideration the characteristics and determinants of an optimum currency area. The determinants of an optimum currency area are the following:

a) Factor mobility

Mundell (1968) describes an optimum currency as a region in which factors of production are mobile internally (in the region) but immobile externally or international (between regions). He argues that the exchange rate should be fixed within areas in which factors are mobile, and flexible between areas in which factors are immobile (Mundell, 1968). Flexible exchange rates should be helpful in restoring and maintaining internal and external balance if factors of production are immobile across regions. Flexible exchange rates are unnecessary if factors of production are mobile across regions. Factor mobility provides the additional degree of freedom needed to fix the exchange rate.

b) Openness of the economy

Openness of the economy can be defined as the ratio of tradable to non-tradable goods (McKinnon, 1963). The openness criteria state that the more open the economy, the more optimally it is positioned to fix the exchange rate. Openness can also be defined as the ratio of total imports and exports to Gross Domestic Product (GDP). A country's total annual output (productions of goods and services) within a country's borders is usually termed its gross domestic product (GDP) (ITRISA, 2000:25).

In the case of flexible exchange rates, the depreciation of the domestic currency will result in expenditure switching from more expensive foreign goods to domestic goods. This would lead to an improvement on the balance of trade and increase employment. In an economy that depends heavily on imports because of domestic substitutes not being available, the rise in import prices leads to high inflation and deficits on the trade

balances. In this case, a devaluation of the domestic currency will tend to have a significant effect on domestic inflation.

Openness of the economy points towards the direction of fixing the exchange rate, whereas more closed economies may benefit from allowing their exchange rates to fluctuate (Wellington, 1990:4).

c) Diversification of outputs

Fixed exchange rates are most appropriate for well-diversified economies. Diversification tends to average out the effect of external shocks, thus forestalling the need for frequent changes in exchange rates. Economies that are less diversified should rely on flexible rates to isolate them from external shock properties. A well-diversified economy could optimally have a fixed or flexible exchange rate system, depending upon its relative degree of openness or closeness (Kenen, 1969).

d) Size of the economy

A small economy tending to be open and undiversified should form larger currency areas by fixing their exchange rates. An economy that is large, closed and well-diversified can afford to have flexible exchange rates (Wellington, 1990:5)

e) Inflationary preference

A determining factor in this regard hinges on whether countries involved have similar preferences for inflation. For example, one may assume that country A has a higher inflation rate than country B. Under a system of fixed exchange rates, country A will tend to run a balance-of-payment deficit and country B may elect a balance-of-payment surplus. Eventually, country A will run out of gold and foreign exchange reserves needed to finance its deficit. In order to keep the exchange rate fixed, country B will have to be willing to hold increasing reserves of country A's currency. This will, in turn, increase country B's domestic money supply and, subsequently, also its inflation rate (Frankel, 1995). This is another indication of how a fixed exchange rate may cause a central bank to lose control over its domestic monetary policy (Wellington, 1990:6)

f) Existence of hegemonic power

A world or region hegemonic power that is both willing and able to exercise its power may be able to sufficiently set the tone for monetary policy amongst all the members of the system, such that a currency area or zone of fixed exchange rates can be established. In the presence of an effective hegemonic power, the resulting cooperation, stability and convergence will tend to make a currency area both feasible and desirable. In the absence of such a power, a system of flexible exchange rates will tend to be preferable (Wellington, 1990: 6).

g) Source of shocks

Floating exchange rates tend to insulate an economy from external disturbances, but they also tend to bottle up an internal shock. In a currency area of fixed exchange rates, the effects of shocks within one country tend to spill over to other countries (Wellington, 1990:7).

2.5 The international monetary system and exchange rate regimes in emerging markets

During the past few years, many countries have suffered severe currency and banking crises (see Chapters 3 and 4), producing a staggering toll on their economies, particularly in emerging market countries. High domestic interest rates and the stability of exchange rates in emerging markets attracted the movement of large foreign funds to these countries, which helped to finance large current account deficits. At some point in time, these foreign funds slowed down and were reversed. Adjustments in macroeconomic policies were delayed and proved to be insufficient, which increased the level of uncertainty in these emerging market countries. As a result, large volumes of capital left these countries and international reserves dropped to dangerously low levels, and exchange rates became overvalued. In a world with high capital mobility, small adjustments in international portfolio allocations to the emerging economies resulted in very large swings in capital flows. Sudden reductions in these flows amplified exchange rate and interest rate adjustments and generated overshooting (Grenville, 2000).

According to Edwards (2001), a need exists to introduce major changes to exchange rate practices in emerging economies in order to prevent crises. Emerging market

countries should adopt "credible" exchange rate regimes. A "credible" exchange rate regime would reduce the probability of rumour-based reversals in capital flows. Emerging market countries should either adopt a free- floating regime or a super-fixed exchange rate system. Edwards (2001) argues that the imposition of capital controls provides an effective way for reducing the probability of a currency crisis.

Since the Asian financial crisis and the subsequent crises in Russia and Brazil, many observers have suggested that intermediate exchange rate regimes are vanishing, and that countries around the world are moving toward corner solutions - hard pegs, such as currency boards, dollarisation or currency unions or, on the other hand, free-floating exchange rate regimes (Calvo, 2000).

The following general experiences may be considered when choosing an exchange rate regime for an emerging market economy:

- Nominal exchange rates are, unaccountably, closely correlated with real exchange rates
- The switch from fixed to floating rates has produced much more variability (an order of magnitude more) even when fundamentals are not more variable (Flood & Rose, 1999)
- Fundamentals cannot explain the behaviour of the exchange rate over a short/medium-term horizon
- Exchange rates have, at times, exhibited long-lived swings, with no apparent changes in fundamentals significant enough to justify them. The US dollar appreciated by about 90 per cent against the Deutschemark in the first half of the 1980s, only to completely unwind this appreciation by 1988. The yen appreciated by about 75 per cent against the US dollar in the first half of the 1990's and unwound this appreciation by 1998 (Grenville, 2000).

2.6 Conclusion

The international monetary system is the total environment which facilitates the flow of trade-related payments of capital, the interactions of currencies, and the exchange of ideas and financial assistance at national and international level. The main function of the international monetary system is to enable the fundamental economic processes of production and distribution to operate as smoothly and efficiently as possible. In section 2.2, the international monetary system was discussed and this included the reforming of the international monetary system after recent financial crises such as the Argentine currency crisis.

A country's exchange rate system provides an important foundation for the implementation of other economic policy measures. In section 2.3, two types of exchange rate regimes were distinguished, including the fixed and floating exchange rate regimes. The appropriate exchange rate regime for each country depends on that country's individual circumstances and these also include the determinants of an optimum currency area, as discussed in section 2.4.1. To understand how the international monetary system operates, a historical perspective was provided in section 2.3, which included the Gold Standard and the Bretton Woods system. The Bretton Woods system (a system of fixed exchange rates) functioned well until the late 1960s, but finally collapsed in 1973. The collapse of the fixed exchange rate system was followed by a system of floating exchange rates that was formalised in January 1976. A floating exchange rate system is one in which the price of the currency, and hence exchange rates, are determined by competitive market forces. Under such a system, the monetary authorities of the country concerned do not attempt to influence the price at which the currency is being traded or the volumes traded. The quantities traded and the exchange rates between the domestic currency and other currencies are determined entirely by the force of demand and supply.

Recent episodes of currency and financial crises have led to a renewed interested in the topic of the most appropriate exchange rate system for each country and economy. Nine alternative exchange rate regimes were described according to their degree of flexibility. In order to prevent a currency crisis, it is often said that emerging market countries should either adopt a free-floating exchange rate regime or a super-fixed exchange rate

regime. Fixed versus floating exchange rate systems was considered, and it was indicated that whether a country should adopt a super-fixed or a floating system will depend on its specific structural characteristics, including the degree of dollarisation of the financial system, the extent of labour market flexibility, the nature of the pass-through co-efficient and the country's inflationary history.

Chapter 3 focuses on currency crises, speculative attacks and contagion in emerging and developing markets.

CHAPTER 3

CURRENCY CRISES, SPECULATIVE ATTACKS AND CONTAGION

3.1 Introduction

Recent years have witnessed an increase in currency crises affecting a large number of countries, either directly or indirectly. Loss of foreign exchange reserves, capital outflow and a sudden depreciation of the currency are some similarities generally observed in the way these crises unfold (Burkart & Coudert, 2002).

Currency crises have been the subject of an extensive range of economic literature, both theoretical and empirical. Notwithstanding such investigations, some unresolved issues persist, and each new set of crises presents new puzzles. Traditional models of currency crises suggest that currency crises are caused by deteriorating economic fundamentals, while more recent models link crises to self-fulfilling prophecies and contagion effects. Contagion effects are increasingly the focus of literature on currency crises, as well as in policy advice to emerging countries and investment strategies of international investors (Drazen, 1999). The objective of this chapter is to identify the different causes of currency crises and contagion, and concurrently with these, also the phenomenon that a currency crisis in one country often seems to trigger crises in other countries. This objective will involve investigating indicators and models of currency crises.

Currency crises in emerging markets are often different in nature from those in mature and developed markets. Currency crises in emerging markets and mature economies have triggered a variety of theories regarding the causes of speculative attacks.

3.2 Currency crises

Davidson (1998) indicates that currency crises can be generated either by self-fulfilling rational expectations or by irrational herding behaviour. In models with self-fulfilling features, a country is potentially vulnerable to speculative attack only when fundamentals are sufficiently weak.

3.2.1 Definition

A currency crisis is defined as a situation in which a currency is under enormous pressure, leading either to a sharp depreciation and/or to a strong drop in international reserves (Plata & Schrooten, 2003).

According to Krugman (1997:1), a currency crisis can be defined as a type of circular logic in which investors flee a currency because they expect it to be devalued, and much (although usually not all) of the pressure on the currency is a result, precisely, of such investors' lack of confidence.

A speculative attack on government's reserves can be viewed as a process by which investors change the composition of their portfolios, reducing the proportion of domestic currency and raising the proportion of foreign currency (Krugman, 1995).

Currency crises and speculative attacks are often regarded almost as synonymic, but in reality, a speculative attack on governments' reserves may or may not result in a currency crisis. It depends on the ability or the will of the government to defend the domestic currency. A currency crisis occurs when the government of a country cannot support its exchange rate (Davidson, 1998:3).

Kamisky, Lizondo and Reinhart (1997:15) define a currency crisis as a situation in which an attack on the currency leads to a sharp depreciation of the currency, a large decline in international reserves, or a combination of the two. A crisis defined thus includes both successful and unsuccessful attacks on the currency. This definition is also comprehensive enough to include not only currency attacks under a fixed exchange rate regime, but also attacks under other exchange rate regimes.

According to Kamisky (1998), an "exchange market pressure index" is constructed in order to identify currency crises. This index is usually calculated as a weighted average of monthly changes in exchange rates and international reserves. Crises then occur when the pressure index reaches extreme values. The advantage of constructing this index is that both successful and unsuccessful attacks on a currency can be detected.

3.2.2 Indicators of a currency crisis

Currency crises of the 1990s have raised questions about whether such crises are predictable events with systematic early warning signs. Recent theoretical research stresses that, within a broader set of fundamentals such as unemployment and the state of the banking system, the possibility of predicting a currency crisis improves. It is, however, often difficult to generate results, as the importance of various fundamentals varies from country to country during any specific period.

It is also true that signals from some variables are better than others in predicting a currency crisis. An effective warning system should consider a broad variety of indicators, since currency crises usually seem to be preceded by multiple economic problems.

Various approaches have been used to assess the usefulness of potential indicators of currency crises, and also to identify those indicators that have been the most effective in predicting currency crises. In order to elucidate the concept of indicators of a currency crisis, the traditional approach, recent model approach and signal approach will subsequently be discussed.

3.2.2.1 Traditional approach

Krugman's (1979) model shows that under a fixed exchange rate system, domestic credit expansion in excess of money demand growth leads to a gradual but persistent loss of international reserves and to a speculative attack on the currency. This speculative attack immediately depletes reserves and forces the authorities of a country to abandon the parity on their exchange rate. The process ends with an attack, because economic agents understand that the fixed exchange rate regime will collapse and in the absence of the attack they would suffer a capital loss on their holdings of domestic money. This model suggests that the period preceding a currency crisis would be characterised by a gradual but persistent decline in international reserves and, concurrently, a rapid growth of domestic credit relative to the demand for money.

Milesi-Ferreti and Razin (1996) point out that one of the main indicators of a currency crisis usually is a sizeable current account deficit. A current account deficit in excess of a 5 per cent of GDP is a matter of concern, irrespective of the underlying factors, especially if the deficit is financed with short term-debt.

The current account position that a country can maintain over the medium run is determined by the pace at which foreigners are prepared to accumulate that country's financial liabilities (Edwards, 2000). An increase in perceived country risk will lead to the loss of foreign investor's confidence in a particular country's level of sustainability of its

current account. The sustainability of a current account deficit varies not only across countries, but is also time-varying within a particular country. A large and persistent current account deficit need not trigger currency crises, at least not in all countries, at all times (Gurtner, 2002:10).

Speculative attacks would generally be preceded by a real appreciation of the currency and a deterioration of the trade balance. This result has been derived from models in which expansionary fiscal and credit policies lead to higher demand for traded goods and non-traded goods. It also follows from models in which expectations of a future crisis lead to an increase in nominal wages, which results in higher real wages and lower competitiveness. These traditional models suggest that the evaluation of the real exchange rate, the trade or current account, real wages and domestic interest rates could be used as leading indicators of crises (Davidson, 1998).

3.2.2.2 Recent model approach

Some recent models have suggested that yet another family of variables could be useful in helping to predict currency crises. The evolution of output and domestic and foreign interest rates may be indicative of a currency crisis. Under a fixed exchange rate, an increase in foreign interest rates will lead to higher domestic interest rates and lower levels of output, making it more costly for the authorities of a country to maintain the parity (Sutherland, 1995).

An increase in domestic interest rates needed to maintain a fixed exchange rate may result in higher financing costs for the government. Higher interest rates may also weaken the banking system. The presence of banking problems could, furthermore, indicate a higher possibility of a crisis (Sutherland, 1995). Leading indicators may also include political variables. Recent models have suggested that crises may develop without any noticeable changes in economic fundamentals. These models emphasise

that the contingent nature of economic policies may give rise to multiple equilibria and generate self-fulfilling crises. Expectations and actions of economic agents affect some variables to which economic policies respond. The economy may be initially in equilibrium consistent with a fixed exchange rate, but a sudden worsening of expectations may give rise to changes in policies that result in a collapse of the exchange rate regime (Kamisky, 1997).

According to Obstfeld (1994), the expectation of a collapse leads to higher wages and lower employment, and these could prompt the government to abandon the parity out of concern for output.

Krugman (1979) also indicates that the theoretical literature on balance of payment crises stress that crises were caused by weak economic fundamentals such as excessively expansionary fiscal and monetary policies, which resulted in a persistent loss of international reserves that ultimately forced authorities to abandon the parity. Smets (1994) presents a model in which the devaluation of a currency by one country causes its trading partners to decentralise in order to avoid a loss of competitiveness.

3.2.2.3 The signal approach

The signal approach involves monitoring the evaluation of a number of economic indicators that tend to react differently prior to a crisis. When one of these variables deviates from its "normal" level beyond a certain "threshold" value, this is regarded as a warning signal about a possible currency crisis within a specific period of time (Kamisky, Lizondo & Reinhart, 1997:15).

The signal approach can be useful as the basis for an early warning system of currency crises. According to Kamisky, Lizondo, and Reinhart (1998, 1999) an early warning system involves a range of macroeconomic and financial indicators that tend to exhibit anomalous behaviour in the periods preceding a currency crisis.

In their study on leading indicators of currency crises, Kamisky, Lizondo and Reinhart (1998, 1999) identify certain variables as leading indicators for currency crises. These include capital account, current account, financial sector, real sector and political variables (see table 1). As viewed in their study, indicators that have proven to be useful in anticipating crises included the behaviour of international reserves, the real exchange rate, domestic credit, credit to the public sector and domestic inflation.

Table 3.1: Indicators of currency crises

INDICATORS OF CURRENCY CRISES		
CAPITAL ACCOUNT	**CURRENT ACCOUNT**	**FINANCIAL SECTOR**
* *International reserves* * *Ratio of broad money to gross ratio* * *Real interest differential* * *Real interest rates of USA* * *Foreign debt* * *Capital flight* * *Short-term foreign debt*	* *Exports* * *Imports* * *Terms of trade* * *Real exchange rate*	* *Stock of commercial bank deposits* * *Ratio of domestic credit to GDP* * *Money multiplier of M2* * *Excess real M1 balances*
REAL SECTOR	**POLITICAL VARIABLES**	
* *An index of output* * *Domestic real interest rates* * *Ratio of lending to deposit rate* * *An index of equity prices*	* *Dummies of elections* * *Change in government* * *Political instability*	

Source: (Kamisky, Lizondo & Reinhart, 1998).

During recent years an extensive body of economic literature, both theoretical and empirical, has appeared on currency crises and the causes of these crises. Each approach emphasised the importance of indicators in order to predict currency crises and to help prevent these from happening. The next section focuses on the causes of a currency crisis.

3.2.3 Causes of a currency crisis

With a fixed exchange rate regime, a currency crisis may result from a conflict between domestic objectives and the currency peg, which can make an eventual collapse of the currency peg inevitable. A speculative attack on a currency can also develop as a consequence of a predictable future deterioration in economic fundamentals, or purely through a self-fulfilling prophecy caused by a self-confirming pessimism (an instance in which a country would suffer an "unnecessary" crisis). In the second-generation crisis, a currency crisis is essentially the result of inconsistent policies with the long-run maintenance of a fixed exchange rate.

Speculation is the activity of buying (selling) and reselling (re-buying) assets in order to anticipate market value and to make money by exploring "delays" as market prices adjust to new economic fundamentals (Davidson, 1998).

In the case of the Argentina crisis, for example, there is no consensus about the precise causes of the currency crisis, apart from the long-lasting foreign debt situation. De la Torre (2002) found that Argentina fell into a growth debt trap after 1998. When economic activities did not increase and credit from abroad dried up, the crisis became unavoidable. Feldstein (2002) argues that the crisis can be ascribed to an exchange rate overvaluation and to high levels of foreign debt (see also Plata & Schrooten, 2003). The causes of the Argentine crisis will be further explored in Chapter 4.

The causes of currency crises can be broadly categorised into two groups, namely inconsistent policies and a shift in expectations.

3.2.3.1 Inconsistent policies

According to Marion (1998), inconsistent policies can be predictable. Models that assume inconsistent government policies push the economy of a country towards a currency crisis, and are called "first generation models" (Flood & Marion, 1996:1). The first generation model will be further discussed under section 3.3.2.1. Speculative attacks occur because government runs macroeconomic policies that are inconsistent in the longer term with fixed exchange rates. Fiscal deficit is regarded as part and parcel of inconsistent policies. Governments of countries might monetise a large fiscal deficit. Over time, excessive money growth leads to a reduction of international reserves, which can eventually trigger an attack by speculators. The government abandons the fixed exchange rate and the currency depreciates, resulting in a currency crisis (Marion, 1998).

3.2.3.2 Shift in expectations

According to Marion (1998), a shift in expectations is unpredictable. In a regime of fixed exchange rates, a change in expectations can lead to an expected future depreciation of the fixed exchange rate. If the central bank of a country runs out of reserves to defend a currency, devaluation of the currency might occur at some point. This means that there is a positive probability that the future exchange rate will be different from the current fixed one if devaluation occurs. Such changes in expectations may be due to changes in fundamental variables such as high domestic inflation, large budget deficits, political risk and changes in investors' sentiment. Self-fulfilling changes in expectations may lead investors to believe that a fixed parity will collapse, and this will lead them to a speculative attack on a currency that has a fixed parity, even if there have been no changes in the underlying fundamental determinants of exchange rates (Roubini, 1998:14).

Financial panic is regarded as a constituent aspect of shifts in expectations, and consists of the following:

- A mismatch between short-term liabilities and long-term assets
- Banks transform most deposits into long-term "illiquid" assets
- Depositors withdraw money on demand on a large scale
- Financial intermediation involves the risk of self-fulfilling bank runs
- Panic from foreign creditors
- Central banks face a dilemma: Inject liquidity or defend the exchange rate (Marion, 1998).

Financial panic is triggered in the case of multiple equilibria. Multiple equilibria imply that the actions based on expectations of a particular outcome can deliver that outcome. In financial markets, a perceived weakness in an economy may easily create the expectation that the markets will collapse at some point. Although the fundamentals at the time may not justify this expectation, actions of the agents triggered by this expectation may lead to a crisis in currency, debt or equity markets. Thus, multiple equilibria could trigger self-fulfilling crises (Aybar, 1999).

According to MacDonald (1991:85-86), the following macroeconomic factors have contributed significantly to financial stresses and currency crises over the past few decades:

a) Macroeconomic volatility

Macroeconomic volatility can derive from both external and domestic factors. External factors include large fluctuations in the terms of trade, relatively low export diversification, volatile international interest rates and real exchange rate volatility. As a result, economies are at times exposed to massive over-consumption, too high levels of domestic investment and too large internal and external debt levels.

b) Exchange rate regimes

Fixed exchange rate regimes have been criticised for increasing the fragility of the banking system and external adverse shocks, because such shocks easily lead to a balance of payment deficit, a decline in money supply and higher domestic interest rates. Fixed exchange rates can create a moral hazard by inducing banks to fund high interest rate loans in domestic currency with low interest rate foreign currency liabilities. The unmatched foreign currency position can cause a bank to become insolvent if the domestic currency is devalued.

c) Contagion across markets and countries

Even if a specific market or country is well-regulated and financially sound, it may be adversely affected by distress elsewhere in the region. Contagion spreads quickly through a region, mainly by means of two channels. Firstly, through a general lack of investors' confidence in a specific region, which results in the reallocation of capital to other parts of the world. Secondly, an exchange rate fear among these investors that those countries in the region will have to devalue their currencies in tandem simply to remain competitive. Different countries may react differently to the impact of contagion.

d) Lack of market liquidity

A sudden hardening of monetary policy may have major liquidity consequences for markets and even countries. A liquidity crisis is reflected in higher domestic interest rates and a weaker currency with major consequences for business confidence and price stability.

As mentioned earlier, currency crises can be predictable as well as unpredictable. It may be possible to prevent a currency crisis if countries were to follow sound and consistent economic policies, so that they are not attacked by speculators. Once a country has a floating exchange rate, any speculative concerns about its future policies will already be reflected in the exchange rate. Krugman (1997) is of the opinion that a currency crisis can be prevented simply by not providing speculators with an easy target, by refusing to defend any particular exchange rate in the first place.

Institutional arrangements such as currency boards do not offer secure protection against speculative attacks. For countries with substantial debt in foreign currencies, steep currency depreciation may undermine the solvency of domestic firms and financial institutions as much as, or even more than temporary increases in interest rates. If confidence in a currency continues to erode, a larger increase in interest rates may be required to stabilise the situation than would normally be necessary in the early stages of a crisis. Once confidence in a currency has been compromised, a period of sufficiently tight money management is necessary, either to defend a currency peg or to stabilise a flexible exchange rate (Kamisky, 1998).

Speculative attacks and contagion will be discussed under the following sections in order to explore the concept and causes of currency crises further.

3.3 Speculative attacks

In recent years, both developed and developing countries have experienced speculative attacks on their currencies. The conventional wisdom is that speculative attacks refer to episodes where currencies come under severe pressure to be devalued. Speculative attacks are characterised by sharp declines in reserves, depreciation of the exchange rate and/or an increase in interest rates. When a currency comes under attack, government can allow the currency to depreciate, lose reserves while keeping the exchange rate fixed, and/or raise interest rates to defer speculation (Peria, 1999).

Theoretical studies have identified several types of crises. "Speculative attack models" of currency crises emphasise the importance of fundamental factors in the triggering of crises (Krugman, 1979). In this type of model, speculator behaviour is not the source of the crisis; it only accelerates the process. Two types of models, the so-called "first generation" and "second generation" models, dominate existing literature on the determinants of speculative attacks and devaluations. The first generation models

emphasise the relationship between speculative attacks and economic fundamentals. According to these models, countries suffer attacks when they implement unsustainable monetary and fiscal policies (Krugman, 1979).

Second generation models allow speculative attacks to be self-fulfilling. In these models, expectations play a crucial role in bringing about speculative attacks. If no speculative attacks take place, government policies are consistent with the exchange rate peg and the peg is maintained (Obstfeld, 1994). "Escape clause models" are closely related to second generation models. These models introduce strategic considerations based on the consequences of the defence of a peg in speculative attacks (Obstfeld, 1994). The escape clause model states that expectations of crises may be self-fulfilling and that there is a possibility of multiple equilibria. Therefore, crises may occur without a worsening of fundamentals and without inconsistent policies.

3.3.1 Definition

Davidson (1998) argues that a speculative attack can start once speculators believe that someone can convert their resources in foreign currency, and the government is unable to support the total demand for foreign currency. Since the end of the Bretton Woods system, institutional arrangements do not protect economies from speculative attacks. A speculative attack on a country's reserves is always possible when there is no strong market maker or rules that can be used to control speculators' actions.

As indicated earlier, two types of models - "first generation" and "second generation" models - dominate existing literature with regard to determining speculative attacks and devaluations. The latter two aspects will subsequently be reviewed under section 3.3.2. (Also see section 4.2.4.2 in Chapter 4 on devaluation.)

3.3.2 Currency crises and speculative attacks models

Currency crises in Latin America in the 1960s and 1970s inspired the earlier models of balance-of-payment problems. In these models, unsustainable money that financed fiscal deficits led to a persistent loss of international reserves, which in turn led to a currency crash (Krugman, 1979). Krugman's (1979) model of balance-of-payments crises shows that one cause for a balance-of-payment crisis can be found in the fact that a fixed exchange rate regime will collapse when policymakers pursue an expansionary domestic credit policy relative to the anchor country in the presence of perfect capital mobility. This model developed by Krugman has been extended in various ways through the relaxation of the purchasing power parity, causing prices to rise and real exchange rates to appreciate prior to attacks.

According to Botman and Jager (1998:160), the facts of balance-of-payment crises are the following:

- The currency is usually overvalued prior to the occurrence of an attack.
- An exchange rate jump occurs at the moment of a successful speculative attack, instead of the continuous transition from fixed to flexible rates.
- Speculators make profits, at least as a group. These profits are made at the expense of the central bank, which suffers capital losses on its foreign exchange position.
- Contagion occurs; this refers to the occurrence of several subsequent, speculative attacks on different currencies, with the result that a successful attack on one currency increases the probability of a successful attack on another currency.
- Reserves often show large fluctuations before the fall of a fixed exchange rate system.

Financial and currency crises since the 1970s in emerging markets and mature economies have triggered a variety of theories regarding the causes of speculative attacks. Models of currency crises and speculative attacks have been catalogued into three generations. Kamisky (1998) indicates that first generation models focus on the fiscal and monetary causes of crises. These first generation models were mostly developed to explain crises in Latin America in the 1960s and 1970s. The second generation models focus mostly on the effects of countercyclical policies in mature economies and on self-fulfilling crises that are unrelated to market fundamentals at the core of the crisis. The Mexican crisis of 1994 and the Asian crisis of 1997 fuelled a new model, the third generation model. The third generation model focuses on moral hazards and imperfect information. The emphasis of the third generation model has been on "excessive" booms in international lending and asset price bubbles. The first, second and third generation models of crises are discussed below.

3.3.2.1 First generation model

According to the "first generation model", currency crises occur due to a run on international reserves (Krugman, 1979). A speculator understands that fiscal and monetary policy is inconsistent with the chosen fixed exchange rate. The model explains speculative attacks against a currency as a consequence of unsustainable developments in the "fundamentals" of an economy - such as growing budget deficits, high inflation, and large and growing current account deficits (Plata & Schrooten, 2003).

In the first generation crisis model, also known as the "canonical" crisis, the logic of the currency crisis is as follows: At the point when speculators are supposed to wait until the reserves are exhausted in the natural course of events, they would know that the price of foreign exchange rate fixed up to now, will begin to rise. In the event of the depreciation of a currency, people would hold foreign currency instead of holding domestic currency, and this gives rise to a jump in the exchange rate - and by doing so,

the date of exhaustion of reserves is advanced. When reserves fall to some critical level, there would be an abrupt speculative attack that would quickly drive those reserves near zero and, as a result, force an abandonment of the fixed exchange rate (Flood & Garber, 1984).

According to this model, such a crisis results from a fundamental inconsistency between domestic policies. This includes the existence of financial budget deficits and an attempt to maintain a fixed exchange rate once the government is assumed to use a limited stock of reserves to fix its exchange rate. The attempt of investors to anticipate the inevitable collapse would generate a speculative attack on the currency when reserves fall to some critical level (Davidson, 1998:3).

3.3.2.2 Second generation model

The "second generation models" of currency crises (Obstfeld, 1986, 1996) focus on expectations rather than on fundamentals and their developments. Unlike the first generation models, even if fundamentals are not particularly unfavourable, a speculative attack may occur. The behaviour of the domestic interest rate reflects the possibility of a crisis. Since defending the exchange rate against an attack requires authorities to raise interest relative to world levels, maintaining the fixed peg becomes costly for policymakers. Therefore crises can be purely self-fulfilling events (Plata & Schrooten, 2003).

In the case of a self-fulfilling exchange rate crisis, an individual investor will not pull money out of the country if he believes that the currency regime is in no imminent danger, but he will do so if a currency collapse seems likely. A crisis will become visible precisely if many investors do pull their money out of the country. In models with self-fulfilling features, it is only when fundamentals – such as foreign exchange reserves, government's fiscal position or the political commitment of the government to the exchange regime – are sufficiently weak, that the country is potentially vulnerable to speculative attacks (Krugman, 1997).

As mentioned, "second generation models" allow speculative attacks to be self-fulfilling. In these models, expectations play a crucial role in bringing about speculative attacks. If no speculative attack takes place, government policies are consistent with the exchange rate peg and the peg is maintained. However, if – and only if – an attack occurs, government policies become more accommodating, causing the exchange rate to depreciate.

The second generation crisis model government chooses to defend or not to defend a pegged exchange rate by a trade-off between short-run macroeconomic flexibility and long-term credibility (Obstfeld, 1994). The government of a country must have a reason for either abandoning or defending its fixed exchange rate. The cost of defending a fixed exchange rate must increase when people expect that the exchange rate might be abandoned. Davidson (1998) argues that the main reason for allowing the currency to depreciate in a country is related to increasing unemployment due to a downward rigid nominal wage rate, while a specific motive to fix the exchange rate can be related to the possibility of facilitating international trade and investment.

According to these models, a fixed exchange rate will be costly to defend due to the fact that people, in the past, expected that the exchange rate would depreciate at any time now and in the future. The logic of the crisis stems from the fact that defending parity is more expensive if the market believes that the defence of the exchange rate will ultimately be unsuccessful. If a country's trade-off between the cost of maintaining the current parity and the cost of abandoning the fixed exchange rate is predictable, it is most likely that such a country will devaluate its currency, even in the absence of a speculative attack (Davidson, 1998).

3.3.2.3 Third generation model

This "third generation" of currency crisis models focuses on the central bank's function as a lender of last resort as a contributing factor to moral hazard in domestic banking, mismatched external assets and liabilities and volatile capital flows to emerging markets in fixed exchange rate environments (Dooley, 1997). According to ITRISA (2000:201), a moral hazard is said to exist when a financial institution makes careless decisions, certain in the knowledge that it will be rescued or bailed out. If a bank or investment manager thinks that it will be rescued irrespective of how badly it has managed its funds, there will be no incentive to seek the best investment. Thus, funds of innocent investors could be at risk.

When evaluating "third generation" models, a common feature in transmission mechanisms is the existence of a potential crisis equilibrium whose timing depends on something not quite captured by fundamentals, as typically defined in "first generation" crises. Domestic investors perceive that the economy as a whole is illiquid and that a "run on the central bank" would be self-validating (Dooley, 1997).

Shankar (2002:7) states that "third generation" models are modified first generation models where the focus is on the macroeconomic implications of the inconsistency introduced by the insolvency, or perceived insolvency, of the central bank, the domestic banking sector or the economy as a whole.

First, second and third generation models of currency crises and speculative attacks contribute towards identifying speculative attacks. The following section will focus on identifying speculative attacks.

3.3.2.4 Identifying speculative attacks

Over the past few years, a great deal of studies focussed on speculative attacks in developing and developed economies. Eichengreen (1995, 1996), Kamisky and Reinhardt (1996) and Frankel and Rose (1996) are the main contributors to this body of literature. These studies constructed indices of speculative pressure to identify attacks against developing and developed countries currencies, which are weighted averages of reserves, exchange rates and interest rate differential changes. When the index is above a certain threshold, the associated period is classified as a speculative attack episode (Peria, 1999:6). On the other hand, identifying contagion requires testing if the probability of a currency being attacked in one period is influenced by knowledge of the history of speculative attacks on all currencies in the sample, even after controlling for fundamentals.

According to Zang (2001), there are three approaches that can be followed to identify speculative attacks, namely:

- Identify speculative attacks qualitatively by plotting the exchange rate and picking up sharp jumps. This approach functions well when the researcher is interested in analysing one or several crises that are well-documented.
- Frankel and Rose (1996) define a currency crash as a nominal depreciation of the currency of at least 25 per cent that also constitutes at least a 10 per cent increase in the rate of depreciation. The requirement pertaining to the increase in the rate of depreciation is a technique used to screen out high inflation countries that depreciate their currencies year after year.
- The third approach is to construct an index that summarises changes of exchange rates, reserves and interest rates.

These three approaches will be explored further in Chapter 5 in order to assess the speculative attacks during the Argentine currency crisis on selected emerging market currencies.

3.4 Contagion

A prominent feature of financial crises that affected emerging market economies in recent years – the Mexican crisis of 1994-95, the Asian crisis of 1997, and the Russian crisis of 1998 – was the spread of financial difficulties from one economy to others in the same region and beyond, in a process that has come to be referred to as contagion. Policymakers and researchers have increasingly contemplated the nature of these crises, the factors responsible for their spread, and particularly, whether a country with seemingly appropriate domestic and external fundamentals can experience a crisis because of contagion (Caramazza & Ricci, 2003:51).

Contagion itself can be a difficult concept to measure. The first type of contagion is caused by a fundamental spill-over resulting from the normal interdependence among economies. An example of this type of contagion can be found in fundamental trades and financial links between economies. The second type of contagion cannot be attributed to fundamentals and looks to investor behaviour for an explanation. One example is that declines in asset prices cause large capital losses, which induce investors to sell securities in other emerging markets in order to raise cash for redemptions (Collins & Biekpe, 2002).

3.4.1 Definition

According to Rigobon (2000), contagion can be defined as a significant increase in cross-market linkages after a shock. This can be measured by anything from a correlation in financial assets to the probability of a speculative attack, to the transmission of stocks.

Calvo and Reinhart (1996) distinguish between fundamental-based contagion, which arises when the infected country is linked to other countries via trade or finance, and true contagion, which is the kind that arises when common shocks and all channels of potential interconnection are either not present or have been controlled.

The following conclusions about contagion emerged from Kamisky's (1999) analysis:

- Contagion is more regional than global.
- Susceptibility to contagion is highly nonlinear. A single country falling victim to a crisis is not a particularly good predictor of a crisis elsewhere.
- Observational equivalence is a serious obstacle in understanding the channels of transmission. It is difficult to distinguish between trade links and financial links, because most countries that are linked in trade are also linked in finance.

Eichengreen (1996) defines contagion as an increase in the likelihood of a crisis in a particular country given that there is a crisis elsewhere. Crises in his sample are identified as periods of extremely high pressure in the foreign exchange market. Eichengreen (1996) concludes that contagion can be explained better in terms of trade links than in terms of macroeconomic similarities.

3.4.2 Contagion channels

Recent experience has shown that some countries may suffer from contagion effects in spite of relatively good fundamentals. In some instances, contagion triggers a currency crisis that would not have otherwise occurred. According to Burkart and Coudert (2002), several real and financial channels and effects of contagion can in theory be identified, namely:

- Trade links or direct trade competition
- Price competition effect
- Volume effect
- Financial links or neighbourhood effects
- Financial competition in banking centres
- Spill-over effect.

Contagion occurs through different channels simultaneously. Some channels might be more important during particular events. Trade is an important channel of contagion, above and beyond macroeconomic influences. Countries that trade and compete with the target of speculative attacks are themselves likely to be attacked. The incidence of speculative attacks across countries is linked to the importance of international trade linkages (Glick & Rose, 1999).

Contagion effects may also arise if investors pay little need to countries' economic fundamentals. If contagion effects are present, a crisis in a neighbouring country may be an indicator of a future domestic crisis (Kamisky, 1997).

A currency crisis is contagious if it spreads from the initial target, for whatever reason. According to Glick and Rose (1999), there are at least two different types of explanations as to why contagion spreads. The first relies on macroeconomic or financial similarities; whereby a crisis may spread from the initial target to another if the two countries share various economic features. Secondly, a currency crisis may be regional if macroeconomic features of economies tend to be regional. Devaluation provides a country with a temporary boost in its competitiveness. A currency crisis that hits one country may be expected to spread to its trading partners (Glick, 1999).

The four channels of contagion that will subsequently be discussed include trade links, financial links, weaknesses in macroeconomics and investor behaviour.

3.4.2.1 Trade links

Trade links explain contagion because of the possibility of competitive devaluations. The government may attempt to safeguard the country's competitiveness by devaluing its currency if devaluation in a trading partner or trade competitor country occurs. Investors will cut their demand for the country's assets, therefore triggering a crisis devaluation, and in the process validating their own expectations. Investors will cut their demand for the country's assets and therefore trigger a crisis in validating their own expectations. The crisis may, in the end, be self-fulfilling phenomenon that occurs despite the government's initial intention not to devalue (Hernadez & Valdes, 2001:205).

When a country experiences a financial crisis marked by a significant depreciation of its currency, other countries may suffer from trade spill-over, owing to the improved price competitiveness of the crisis country. If the exchange rate crash is accompanied, as is typically the case, by a downturn in economic activity and a compression of imports in the crisis country, the associated income effect would further lead to a decline in the exports of trading partners. The price and income effects operate not only through direct bilateral trade linkages, but also through price competition and income repercussions in third markets. In view of the critical role played by expectations in financial markets, it is also important to consider trade spill-over not only from countries that have already experienced an exchange rate crash, but also from those that might be subject to contagion effects (Herndez & Valdes, 2001).

3.4.2.2 Financial linkages

Financial linkages explain contagion in several ways:

- Direct financial linkages refer to direct cross-country investments which tie corporate and financial sector returns (Hernadez & Valdes, 2001)
- Financial market institutional practices which entail that a negative shock in a particular country generates less demand for assets of other countries (Glick, 1999)

- Information asymmetries and herd behaviour that include a series of theories based on capital market distortions which produce co-movement across countries (Hernadez & Valdes, 2001).

Financial linkages can be another channel for spill-over and contagion effects. A crisis in one or more countries might induce investors to rebalance their portfolios for risk management, liquidity, or other reasons. For instance, when a crisis breaks out in one country, investors who have positions in that country will usually want to reduce their now-increased risk exposure and will sell assets whose returns are highly variable and positively correlated with those of the assets in the crisis country. A strong financial linkage with the major lender to a crisis country would increase the country's financial vulnerability. Some countries may experience capital outflows in the wake of a crisis elsewhere, independent of their macroeconomic fundamentals, because their assets are viewed as more risky, more liquid, or highly represented in the portfolio of creditors to the crisis country (Caramazza & Ricci, 2004).

Neighbourhood effects reflect institutional practices in the international financial system where institutional investors view all countries from the same region as equal, without noticing the difference in their fundamentals. The neighbourhood effect could also reflect uncovered trade links between neighbouring countries (Hernadez & Valdes, 2001:207).

3.4.2.3 Weakness in macroeconomic fundamentals

This channel explains contagion because countries with weak fundamentals are either bound to have a crisis or may enter a multiple equilibria zone. Contagion will show up in countries with weak economic fundamentals that are subject to negative economic shocks. Investors might pull out from countries with similar macroeconomic conditions, expecting that the same problem will arise in those countries. Once a country is hit by a currency crisis, there is an information spill-over against countries in a similar situation (Hernadez & Valdes, 2001:205).

The simultaneous occurrence of currency crises may stem from the interaction of a common shock with macroeconomic fundamentals. Masson (1998) distinguishes three origins in the propagation of shocks. Firstly, a common cause stemming from the industrial countries that affects the emerging economies in the same way; secondly, a crisis in one country entailing a modification of macroeconomic fundamentals in another country, which is known as the spill-over effect and thirdly, the shift in market sentiment in one country can trigger a crisis in another country (Caramazza & Ricci, 2004).

3.4.2.4 Investor behaviour

The shifts in investor's sentiment, particularly with regard to macroeconomic and financial fundamentals, might also play a role in inducing crises and their transmission across countries because economies with weaker fundamentals may be more vulnerable when others are suffering from crises. A crisis in one country can serve as a "wake-up call", inducing financial markets to reassess other countries' fundamentals (Goldstein, 1998). Countries with mediocre fundamentals or financial vulnerabilities may then be subject to contagion effects from a shift in market sentiment or increased risk aversion. If a currency crisis in one country generates fears of speculative attacks elsewhere, investors may expect to profit from speculating against currencies that they think other investors will also sell. The most promising targets are likely to be currencies that, although defended by official exchange market intervention or increases in interest rates, seem most likely to eventually collapse and yield speculative gains. A country with a weak domestic banking system may also be at risk, because financial market participants may see this situation as a constraint on the monetary authorities' ability (and willingness) to raise interest rates in defence of the currency (Caramazza & Ricci, 2004).

3.4.3 Measuring contagion

The previous section focussed on four channels of contagion. This discussion gives rise to the question of the measurement of contagion. Contagion can, by and large, be a difficult concept to measure. Not all economists agree on how to measure contagion. The most commonly used definition of the term is that contagion is occurs where correlations of asset prices increase significantly during a period of turmoil. If there is a significant increase in correlation, it suggests that there is a strengthening of transmission mechanisms between the two countries in question. If there is no significant change in correlation over the period of turmoil, then there is interdependence but not contagion between the two countries. The most commonly used measure of contagion is the change of the simple correlation coefficient during a period of market turmoil in one country (Collins & Biekpe, 2002:288).

Rzepkowski (2003) propounds that, empirically, contagion is often measured by cross-country correlations among similar assets. The historical correlation between two exchange rates observed in a quiet period should increase significantly during the crisis period if contagion is present.

3.5 Lessons from currency crises

While the previous section explained the measuring of contagion, the implications for exchange rate regimes are reviewed in this section. The damage created in the real sector of the economies hit by currency crises has the potential to dictate a new set of priorities in the economic development process. The classical currency crisis scenarios were invariably linked to large public sector deficits caused by high inflation, rampant real exchange rate depreciation and growing current account balances (Krugman, 1998).

Lessons learned from the Mexican crisis of 1994 include an awareness of the incredible power of the international financial system. Although there were traces of financial panic and imperfections in the international system, this power was interpreted as the international financial markets' ability to punish governments for upholding undesired policies by global investors. The Asian crisis has made it clear that triggers of crises are becoming increasingly difficult to predict (Aybar, 1999).

According to Cardoso (1998), the following valuable lessons can be learned from the exchange rate, and monetary and fiscal policies regarding recent currency crises in Asia and Latin America:

a) Defending the currency

When determining whether to defend the exchange rate, policymakers need to assess the size of the shift in foreign finance and the responsiveness of capital flows to changes in interest rates. If the shift is small and capital flows are very responsive to changes in interest rates, the cost of defending the currency could be small relative to the loss of stability if the peg were abandoned. If the shift is large enough that high interest rates will have to be maintained for an extended period, however, policymakers might want to let the exchange rate go in order to avoid a protracted recession.

b) Allowing the exchange rate to float

Policymakers may choose to stop defending the currency for several reasons. Firstly, if the currency is defended and interest rates rise, output can fall, thus increasing the risk that borrowers will default on their debt. Higher interest rates may therefore decrease the expected rate of return on domestic assets and in this way force depreciation. Secondly, higher interest rates are likely to have an adverse effect on debt service. If high interest rates increase the fiscal deficit, leading to a larger expected devaluation in the future, policymakers may have difficulty maintaining the fixed rate. Thirdly, if some investors are not interest-sensitive and decide to leave the country because of panic, much higher interest rates will need to be maintained to convince the remaining interest-sensitive foreign investors to stay and maintain the exchange rate (Kamisky, 1998).

If policymakers choose not to defend the currency following a crisis, they will have to choose between adopting a floating exchange rate regime, or returning to a fixed exchange rate regime at the new depreciated level of the currency. Some evidence suggests that fixed rates, particularly those maintained by currency boards, contribute to instability in the financial sector in general, and bank runs in particular. In general, then, allowing the exchange rate to float is the appropriate policy (Little, 1997:7).

c) A new monetary framework should be developed following adoption of a flexible/ floating exchange rate regime

The adoption of a flexible exchange rate regime will impose the need for a new monetary framework and a new nominal anchor. The substantial depreciation of the currency after a speculative attack implies that during the months following the collapse of the currency, inflation can increase sharply. This temporary increase in inflation implies a substantial reduction in real interest rates on debt denominated in domestic currency.

d) Fiscal policy should be tightened in response to speculative crisis, but it should not be too contractionary if a tight monetary policy is also adopted

A new exchange rate will be sustainable only if it is perceived to be fiscally responsible. For this reason, speculative crises need to be followed by restrictive fiscal policies, but fiscal policy should not be too contractionary. If interest rates are kept high in order to avoid speculation and inflation following the collapse of the exchange rate, policymakers may want to avoid excessive expenditure cuts, which could lead to more contraction and lower tax revenues, making it more difficult to service the public debt (Little, 1997).

Recent crises have affected many emerging market economics with important links to modern global financial markets directly and adversely. These crises have only indirectly affected (through movements in world commodity prices and trade flows) the majority of developing and transition countries. Lessons for exchange rate regimes

from these crises relate primarily to emerging market countries and not necessarily more broadly, to other countries. For those emerging market countries that were severely affected by recent crises, it must be recognised that their exchange rate regimes were an important contributing factor towards their vulnerability. Emerging market countries such as Chile, Mexico and South Africa all seem to have benefited from the flexibility in their exchange rates during recent international financial crises. A genuinely floating exchange rate allows greater flexibility for monetary policy at times of exchange rate pressures and economic difficulty (Hill, 1999). This will be further explored in Chapter 5.

According to Grenville (2000), immediate and obvious lessons for exchange rates from emerging market crises include the following:

- Exchange rates overshoot, resulting in substantial and sustained shifts or real exchange rates not explicable in terms of fundamentals. Once an exchange rate begins to move, or a peg is broken, it can be difficult to limit adjustments to modest amounts.
- Contagion is a problem. While markets did discriminate among countries to a degree, this was more noticeable in the longer run than in the short run.
- There has been a lack of players in the foreign exchange market that are willing to take contrarian foreign exchange positions in newly emerging countries. This is a self-reinforcing problem that is based on the market's view of exchange rate fundamentals that can be fragile and may create a lack of policy credibility, which can only be redressed over time.
- The transition from regulated to liberalised financial systems is a vulnerable period. Careful sequencing may help, but it is difficult to create the necessary infrastructure quickly.
- Massive capital flows (inflows prior to the crisis, and outflows thereafter) were a dominant factor. The regime needs to take into consideration not only current account issues, but also the greatly increased mobility of capital and the international integration of financial markets.

The adoption of a freely floating exchange rate regime and the inflation targeting monetary framework have led to substantial swings in the exchange rate of the South African rand. The depreciation in the exchange rate of the rand during 2000 and 2001 mainly reflected investors' concerns about developments in other emerging market economies such as the Argentine currency crises, rather than weaknesses in fundamental economic factors in South Africa (Van der Merwe, 2003).

A reasoned judgement on the desirable exchange rate regime needs to be based not only on how it performs during a crisis, but how it performs on average over time. In countries with better managed and supervised financial systems, governments would be better able to raise domestic interest rates when needed to defend the exchange rate. If exposure to foreign currency denominated debt were more limited, exchange rate adjustments could be undertaken with less damage and less reason for delay. This would tend to render fixed exchange rate regimes less dangerous and more tenable for countries with significant involvement in modern global financial markets. When the exchange rate is fixed or tightly managed, there is often little risk for domestic firms or financial institutions to borrow foreign currency (Hill, 1999).

Falling short of introducing currency boards or otherwise completely ceding national monetary autonomy, well-designed programmes of exchange rate stabilisation can reduce the incidence of over-borrowing manias. This can reduce the exposure of emerging markets to sudden reversals of investor sentiment leading to financial panic (McKinnon, 1999).

3.6 Conclusion

The aim of this chapter was to identify the different causes of currency crises and contagion. Traditional models of currency crises hold that currency crises are caused by weakening economic fundamentals. Recent models link crises to self-fulfilling prophecies and contagion effects. In section 3.2.1 it has become evident that currency crises refer to a situation in which a currency is placed under enormous pressure, leading to a sharp depreciation and/or a strong drop in international reserves.

Currency crises and speculative attacks are used almost synonymously, but in reality a speculative attack on governments' reserves may or may not result in a currency crisis. Various approaches have been identified under section 3.2.2 to assess the usefulness of potential indicators of currency crises, and these include the traditional, recent model and signal approach. Each of these approaches can help to identify those indicators that have been the most effective in predicting currency crises.

Under section 3.2.3, two broad causes of currency crises were identified, namely inconsistent policies and a shift in expectations. Inconsistent policies are predictable and include first generation models. First generations models focus on fiscal and monetary causes of crises. These models explain speculative attacks against a currency as a consequence of unsustainable development in the fundamentals of an economy - such as growing budget deficits, high inflation, and large and growing current account deficits. A shift in expectations is unpredictable and includes second generation models. The second generation models focus mostly on the effects of countercyclical policies in mature economies and self-fulfilling crises that are unrelated to market fundamentals at the core of the crisis. Third generation models focus on the central bank's function as lender of last resort as a contributing factor to moral hazard in domestic banking.

Under section 3.3.1, speculative attacks were identified as a period where currencies come under severe pressure to devalue. Models of currency crises and speculative attacks were catalogued into three generations under section 3.3.1. These include first, second and third generation models. Under section 3.3.2.4, three approaches to identify speculative attacks were identified and these will be used in Chapter 5 to assess speculative attacks during the Argentine currency crisis on selected emerging market currencies.

The spread of financial difficulties from one economy to others in the same region and beyond has come to be referred to as contagion. Several types of contagion channels were identified under section 3.4.2, including trade links, financial linkages, weakness in macroeconomic fundamentals and investor behaviour. Contagion can be measured where the correlation of asset prices increases significantly during periods of turmoil.

This chapter suggests that currency crises cannot be explained solely by looking at economic fundamentals and that contagion effects as well as speculative behaviour of investors may be important in determining currency crises. Chapter 4 will focus on the Argentine currency crisis, in order to explain the causes of this the crisis and the influence on selected emerging and developed markets,

CHAPTER 4

THE ARGENTINE CURRENCY CRISIS

4.1 Introduction

For many years, Argentina was considered to be the most successful and best example of a successful super-fixed exchange rate system. The massive collapse of the Argentine economy and the abandonment of the currency board in early 2002 have opened questions regarding exchange rate regimes in developing and emerging market countries. As mentioned earlier, Fisher (2001) is of the view that countries should either have a floating or flexible exchange rate, or they should have a super-fixed exchange rate regime – that is, a currency board or full official dollarisation. The collapse of the Argentine experience with a currency board in 2002 has greatly affected this debate on exchange rate policies in emerging market countries.

Over the past few years, emerging markets have experienced an increasing number of financial crises, with dire consequences. It is increasingly argued that the liberalisation of capital flow that occurred in several emerging countries has been excessive and has partially been responsible for these crises.

After the Brazilian financial crisis in January 1999, the second–biggest South American economy was hit by a liquidity crisis in November 2000 and seemed to be on the verge of default. Argentina's currency board arrangement (CBA), which was introduced in 1991 and which linked the value of the peso to the US dollar at a one-to-one rate, came under fire of critics who held it responsible for Argentina's plight (Gurtner, 2002).

Given the above contextualisation, the main objectives of this chapter are to investigate and provide reasons why Argentina decided to adopt the most extreme form of exchange rate peg; and, concurrently, to establish the extent to which Argentina's severe liquidity crisis may be relevant to other emerging market countries, including South Africa.

4.2 The Argentine currency crisis

The impact and severity of the Argentine currency crisis have come as a surprise to most observers. The Argentine economy appeared to be in good shape before the Russian crisis. The attention of international financial institutions and markets was focused rather on Brazil, which had more apparent macroeconomic imbalances and had suffered severe speculative attacks during October 1997. After the Russian crisis, Brazil experienced a demise of their exchange rate band and this led to a sharp devaluation of the Brazilian real in January 1999 (Perry, 2003).

Argentina outperformed most other economies in the region in terms of their growth per capita until 1997, in spite of a short-lived interruption in 1995 when it suffered severe contagion from the Mexican crisis. However, Argentina's income distribution did not improve and unemployment remained at high levels. After the major slowdown in growth in 1999 that affected the entire region, other countries in the region showed a measure of recovery, while Argentina plunged into a protracted recession (Perry, 2003).

4.2.1 Historical background

Argentina adopted a currency board in April 1991, after the collapse of another inflation stabilisation plan that commenced in July 1989 and which ended after seven months in February 1990, when the peso devalued by 220 per cent and the central bank of Argentina had lost 58 per cent of its reserves. A currency board arrangement (CBA) was envisaged as a solution to put an end to hyper-inflation in Argentina, which at the time had experienced no less than eight major currency crises since the beginning of the 1970s (Choueiri & Kamisky, 1999).

A currency board arrangement (CBA) represents the most rigid form of all fixed exchange rate regimes. Under a CBA, monetary authorities guarantee with no restriction the conversion of domestic currency against a well-determined reserve currency at a fixed rate. The liabilities of a currency are entirely backed by foreign exchange reserves. CBA's are used to enhance credibility and break inflationary inertia after episodes of currency crises (Gurtner, 2002) (also see section 2.3.3.8 of Chapter 2).

The aim of a currency board is to import price stability – in the case of Argentina, from the USA. The introduction of a currency board (a fixed exchange rate regime) was expected to make foreign investment more attractive and to assist in promoting growth in Argentina (Plata & Schrooten, 2003:5).

Countries wanting to avoid the costs of both currency flexibility and capital controls, and thus seek credibility for their fixed exchange rates, may wish to consider a currency board. According to Wagner (2000), a currency board is a monetary institution that fixes a country's exchange rate and permits high-powered money to be created, but only if it is fully backed by holdings of foreign exchange.

Wagner (2000) further characterises a currency board as the following:

- An exchange rate that is fixed not just by policy, but by law
- A reserve requirement ensuring that each dollar's worth of domestic currency is backed by a dollar's worth of foreign reserves
- A self-correcting balance-of-payments mechanism, which – in the case of a payments deficit – automatically reduces the money supply, which results in a reduction in spending.

In April 1991, Argentina introduced the CBA, tying the peso to the US dollar at parity, in an economy that was thus largely dollarised. A currency board is expected to assist in creating a credible policy environment by eliminating the option of financing government deficits through money creation. After the loss of fiscal and inflation credibility, the authorities attempted to drive inflation out of the economy by adopting a monetary policy to avoid any further macroeconomic mismanagement. The best monetary policy at that time was to have no independent monetary policy, and therefore Argentina adopted the monetary policy of the US and the Federal Reserve (Gurtner, 2003:4).

An independent monetary policy is a policy that allows for a truly flexible exchange rate – in a situation in which the domestic currency is the effective standard of value. The introduction of a currency board in Argentina led to an impressive GDP growth, and the economy grew at an annual average rate of 5.7 per cent from 1991 to 1998. From 1991 to 1995, the Argentinean economy seems to have reaped the full benefits of the hard peg, as both nominal and real variables moved in the desired direction. However, while the inflation record continued to be satisfactory in 1995, economic growth became much more volatile (Gurtner, 2003:5).

After the Asian crisis (1997) and the Russian crisis (1998) as well as the devaluation of the Brazilian real (1999), Argentina experienced changes in the international financial markets. Argentinean policy-makers were faced with a dilemma. Argentina then opted for a currency board, and tying the hands of monetary authorities was regarded as the best response to address the chronic inflation that the country experienced, and thus to expand confidence in the currency on the part of the public.

4.2.2 Recent developments in Argentina

In 1995, Argentina experienced its first recession under the currency board arrangement, but the monetary regime survived and the prevailing parity on the exchange rate remained unchanged. In 1999, four years later, Argentina suffered another severe recession as a result of the outcome of a deteriorating external environment specific to Argentina, including the devaluation of the Brazilian real, a strong US dollar and terms of trade loss. This crisis plunged Argentina into a long period of stagnation and shook confidence in its exchange rate regime. The currency board arrangement has become a trap (Gurtner, 2002).

In January 1999, Argentina planned and proposed to replace the peso with the dollar as the legal currency. The timing of this initiative suggested that short-term objectives such as the need to minimise contagion, prone international capital markets and to placate stability-craving voters, may have triggered this plan (Wagner, 2000).

External debt in Argentina rose from 42.4 per cent of GDP in 1997 up to 52.7 per cent in 2000. During the last quarter of 2000, the effects of the internal political crisis and signs of growing social unrest raised serious concerns among international lenders and caused investors to withdraw funds from Argentina. This resulted in a rapid widening of interest rate spreads on Argentina's sovereign bonds. Interest rate spreads refer to the differences between yields on sovereign bonds of developing

countries and those on US treasury securities of comparable maturities, which are a proxy for country risk. The rising borrowing cost in Argentina left the country on the brink of default in November 2000, which increased further panic among investors that its fixed exchange rate might collapse. This crisis revealed the dangers of a monetary regime which permanently fixed the peso to the currency of a country whose business cycle does not closely correlate with its own.

According to Wolf (2001), the following combination of events led to an overvalued peso:

- An appreciated value of the anchor currency in Argentina's case the US dollar
- A depreciated value of the biggest regional economy's currency. In the case of Argentina, a depreciation of the Brazilian real
- Terms of trade loss. If imports exceed exports in the country involved, it will lead to a deficit on the country's current account balance.

Export could not be an effective engine for growth with high wages and price levels in US dollars. The rise in Argentina's borrowing cost showed the extreme sensitivity of currency board arrangements (CBA) to confidence and the reflection of investors' scepticism. Undoubtedly, negative developments have demonstrated that only external help from abroad had saved Argentina from a possible default in December 2000, following the crisis that had emerged one month earlier.

Perry (2003) highlights the following favourable developments from abroad in helping to save Argentina from a default:

- A loan agreement with the IMF (International Monetary Fund) in December 2000 guaranteed Argentina's government borrowing needs for most of the year 2001, and therefore eased fears about a liquidity crisis
- The monetary policy shift in the United States provided additional breathing space by reducing debt service costs
- The relative weakening of the US dollar against the euro after a continuous appreciation since January 1999 gave a modest boost to Argentina's exports

- International prices for wheat and soy rose after a long slump, contributing to a net improvement of Argentina's overall terms of trade
- Terms of trade gains contributed towards the improvement in the current account balance. Argentina's current account deficit was brought down to 3.4 per cent in 2000, from 4.4 per cent in 1999.

In order for Argentina to stabilise its external debt, the country's first priority was to reduce public spending in order to get the budget deficit under control. Argentina failed to stabilise its own external debt in 1999/2000, and the country's external debt in US dollars had grown substantially before the liquidity crisis in November 2000.

The real exchange rate overvaluation had led the country into a prolonged stagnation that prevented tax revenues from increasing. The primary balance needed to be increased, and by doing so, Argentina was willing to provide more guarantees to investors that it would have enough revenue to meet its obligations. The Argentinean economy was stuck in a deflationary cycle, which had negative effects on growth. Economic growth had come to a standstill and there seemed to be no clear strategy to pull Argentina from this trap. The Argentinean government considered undertaking structural reforms in the fiscal area, including passing laws, tightening administration, reforming the social security system and modifying revenue sharing arrangements with provinces (Gurtner, 2002).

Under the CBA, Argentina could not rely on a downward correction of its nominal exchange rate to stimulate activity. To avoid a unilateral default, Argentina urgently needed to raise its modest primary budget surplus to convince investors that it would be able to meet its obligations. Alternative options, including floating the peso, appeared highly undesirable, with almost all debts denominated in US dollars depreciation would have increased the cost of debt service and bankrupting the government (Gurtner, 2002).

In 2001, the current account deficit, which is the most prominent indicator of a currency crisis, decreased to 2 per cent. Yet, this important crisis indicator did not send appropriate warning signals during the immediate pre-crisis period (Plata & Shrooten, 2003:4).

The lack of recovery in economic growth made the future of Argentina's monetary regime uncertain. A currency board arrangement (CBA) is not the most suitable exchange regime for a country that has a good regulated labour market and in which political obstacles block the implementation of necessary reforms (Gurtner, 2003).

In June 2001, a dual exchange rate was introduced. This reconstruction was designed as a weighted peg of the peso to both the US dollar and the euro. A run on bank deposits began in August 2001, and escalated to $1 billion a day in November 2001 while international reserves fell to $15 billion. Banks were closed and withdrawals were limited to $250 a week after reopening (Sahbaz, 2003:5-6). During the last few months of 2001, several forms of quasi-money were introduced, which constituted a clear indicator that the currency board was drying out. In January 2002, the Argentinean currency board (known as the convertibility plan) – which started with overwhelming economic success (low inflation and high growth rates) – came to a dramatic end and the peso depreciated significantly. Argentina was being sucked into the maelstrom of a currency crisis.

4.2.3 The causes of the Argentine currency crisis

The Argentine currency crisis has led to many questions regarding the causes of this crisis. Schuler (2002) presents a conventional view of the Argentine crisis that includes the following:

- Argentina's monetary system, locally known as "convertibility", was a currency board
- The peso's exchange rate of 1 peso per dollar persistently overvalued the peso
- As a result, Argentina's exports suffered, triggering recession and defaults.

Argentina's monetary system from April 1991 up to January 2002 was known locally as convertibility. According to Hanke (2002), the convertibility system was not an orthodox currency board, but rather a fixed exchange system that displayed a mixture of currency board and central bank features. As mentioned earlier, the main objective of the convertibility plan was to control hyperinflation in Argentina by fixing the peso to the US dollar at parity of one peso to one dollar.

A number of commentators on currency boards have distinguished between orthodox and unorthodox boards. According to Hanke (2002:43), an orthodox currency board has the following three major defining features:

- A fixed exchange rate with an anchor currency
- Full convertibility into the anchor currency at that exchange rate
- Reserves of 100 per cent or slightly more of its monetary liabilities, held in foreign assets only.

Together, these three features imply that an orthodox currency board has no room for discretion in monetary policy. Under the convertibility system, Argentina did not comply with all three of these orthodox currency board features.

From the previous discussion it is evident that a number of factors led to the Argentine crisis, including an overvalued Argentine peso, fiscal imbalances, government debt, changes in the currency board, political instability and the Argentinean banking system. Each of these will subsequently be discussed.

4.2.3.1 Overvalued Argentine peso

There has been a significant overvaluation of the peso after the mid 1990s. Argentina's real exchange rate (REER) exceeded its equilibrium level relative to the price level of trading partner's currencies that has also contributed to the overvaluation process. The depreciation of the Brazilian real in 1998/1999 was solely responsible for 14 per cent of the overvaluation of the Argentine peso (Sahbaz, 2003:8).

According to Schuler (2002:5) and Hanke (2001) there are three senses in which a currency can be overvalued, namely:

- A pegged or fixed exchange rate is overvalued if, at that rate, demand to sell the currency exceeds the willingness of the central bank to buy the currency
- A currency is overvalued if it deviates from an ideal of "neutral money" and makes prices fall purely because of a lower than optimal supply of money and credit, and not because of lower demand for the goods themselves
- A currency is overvalued if, expressed in a common currency, some measure of prices has increased more in one country than in another over a period.

The overvaluation of the Argentine peso after the devaluation of the Brazilian real in 1998 produced unsustainable trade deficits and thus contributed towards the crisis in Argentina. The overvaluation of the Argentine peso resulted from various causes, most notably the appreciation of the US dollar and the depreciation of the Brazilian real, as well as global financial shocks (Perry & Serven, 2004).

4.2.3.2 Government debt, continued fiscal imbalances and tax increases

Schuler (2002:7) contends that the main cause of the Argentine crisis was not the fixed exchange rate, but rather mishandled government finance, in particular government debt. The fiscal imbalances gave rise to a high level of public debt, which in turn became unsustainable. Tax revenue of the government fell because of the deepening recession towards the end of the decade, and the debt burden increased. The Argentine government tried to cut spending by announcing three large tax increases. These tax increases, in turn, stifled the recovering economy. As the economy continued to shrink under the high tax burden, the government had increasing difficulty funding its debt, because potential lenders were afraid of an eventual default. The interaction between the overvaluation of the peso and public debt burden is essential for an understanding of the crisis in Argentina. The overvaluation caused a recession and contraction of the tax base, and thus a decrease in government tax revenue (Sahbaz, 2003).

Furthermore, Argentina suffered the unfavourable external shocks of the East Asian currency crises, which slowed investment in emerging markets in general and contributed towards the devaluation of the Brazilian real. Schuler (2002:7) comments in this regard that internal factors were far more important than external factors in bringing about the Argentine crisis.

4.2.3.3 Change in currency board

A strong peso was not the only factor responsible for the low exports in Argentina. The convertibility system and other reforms led to extensive and painful changes to Argentina's economy as it adapted to greater openness to the outside world. Argentina's imports increased, although exports in 2001 barely exceeded those in 2000, but this was due to the freeze of bank deposits in December 2001 which restricted trade generally. The most significant factor behind the deficits of the convertibility system was interest payments owed to foreign investors. Persistent

current account deficits do not necessarily indicate an overvalued currency or danger of a currency crisis, especially for a country that has capital account convertibility (as Argentina did for almost the entire life-span of the convertibility system) (Sahbaz, 2003).

4.2.3.4 Political instability

In 1999, Fernando de la Rua won the presidential election. Political instability continued in Argentina, lowering investors' confidence in the country and preventing serious steps being taken in order to overcome the approaching economic collapse. The last quarter of 2000 witnessed a time of political turmoil in Argentina. Vice-president Carlos Alvarez resigned on the accusation of bribery in a debate on a law increasing the flexibility of the labour market (Sahbaz, 2003).

After the bank runs in August and November 2001, Domingo Cavallo and Fernando de la Rua resigned in mid-December. On 1 January 2002, a new president, Eduardo Duhalde, was elected. Eduardo Duhalde announced a default on government debt and the convertibility plan was ended in January 2002.

4.2.3.5 The Argentine banking system

Argentina's banking system was quite vulnerable to crises and faced a serious exchange rate risk because of its currency board. Under the currency board system, banks were encouraged to borrow in dollar terms, while their assets were largely in peso terms. Government did not issue prudential norms that would dissuade the use of the dollar in financial contracts. The banking system thus lacked regulatory norms to address the adverse effect of the real exchange rate adjustment on the non-tradable sector data (Sahbaz, 2003:8).

Despite problems with government debt and the over-valuated peso, the banking system remained solid until March 2001. In June 2001, the convertibility system was definably finished. A dual exchanged rate was announced. The freeze on bank deposits imposed on 1 December 2001 was the decisive factor. On 6 January 2002, the government announced measures which amounted to massive destructions of properly rights. These measures included the following:

- Devaluation of the peso to 1,40 per dollar, and later on, a floating exchange rate
- Forced pesofication of dollar bank deposits at 1,40 peso's per dollar and dollar loans at 1 peso per dollar
- Forced pesofication of contracts in dollars at 1 peso per dollar
- Seizure of dollar reserves of banks
- New taxes and regulations
- Exchange contracts (Schuler, 2002:9).

It can therefore be concluded that an overvalued peso, government debt, continued fiscal imbalances, tax increases, changes in the currency board, political instability and the Argentine banking system are all factors that have contributed to the Argentine currency crisis. In the following section, possible strategies will be discussed that could have helped Argentina to overcome this crisis.

4.2.4 Ending the Argentine crisis – exit strategies

Strategies that can be used in a country that experiences a crisis (in this case Argentina) to end a crisis include: floating the currency, pesification (in the instance of Argentina), devaluation, and dollarisation. These different exit strategies are sub-sequently discussed below.

4.2.4.1 Floating the currency

By letting the currency float freely, the real exchange rate overvaluation would be overcome immediately. However, adverse effects would include the exchange rate overshooting, making adjustments more costly (Sahbaz, 2003:13).

Large and persistent overvaluations occur much less frequently under floating regimes than under fixed exchange regimes. The reason for this is that, under a floating exchange regime, an overvaluation can be eliminated quickly through a nominal devaluation. By contrast, under a fixed exchange regime, the real exchange rate adjustment must occur through changes in the domestic price level relative to the price level of trading partners (Perry & Serven, 2004:15).

Floating the currency is a better option for large emerging market countries. Fixed exchange rates involve many risks that do not outweigh the potential gains. In the case of a floating exchange rate regime in a country, the central bank's intervention in the foreign exchange markets should be limited to avoid excess volatility and should not be directed to defend a particular rate (Sahbaz, 2003:13)

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4.2.4.2 Pesification and devaluation

Pesification refers to the conversion of dollar deposits and loans to Argentina pesos. Pesification can cause a bank-run that leads to the freezing of deposits. Restoring confidence in the peso as a store of value and a nominal anchor would be difficult afterwards (Sahbaz, 2003:13). Large economic shocks, such as big jumps in world oil prices or the fall of important export prices, may cause countries to devalue. According to Van der Berg (2004:507), the term devaluation refers to an international one-time lowering of the fixed value of a currency under a fixed exchange rate arrangement. Edwards (2002:2) states that, in the presence of a high degree of balance sheet dollarisation, devaluation would result in a large increase in debt burdens and would unleash a string of bankruptcies.

Roubini (2002), on the other hand, argues that pesification at a margin would not be effective in the case of Argentina and that the private sector should rather have maintained the dollar-peso standard. After the deposit freeze of December 2001, bank deposits and loans were converted to pesos at arbitrary rates. Conversion of loans to pesos at a lower exchange rate than deposits wrecked the Argentine banking system.

4.2.4.3 Dollarisation

An interesting option regarding exchange rate systems for emerging and developing countries is full or official dollarisation. With dollarisation, the local or national currency of a country is replaced by the US dollar or another prominent currency such as the euro. The primary function of dollarisation is to obtain monetary stability by importing it from another country (Wessels, 2002:2). Full or official dollarisation implies that national economic agents use a foreign currency, most frequently the US dollar, as legal tender parallel to, or instead of their local currency. Official dollarisation implies that the dollarised country has relinquished its own independent monetary policy of the issuing nation (Wessels, 2002:2).

The advantages of dollarisation include the following:

- Increased policy credibility of the dollarising country and the reduction in exchange rate volatility that reduces the risk of a currency crises. Policy credibility will stabilise inflation that promotes economic growth and employment (Visser, 2000:158).
- Dollarisation improves the transparency of the government's tax and general budgetary policy and contributes to the prevention of monetisation of the government debt (Wessels, 2002:5).
- According to Alesina and Baro (2001:381), dollarisation lowers the transaction costs related to the converting of different national currencies.

- Dollarisation lowers information costs, since it decreases the need for information, alleviates the information problem and lowers the incidence of contagion (Calvo, 2001:319).
- Dollarisation can promote integration with the economic activity of the U.S. and links a dollarising country's financial system to a huge, liquid global market for lending and borrowing in dollars (Schuler, 200:5).

The disadvantages of dollarisation include the following:

- According to Berg and Borensztein (2003:12), countries are likely to be reluctant to abandon their own currencies, as these are symbols of their nationhood, particularly in favour of those of other nations.
- The right to issue a country's currency provides its government with seigniorage revenues, which show up as central bank profits and are transferred to the government. From an economic point of view these would be lost to dollarised countries (Berg & Borensztein, 2000:12).
- The standard fix-flexible argument concerns the loss of the exchange rate instrument to buffer the economy against real or external shocks. The loss of monetary independence applies in this case (Sturzenegger & Yeyati, 2001:20).
- According to Berg and Borensztein (2000:12), a dollarising country would relinquish any possibility of having an autonomous monetary and exchange rate policy, including the use of central bank credit to provide liquidity support to its banking system in emergencies.
- The use of a foreign currency for financial intermediation eliminates the capacity of the domestic central bank to finance its lender of last resort activities by printing the domestic currency (Sturzenegger & Yeyati, 2001:20).

4.2.4.4 The most effective exit strategy

The convertibility system was a stabilising force in the Argentina's economy. The rapid depreciation of the peso under a floating exchange rate regime is the most visible sign of lack of confidence in the economy and in the government of Argentina. The peso has depreciated from 1 peso per dollar at the beginning of 2002 to about 3,70 pesos per dollar in June 2002. Dollarisation – officially replacing the peso with dollars - would have been the most effective step to increase confidence in the currency and in the economy of Argentina.

As previously mentioned, the main attraction of dollarisation is the elimination of the risk of a sudden, sharp devaluation of the country's exchange rate. Dollarisation may allow the country to reduce the risk premium attached to its international borrowing. Dollarised economies could enjoy a higher level of confidence among international investors, lower interest rate spreads on their international borrowing, reduced fiscal cost and more investment and growth (Berg & Borensztein, 2000:2).

The amount of dollar reserves necessary to support dollarisation depends on the exchange rate the government chooses. According to Schuler (2002:12), the following steps are involved in determining the appropriate exchange rate for dollarisation:

- Determine what liabilities need to be redeemed with dollar reserves.
- Assess the financial position of the central bank and the government. The central bank should publish a detailed description of its dollar reserves. The government also has the option of borrowing money from the IMF (International Monetary Fund) to support dollarisation.
- Ordinary procedure that involves the announcement that dollarisation will occur and which allows the peso to float for no more than one week. The government should not try to manipulate the currency, but instead allow market participants to determine the level.

- Panic procedure that involves the reallocation of exchange controls. Exchange controls on the use of the peso should be established when dollarisation is announced.
- At the end of the floating period, a fixed exchange rate with the dollar should be announced.
- Reconvert deposits originally in dollars, into their original amounts in dollars.
- The announcement of peso assets and liabilities to be effective immediately into dollar assts and liabilities at the fixed exchange rate.
- Freeze the central bank's total liabilities and dollarise the liabilities determined.
- Decide what to do about coins. Arrangements can be made to have a supply of US coins to replace peso coins as soon as dollarisation occurs.

Dollarisation would not have guaranteed success, but would have improved the chances for success. Argentina could always change the convertibility law of switching its peg from dollar to euro if the US monetary policy was disappointing (Frankel, 1999).

Dollarisation makes sense for essentially the same types of countries as currency boards. These are countries which are small and very dependant on the world economy, as well as those with a history or recent experience of hyperinflation. Dollarisation is a total surrender of monetary independence. A currency board, in contrast, allows the country to preserve a small degree of monetary independence and to keep alive the national currency as a symbol of pride. Dollarisation would have eliminated questions about confidence in the peso by eliminating the peso. A lack of resolve by the Argentine government and a lack of support from the US government prevented this from happening in 1999. Instead, Argentina eventually suffered both a currency crisis and political crisis (Hanke, 2002).

Argentina does not satisfy the traditional optimum currency area (as discussed in Chapter 2, section 2.4). Roubini (2001) proposes the following possible shortcomings of dollarisation in the case of Argentina:

- Argentina's business cycle is not correlated with the USA
- Argentina is a relatively closed economy and has little trade with the USA
- Dollarisation would render Argentina's economy prone to external shocks, as an exchange rate buffer no longer exists
- Argentina's economy has a very rigid labour market
- The fragile banking system would be more crisis-prone, as the lender of last resort function is eliminated by dollarisation.

Thus, dollarisation could have improved the situation during the crisis, but would not have been a long-term solution for Argentina. The Argentine economy suffered from three major vulnerabilities, which emerged towards the end of the decade. The fixed exchange rate regime adopted against the optimal currency area criteria allowed for nominal stability and promoted financial deepening, but also permitted a large overvaluation to develop under the pressure of fiscal and external imbalances and the depreciation of the euro and Brazilian real (Perry & Serven, 2004:23).

4.2.5 Lessons learned from the Argentine currency crisis

Most of the lessons and conclusions from the Argentine currency crisis are not new; nor are they surprising. According to Edwards (2002:7), a partial list of lessons, both old and new, would include the following:

- The existence of a currency board does not force politicians to implement a prudent fiscal policy and does not result in lasting low inflation equilibrium.
- The Argentine crisis shows that a super-fixed exchange rate regime (in this case, a currency board) is not, on its own, a solution for countries' macroeconomic problems.
- Where a country fails to generate a primary surplus large enough to stabilise the debt to GDP ratio, it usually generates a vicious cycle, where failure to stabilise the debt ratio results in higher cost of funds, lower growth and a larger required surplus.

- Situations of real exchange rate overvaluation are very costly and lead to low growth and stagnation in some cases. Under a super-fixed nominal exchange rate, regime overvaluation is very difficult to resolve.
- Fiscal federalism is important when determining the political economy of fiscal policy. The inability to bring the provinces' finances into balance in Argentina was a key contributing factor in the unfolding of the crisis.
- Economies with a low degree of openness to international trade have difficulties adjusting to external shocks.
- Defaulting on the public may be very costly.
- A banking system dominated by major foreign banks may still be subject to a run on deposits. This was what happened in Argentina throughout 2001 and what induced Minister Cavallo to impose the ill-fated deposit freeze and exchange controls early in December 2001.
- There are a number of risks associated with a highly dollarised banking system – in particular, the absence of a lender of last resort. In the case where the banking system is highly dollarised, a run-of-the-mill crisis may be transformed into a major catastrophe.

In the case of Argentina, no consensus exists regarding the cause(s) of the currency crisis, apart from the long-lasting foreign debt situation. As mentioned earlier, dollarisation would have improved the chances for success in the case of Argentina and would reduce the risk premium attached to its international borrowing.

4.3 Emerging markets and the impact of a currency crisis

After the Argentine currency crisis, some supporters of a fixed exchange rate regime have not changed their views. Some of them argue that the preferred super-fixed regime is dollarisation, or a regime where the country in question relinquishes its own currency and adopts an advanced nation currency as legal tender (Edwards, 2002:10). Some of the supporters argue that emerging markets have no alternative

but to adopt a true fixed exchange rate regime. According to Edwards (2002:10), emerging markets cannot really adopt a flexible exchange rate regime, because intervention in the foreign exchange market has destabilising consequences.

The economic leaders among developing countries are generally regarded as the emerging market economies. The group of 24 countries includes Argentina, Brazil, Chile, China, Colombia, the Czech Republic, Egypt, Hong Kong, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, the Russian Federation, Singapore, Thailand, Turkey, Venezuela and South Africa. Emerging market economies have, since the early 1990's, played a more important role in the world economy (Loots, 2001:7).

According to Loots (2001:8) portfolio flows to developing countries are also directed at emerging economies, since their financial markets are more developed and these flows are very volatile and subject to emerging market crises.

Emerging market economy (EME) financial crises in recent years have sometimes spread quickly to other countries. According to Chui, Hall and Taylor (2002:29), despite severe economic problems facing Argentina, spill-overs to other major EME's were relatively limited.

Brazil had very strong trade linkages with Argentina in 2000, and indeed has seen some decline in exports to Argentina in the wake of the crisis. Argentina appeared to have had less strong indirect trade ties with other emerging market economies in 2000 (Chui, Hall & Taylor, 2002:29). Many emerging market countries have moved towards flexible exchange rate regimes which may provide an additional buffer in the event of spill-overs caused by crises in other emerging market countries. Behavioural changes among investors may have contributed to the absence of spill-

overs from the Argentine crisis. Chui, Hall and Taylor (2002:29) suggest that evidence of spread behaviour and rating downgrades in various economies in the period around crises were more widely anticipated during recent events in Argentina than previously.

The impact of the Argentine currency crisis on other emerging market economies will be discussed in more detail in Chapter 5, where an empirical analysis will be made between Argentina and a few developing and developed economies.

4.4 Conclusion

The aim of this chapter was to analyse the collapse of the Argentine economy and the concomitant collapse of the Argentine experience with a currency board exchange rate regime, and how these have affected the debate on the most suitable exchange rate regime for emerging market currencies. Argentina outperformed most of the economies in the region until 1999, when it was plunged into a protected recession; its income distributor did not improve and unemployment remained at high levels.

Under section 4.2, a historical background and an overview of recent developments in Argentina were provided. A currency board arrangement (CBA) appeared to have been a solution to put an end to hyperinflation in Argentina, which had experienced no fewer than eight major currency crises since the beginning of the 1970s. It was stated that countries wanting to avoid the cost of both currency flexibility and capital controls may wish to consider a currency board. The introduction of a currency board in Argentina led to a growth in the economy until 1995, when Argentina experienced changes in the international financial markets and experienced its first recession. Four years later, Argentina experienced another recession, which plunged the country into a prolonged period of stagnation and shook confidence in the exchange rate regime.

It was evident that a number of factors led to the Argentine crisis, including an overvalued Argentine peso, fiscal imbalances, government debt, changes in the currency board, political instability and the Argentine banking system. Different exit strategies that could have helped to end the Argentine currency crisis were discussed under section 4.2.4. The most effective exit strategy would have been dollarisation. Dollarisation would not have guaranteed success, but would have improved the chances for success in Argentina, although it would not have been a long-run solution for Argentina's problem.

Chapter 5 further explores the effect of the Argentine crisis on emerging markets.

CHAPTER 5

THE IMPACT OF THE ARGENTINE CURRENCY CRISIS ON SELECTED EMERGING MARKETS

5.1 Introduction

A number of recent financial crises, including the Mexican crisis of 1995, the Asian crises of 1997/1998, the default of the Russian government in 1998, the sharp depreciation of the real in Brazil in 1999 and the Argentine currency and financial crisis in 2001/2002, have been accompanied by episodes of financial markets' contagion in which many countries have experienced increases in the volatility and co-movement of their financial asset markets on a day-to-day basis. The pattern of contagion has been uneven across both time and countries – with increased volatility and co-movement occurring principally during times of financial and exchange rate crises (Kodres & Pritsker, 2001:1).

Both developed and emerging market countries have also experienced speculative attacks on their currencies during recent years. As mentioned in Chapter 3, speculative attacks refer to episodes where currencies come under severe pressure to devalue.

This chapter focuses on speculative attacks and contagion effects in emerging markets including Argentina, South Africa, Brazil, Poland and Hungary as well as developed market countries, during the period of the Argentine currency crisis. As stated in Chapter 3, the movement in, and correlations between, movements in the asset prices and exchange rates in these selected countries in the period 1 October 1998 to 31 September 2003 will be analysed.

Latin American countries were the most affected by contagion from Argentina, with Brazil's currency hitting new lows against the US dollar. In Mexico, share prices and the peso were also down, triggered by fears that Argentina could have triggered another Latin American debt crisis (Milner, 2001). Unlike the Asian crisis of 1997/1998, fewer emerging economies made use of fixed exchange rate regimes at the time of the Argentine currency crisis. Markets were much less leveraged and hedge funds played a smaller role than was the case with the Asian crisis. According to Fischer (2001), the contagion would affect countries that were closely linked through trade and finance to Argentina, as was the case with Brazil. Total exports to Argentina accounted for just over 1 per cent of Brazil's GDP (gross domestic product).

Each of the major international capital market-related crises since 1994, including the Argentine currency crisis, was in some way involved with a fixed exchange rate system. At the same time, countries that did not have fixed exchange systems, among them South Africa and Turkey, avoided crises of the type that afflicted emerging market countries with fixed exchange rate systems (Fischer, 2001).

As mentioned in Chapter 3, the adoption of a free-floating exchange rate system from a managed floating exchange rate system in South Africa has led to substantial swings in the exchange rate of the South African rand. Investors' concerns regarding developments in other emerging markets, including the Argentine currency crisis, contributed to a sharp depreciation in the rand during 2000 and 2001 (Van der Merwe, 2003).

The emerging markets' experiences over the last decade highlight the risk of opening the capital account before adopting a flexible exchange rate. Many countries, such as Brazil, were forced to abandon fixed exchange rate regimes after sudden reversals of capital flows under open accounts. Other emerging markets such as Poland faced heavy capital inflows and upward pressure on fixed exchange rate regimes in the 1990s, and had to allow exchange rate flexibility to avoid overheating the economy. Exchange rate pressure in Hungary, generated by capital inflows with sterilised intervention, led to widening the band to 15 per cent of their crawling peg exchange rate system in 2001 (Fischer, 2001).

5.2 Identifying and measuring speculative attacks

Speculative attacks are typically associated with significant depreciations of the exchange rate. Attacks can also result in sharp falls of reserves or increases in the interest rates, depending on the policy pursued by the government at the time of the attack. Therefore, at a given point in time, a speculative attack can be associated with a depreciation of the exchange rate, a fall in reserves and/or an increase in interest rates. Reserves, exchange rates and interest rates exhibit a different behaviour during periods of tranquillity than during periods of speculative attacks (Peria, 1999:11).

The nonparametric approach towards identifying speculative attacks makes use of quarterly data for emerging market countries and developed countries by comparing the behaviour of macroeconomic variables during periods of tranquillity. The finding is that behaviour of macroeconomic variables differs between both periods will provide some support to the view that currency crises are caused by inconsistent macroeconomic policies, for instance high budget deficits to GDP, during periods of crises. Finding that there was no significant difference in the behaviour of these variables in both periods would suggest that

currency crises were caused by arbitrary shifts in expectations (Kruger, Osakwe & Page, 1998). The nonparametric approach was populated by Eichengreen, Rose and Wyplosz (1995).

According to Zang (2001), as previously mentioned in Chapter 3, there are three approaches to identify speculative attacks, namely:

- Plotting the exchange rate and picking up large jumps
- Defining a currency crash as a nominal depreciation of the currency of at least 25 per cent that is also at least a 10 per cent increase in the rate of depreciation
- Constructing an index that summarises changes of exchange rates, reserves and interest rates.

This study makes use of the approaches by Zang (2001) to identify speculative attacks. Speculative attacks will be identified on foreign exchange rates, interest rates and international reserves and will be discussed in the following section.

5.2.1 Speculative attacks on selected emerging markets: period 1998 – 2003

5.2.1.1 Data

The following data will be used in the analysis:

- Monthly and daily foreign exchange rates for South Africa, Argentina, Brazil, Hungary, Hong Kong, Poland, Great Britain and the Euro zone during the period from 1 January 1998 to 31 December 2003, as supplied by ABSA Bank Economic Research Department.
- Monthly central bank lending rates for South Africa, Argentina, Hungary, Brazil, Poland, Great Britain, the Euro zone and the United States of America during the period January 1998 to December 2003, as supplied by ABSA Bank Economic Research Department.

- Weekly interbank overnight deposit rates for South Africa, Argentina, Hungary, Hong Kong, Poland, Great Britain, the Euro zone and the United States of America during period January 1999 to 31 December 2003, as supplied by REUTERS. Historical data on weekly interbank deposit rates is not available for Brazil. Brazil is therefore not included in the movement in interbank deposit rates, due to only annual data availability for the analysis of this country.
- Monthly international reserves for South Africa, Argentina, Brazil, Hungary, Poland, Great Britain and the United States of America during the period January 1998 to December 2003, as supplied by ABSA Bank Economic Research Department.

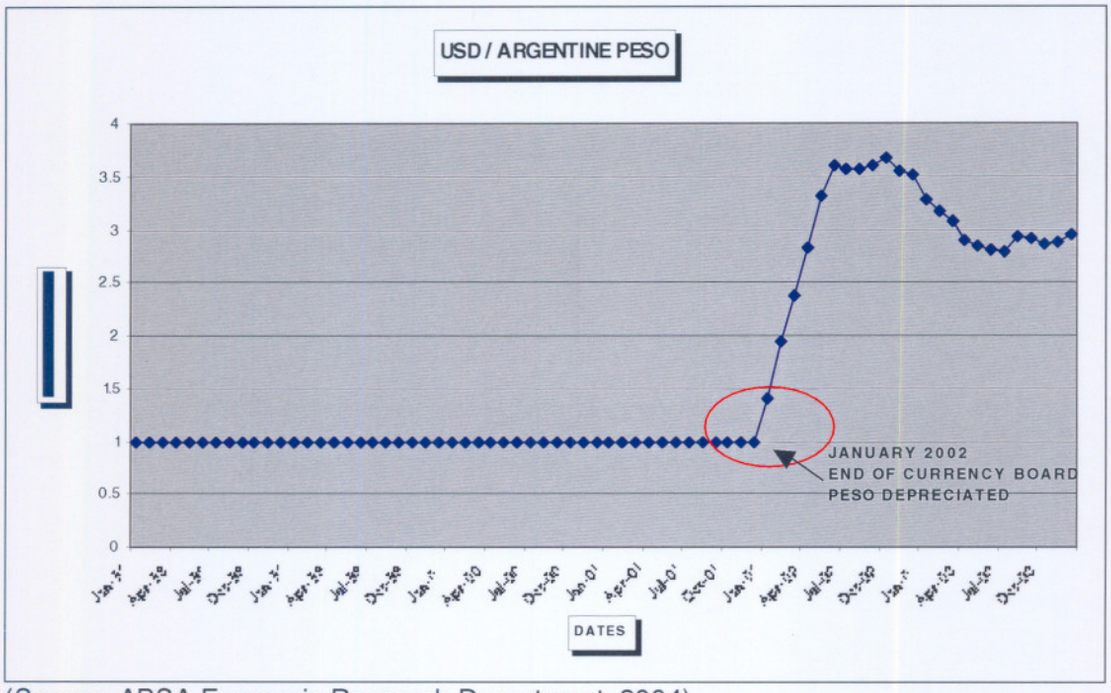
5.2.1.2 Foreign exchange rates

Two methods are used for identifying speculative attacks on foreign exchange rates. The first method focuses on the analysis of currency movements in selected emerging and developed market currencies. The second method that is used to identify speculative attacks focuses on constructing an index of currencies from selected emerging and developed markets that summarises changes in foreign exchange rates. These two methods will be discussed under section 5.2.1.2.1 and section 5.2.1.2.2.

5.2.1.2.1 Currency movements

The first method used to identify speculative attacks focuses on the analysis of currency movements on monthly foreign exchange rates between the Argentine peso, the South African rand, the Hungarian forint, the Brazilian real, the Polish zloty, the Hong Kong dollar, the US dollar, the euro and the British pound during the period January 1998 to December 2003. These are subsequently discussed below.

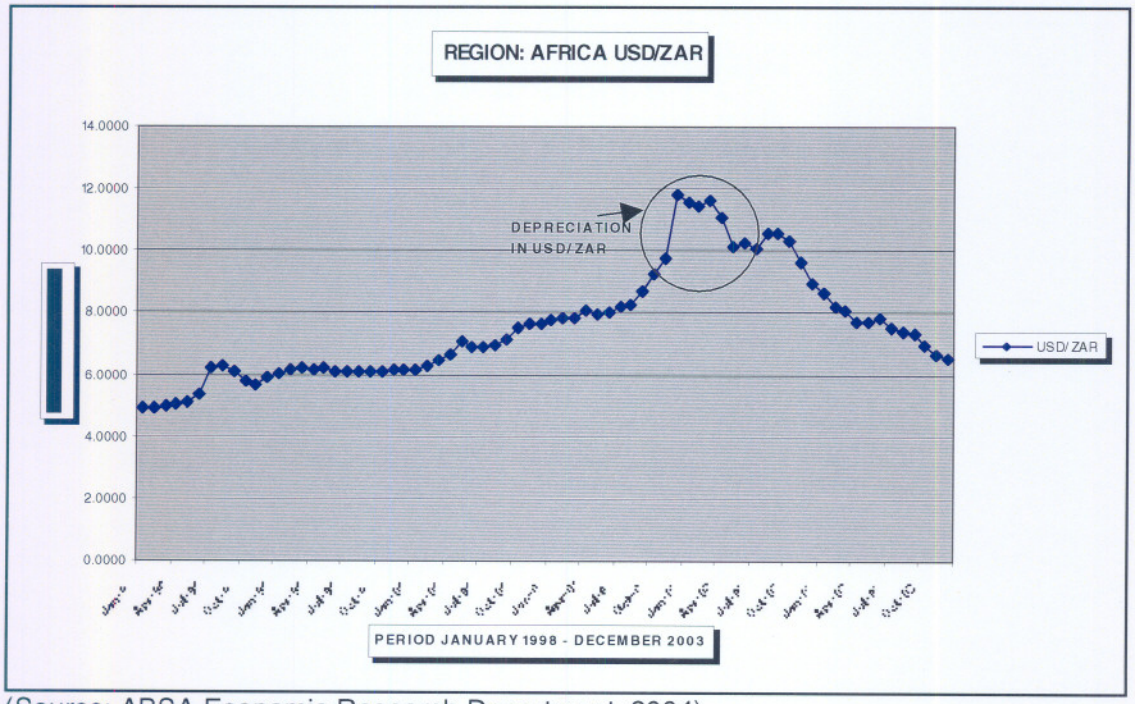
Figure 5.1 The Argentine peso against the US dollar



(Source: ABSA Economic Research Department, 2004).

In January 2002, the Argentine currency board exchange rate regime came to an end, as mentioned in Chapter 4. From Figure 5.1, it is evident that the Argentine peso was devalued in January 2002, which led to a sharp devaluation of the currency. In February 2002, a dual exchange rate was introduced in Argentina, changing the Argentine exchange rate regime from a fixed to a floating exchange rate system. The sharp depreciation of the Argentine exchange rate was due to the currency and financial crisis in Argentina. After the abandonment of the Argentine peso in January 2002, the currency depreciated by 54 per cent. According to the approach followed by Zang (2001), it is clear that a speculative attack on the peso can be identified during this period.

Figure 5.2 The South African rand against the US dollar



(Source: ABSA Economic Research Department, 2004).

The South African rand depreciated sharply against the US dollar during the last four quarters of 2001 – by 42 per cent between September 2001 and December 2001, after a steady decline in the year. According to the approach followed by Zang (2001) for identifying speculative attacks, it is clear that a speculative attack on the rand can be identified during this period. A sharp jump in the rand can be identified in Figure 5.2, during the period of the Argentine currency crisis.

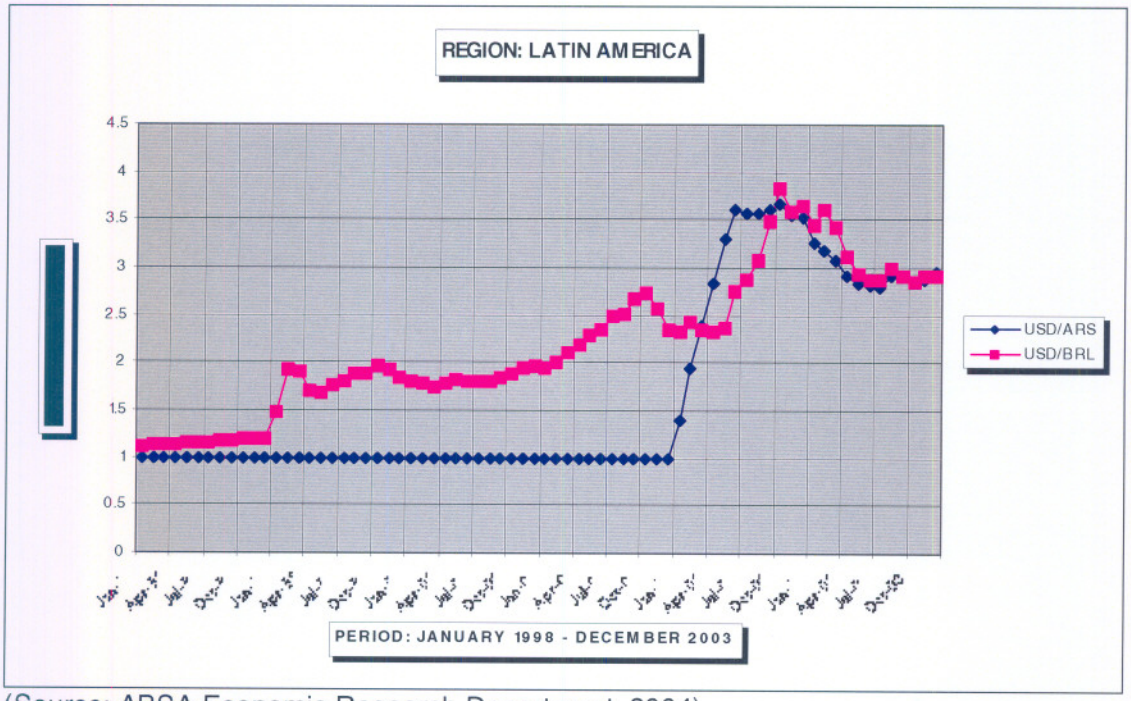
The depreciation of the rand in the last quarter of 2001 led to widespread public concern. Some policymakers voiced their beliefs that market acceleration in the rate of depreciation was not justified by economic fundamentals, but rather by means of a speculative attack on the currency. The President of the South African Reserve Bank (SARB) responded to these events and set up the Myburgh Commission of Inquiry, mandating it to investigate the causes of the

As illustrated in Figure 5.3, it is clear that a depreciation of both the Argentine peso and the South African rand can be identified during the period between August 2001 and October 2002. As mentioned in Chapter 3, Frankel and Rose (1996), define a currency crash as a nominal depreciation of the currency of at least 25 per cent that is also at least a 10 per cent increase in the rate of depreciation, in identifying speculative attacks. According to this approach, it is clear that a speculative attack occurred on both the Argentine peso and the South African rand.

The rand depreciated by 25 per cent during the final quarter of 2001. Sentiment has played an important role in rand weakness, for example political problems in Zimbabwe and the Argentine currency crisis. The Zimbabwean issue created the fear of a direct economic impact on South Africa as well as notions of contagion. Contagion plays a significant role in the minds of both foreign and domestic investors. The situation in Argentina deteriorated progressively during 2001. The South African rand suffered more than the Brazilian real, despite the country's proximity to Argentina, its strong direct ties and its own foreign debt difficulties. The exchange rate of the rand shows an upward drift over time, representing a trend rate of depreciation, as observed in the figure above.

South Africa, despite having a free-floating exchange rate regime, has thus been affected by the Argentine currency crisis. South Africa departed from a fixed exchange rate regime towards a floating exchange rate regime during the early 1980s, but formally adopted inflation targeting and a free-floating exchange rate regime in 2000. The recent changes in the exchange rate of the rand are therefore not necessarily related to the exchange rate regime that has been adopted, but probably rather reflects the liberalisation of capital controls (Van der Merwe, 2003:36).

Figure 5.4 Latin American currencies

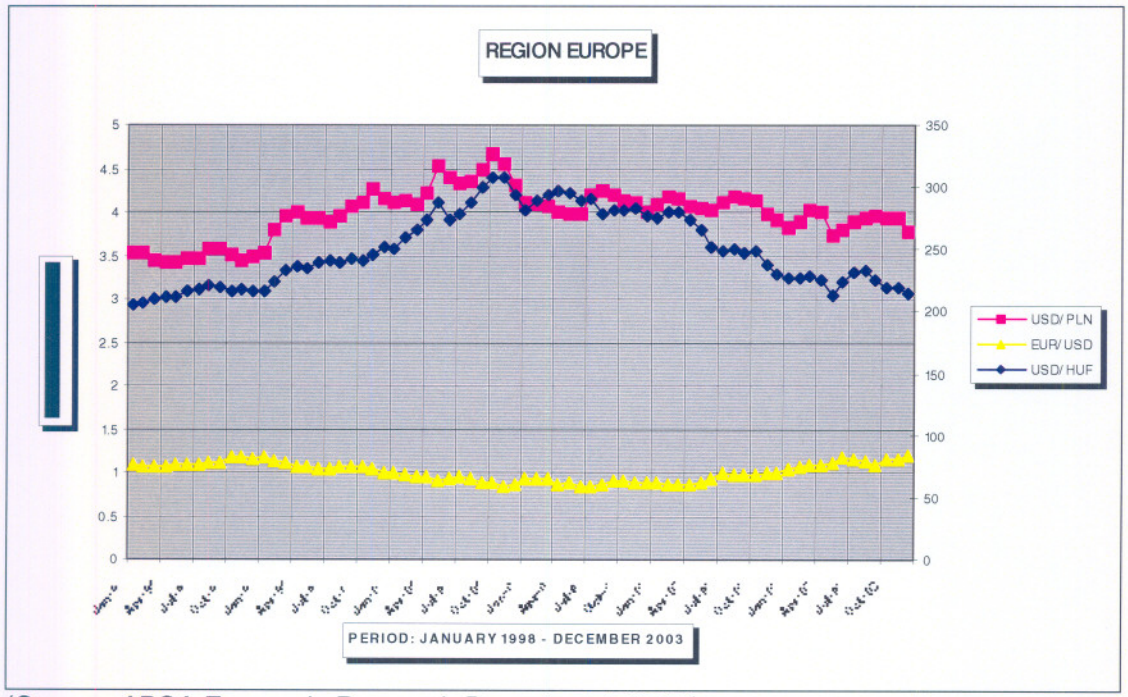


(Source: ABSA Economic Research Department, 2004).

During the first week of July 2001, the Brazilian real lost a fifth of its value against the US dollar as compared to the beginning of 2001. The Brazilian real depreciated by 15.6 per cent against the US dollar in 2001, as indicated in Figure 5.4. Nervousness about Argentine's monetary policy at the time of economic slowdown in some Latin American countries has provoked a sell-off throughout the region. In January 2002, the Brazilian real came under pressure from the relatively mild contagion effect from Argentina. Pressure on the real was caused as participants decided that the Argentine currency has bottomed out and funds started to move back into selected Argentine equities that appeared to be low-priced and seemed likely to perform better on the new terms of trade.

Brazil adopted inflation targeting relatively soon after the crisis-driven exit from the crawling peg in January 1999. Since inflation targeting was adopted in 1999, Brazil has had to manage the financial shocks and exchange rate volatility associated with Argentina's financial crisis.

Figure 5.5 European currencies

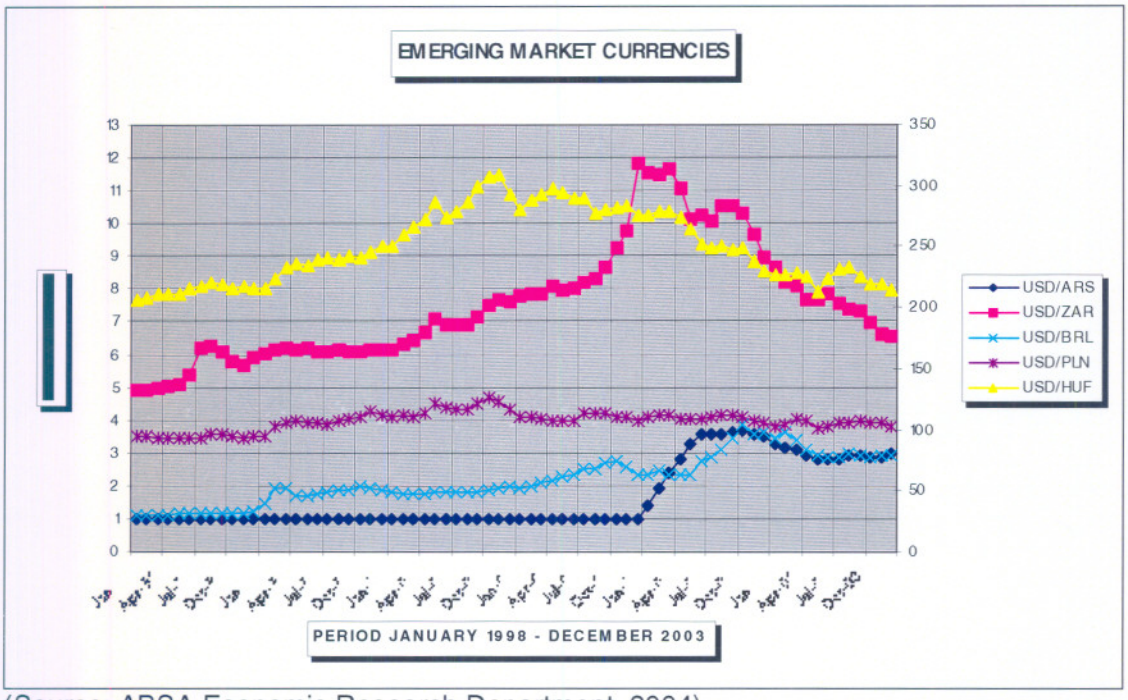


(Source: ABSA Economic Research Department, 2004)

In 2001, fears of contagion hit Eastern European countries; specifically, that panic might spread to markets where there were no immediate crises. In July 2001, the Polish zloty was shaken by fears over government's budget policy and dropped to a seven-month low against the US dollar after losing 4 per cent of its value. During the same period, the Hungarian forint fell to a six-month low against the US dollar. Poland shifted from crawling pegs to crawling bands, and gradually widened their crawling band regime to adopt a floating regime. Heavy capital inflow created tension between external and domestic price stability objectives, leading authorities to introduce a 7 per cent band around the crawling parity to allow monetary policy greater interdependence. The width of the band was gradually widened until it was abandoned in 2000. The Polish zloty depreciated against the euro in late 2002. The zloty has been depreciating since mid-2001, losing more than 14 per cent of its value against the euro in 2003.

Hungary adopted a crawling peg exchange rate regime (with a 2.25 per cent band) in 1995, with the dual purpose of establishing a nominal anchor and maintaining external competitiveness. Crawling peg exchange rate regimes refer to a nominal exchange rate regime that is adjusted periodically according to a set of indicators and is not allowed to fluctuate beyond a narrow range, as discussed under section 2.3.3 in Chapter 2.

Figure 5.6 Emerging market currencies

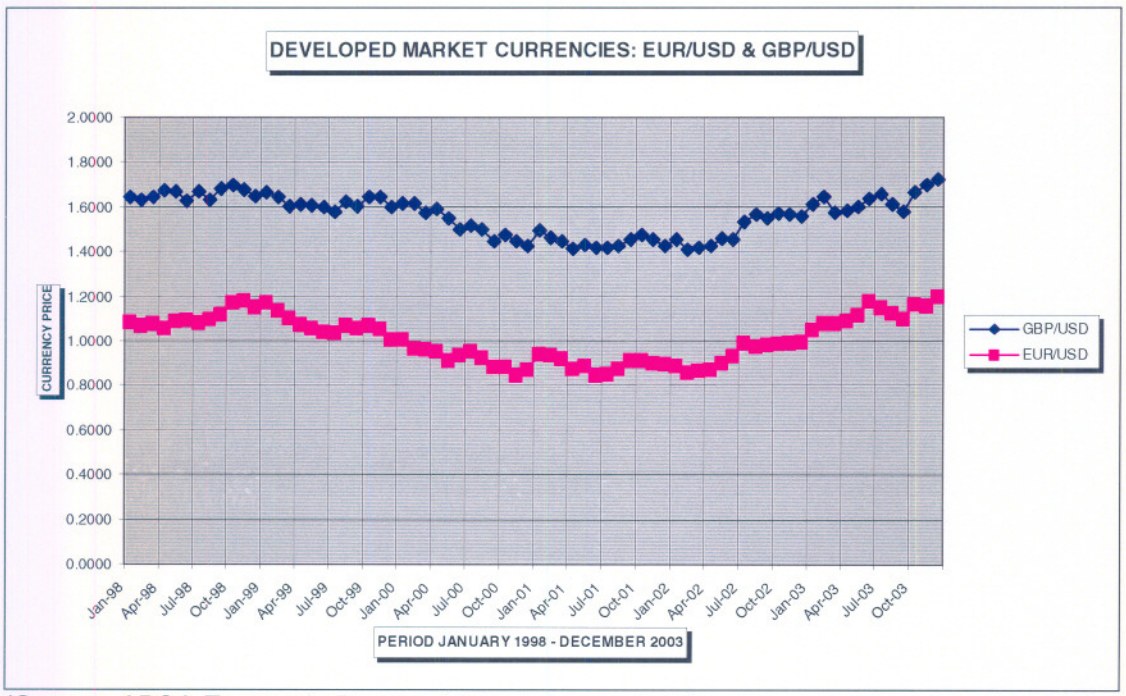


(Source: ABSA Economic Research Department, 2004).

From Figure 5.6 it is apparent that during 2001 and the first half of 2002, the nominal exchange rate of the US dollar remained broadly constant, whereas the exchange rate of the rand depreciated sharply. From this observation it follows that the rand had lost value against other emerging market currencies; and by extension, it was not the US dollar that gained strength, indicating that nominal disturbance originated in the South African economy.

During the period from May 2001 to September 2003, no major exchange rate regime changes took place in Hungary and Poland. The Hungarian forint showed a more significant movement, mainly explained by speculative and currency band shifts in 2003. Band shifts do not constitute a change in the regime, but only a change of 2.3 per cent (central rate); other characteristics remain unchanged.

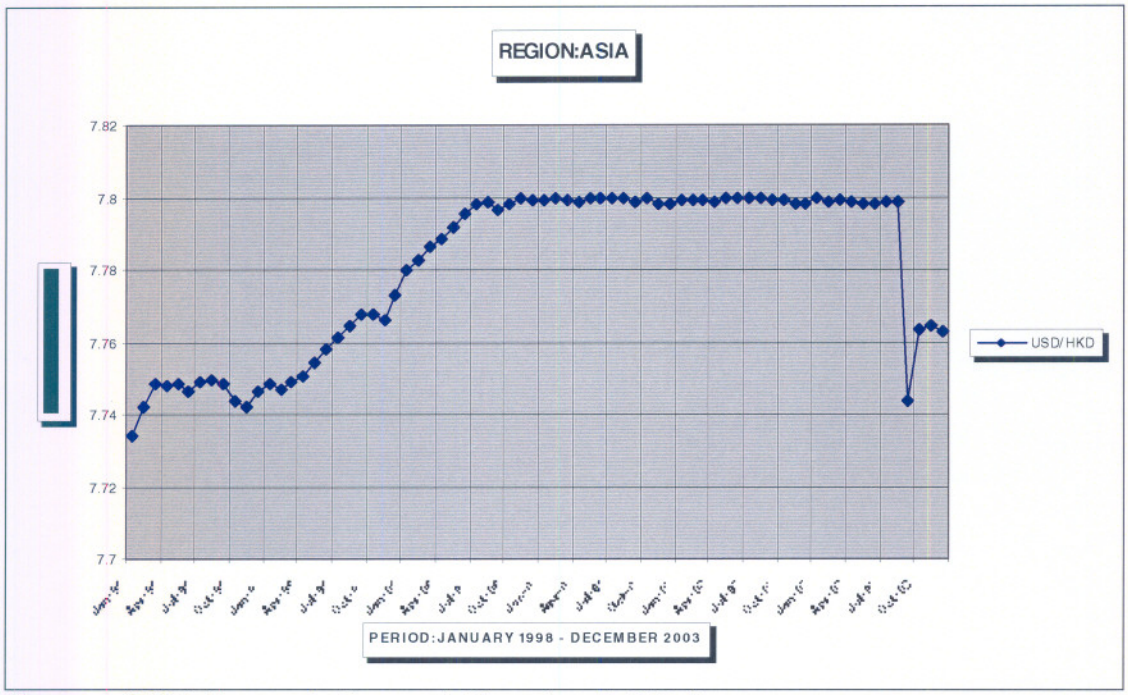
Figure 5.7 Developed market currencies



(Source: ABSA Economic Research Department, 2004).

A significant correlation can be identified between the euro and the British pound against the US dollar during this period.

Figure 5.8 The Hong Kong dollar against the US dollar.



(Source: ABSA Economic Research Department, 2004).

Since 1983, the Hong Kong dollar has been linked to the US dollar through the implementation of a strict and robust currency board system. The convertibility rate for this purpose, which was originally set at 7.75, moved by one pip per calendar day effective from 1 April 1999, and converged with the convertibility rate applicable to the issuance and redemption of certificates of indebtedness at HKD 7.80 on 12 August 2000. Since then, the convertibility rate has remained at 7.80.

the reduction of speculation and devaluation risk of the currency involved, whereas a pure floating exchange rate system has the attraction to withstand a speculative attack without the exchange rate collapsing (Grenville, 2000).

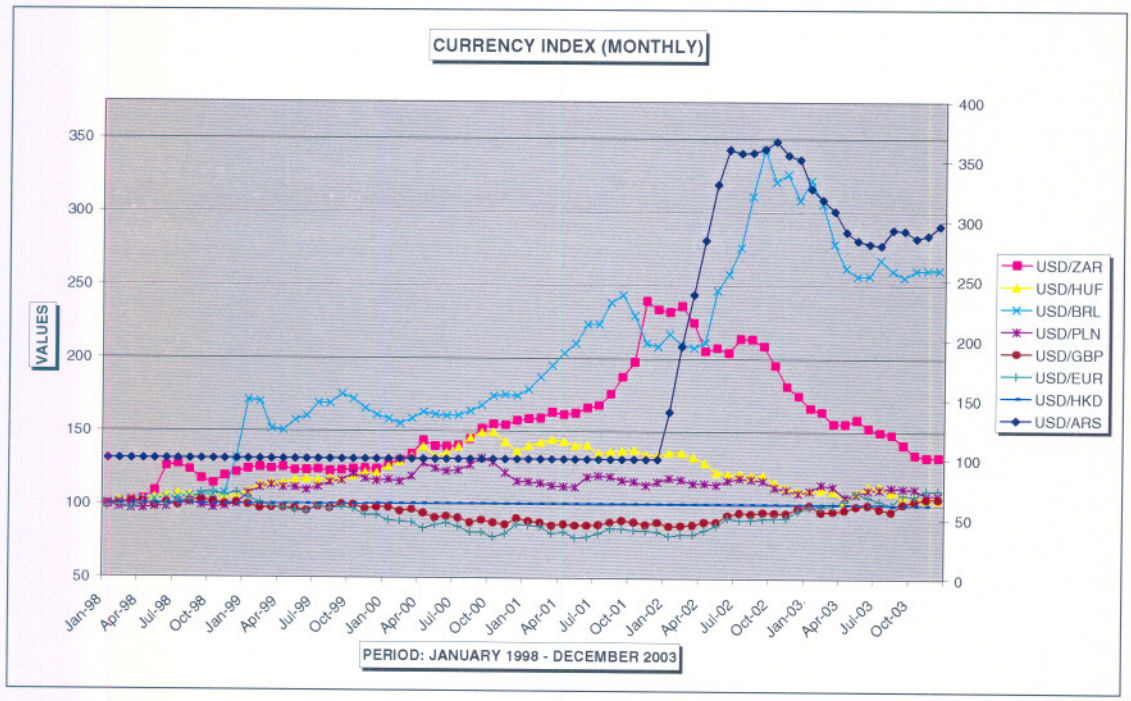
Argentine authorities faced the challenge of operating a floating exchange rate regime with minimal experience in intervention and no market information at the time of its crisis-driven exit from a currency board in January 2002. During the currency board era, the authorities did not collect data on market turnover and net open positions, and the central bank rarely intervened in the market. Thus, upon floating, the authorities quickly established reporting requirements and net open position limits, and also required banks to submit two-way bids to the central bank three times per day. At the same time, the scarcity of foreign exchange, speculative activity and unstable market conditions compelled authorities to institute surrender requirements and allow interbank trading only when it was supported by underlying customer orders (Duttagupta & Fernandez, 2004).

Currencies with free-floating exchange rate regimes were more affected by the currency crisis in Argentina than those countries that followed fixed exchange rate regimes during the crisis period. This observation does not support the assumption by Edwards (2001) that most emerging markets should either adopt a free-floating or a super-fixed exchange rate regime in order to prevent the recurrence of financial or currency crises. Countries in the southern hemisphere were more affected by the Argentine currency crisis than those in other regions and continents.

5.2.1.2.2 Currency index

The second method used to identify speculative attacks is to construct an index of currencies to summarise changes of foreign exchange rates. Constructing an index of foreign exchange rates in the current study requires that one references all the currencies in the sample, starting at a single point in January 1998 equal to a hundred basis points, tracing the diversity through the period to December 2003. Foreign exchange rates in the sample include the currencies of Argentina, South Africa, Brazil, Hungary, Hong Kong, Poland, Great Britain and the Euro zone. Each of these currencies is quoted against the US dollar.

Figure 5.10 Currency index (monthly data)



(Source: ABSA Economic Research Department, 2004).

From Figure 5.10, it is evident that changes in the currencies can be observed in the Argentine peso, the South African rand and the Brazilian real, especially during the period October 2001 to October 2002. Fluctuations in these currencies were caused by speculative attacks, especially during the period of the Argentine currency crisis.

During the last decade there has been a significant shift among emerging market economies from various forms of fixed exchange rate regimes. Examples include Indonesia, Korea, Thailand, Russia, Brazil, Mexico and Argentina. Evidence from previous currency crises shows that a super-fixed exchange rate is not a solution that will prevent a crisis. Fischer (2001) argues that flexible exchange rate regimes are more suitable with regard to overcoming periods of currency crises.

5.2.1.3 Interest rates

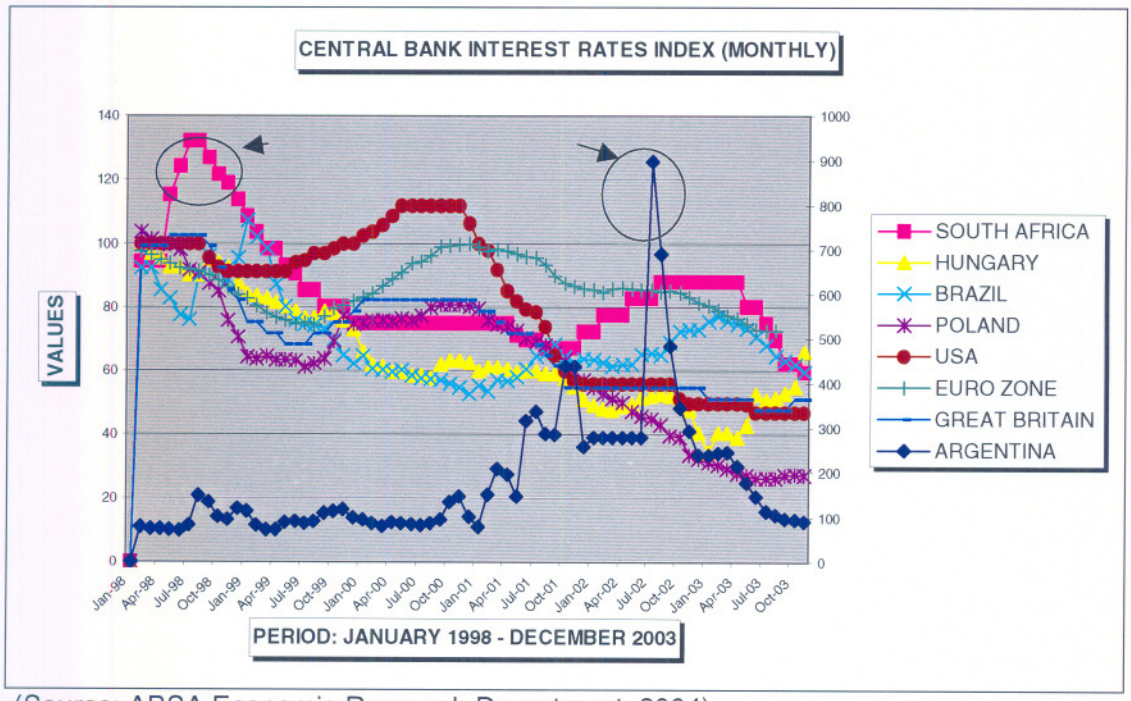
Two methods are used to identify speculative attacks on interest rates. The first method constructs an index on central bank lending rates for a selection of emerging market and developed market countries. The second method concentrates on plotting interbank overnight deposit rates on a graph and picking up large jumps in interest rates. These two methods will be discussed in section 5.2.1.3.1 and section 5.2.1.3.2.

5.2.1.3.1 Interest rate index

The first method focuses on constructing an index of central bank lending rates in Argentina, Brazil, South Africa, Hungary, Poland, the United States of America, the Euro zone and Great Britain in order to identify speculative attacks on interest

rates. Constructing an index of central bank lending rates requires the referencing of central bank lending rates for all the countries in this sample, starting at a single point in January 1998 equal to a hundred basis points, tracing the diversity through the period to December 2003. This is graphically illustrated in Figure 5.11.

Figure 5.11 Central bank lending rates index



(Source: ABSA Economic Research Department, 2004).

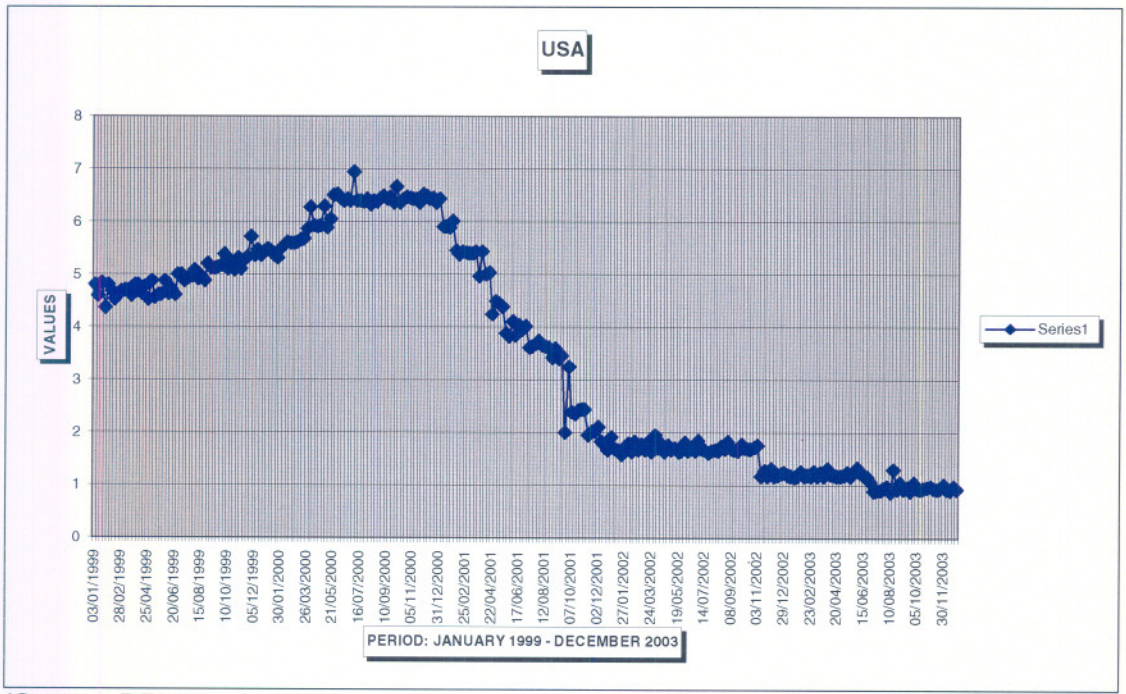
During the Asian currency crisis in 1998, interest rates rose in Argentina – from 9.53 per cent in August 1998 to 16.94 per cent in September 1998. During the same period, South Africa suffered a 4 per cent rise in their interest rates. Brazil suffered a 13.59 rise on their interest rates during September 1998. This can be attributed to contagion spreading to emerging markets from the currency crisis in Asia during 1998. During the Argentine currency crisis towards the end of 2001,

interest rates rocketed to 19.35 per cent in Argentina. Interest rates in Argentina only stabilised after the currency crisis, towards the end of 2002. Large jumps in central bank lending rates can be identified in Figure 5.11, for example, during July 1998 in South Africa, and during July 2002 in Argentina.

5.2.1.3.2 Interest rate movements

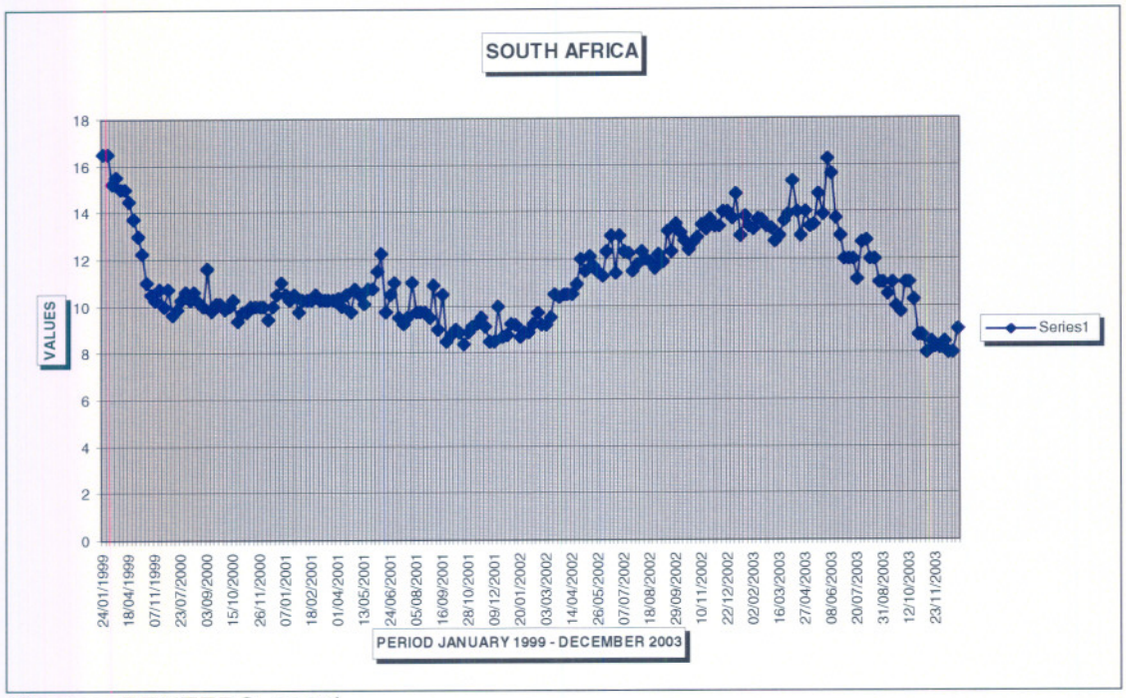
In order to identify speculative attacks on interest rates, the second method this study uses is plotting interbank overnight deposit rates on a graph, for the United States of America, South Africa, Poland, Hungary, Great Britain, the Euro zone, Hong Kong and Argentina, in order to identify large jumps in these weekly interest rates for the period January 1999 to December 2003. This is illustrated in Figure 5.12 to Figure 5.19.

Figure 5.12 USA interbank overnight deposit rates



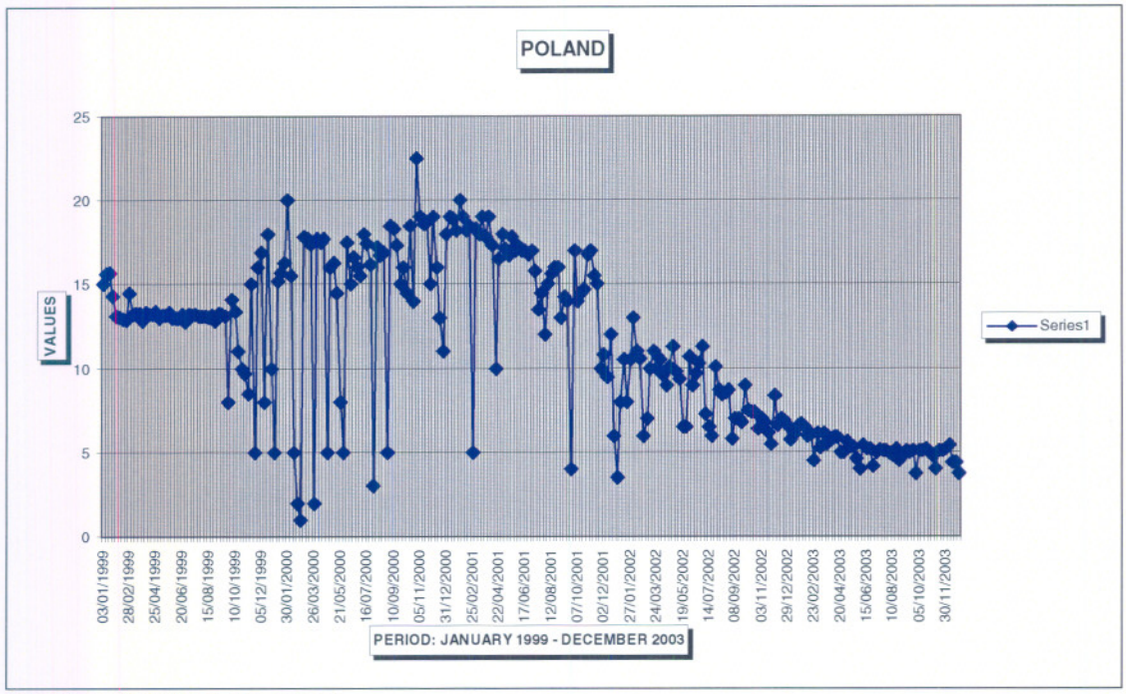
(Source: REUTERS, 2004).

Figure 5.13 South African interbank overnight deposit rates



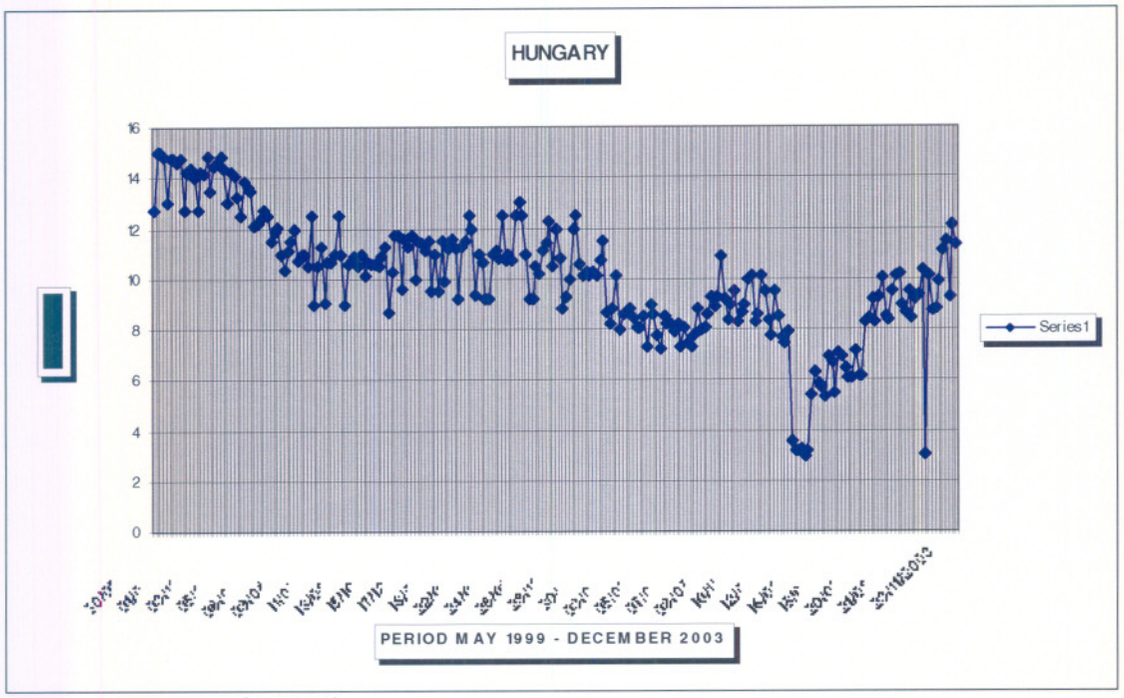
(Source: REUTERS, 2004).

Figure 5.14 Poland's interbank overnight deposit rates



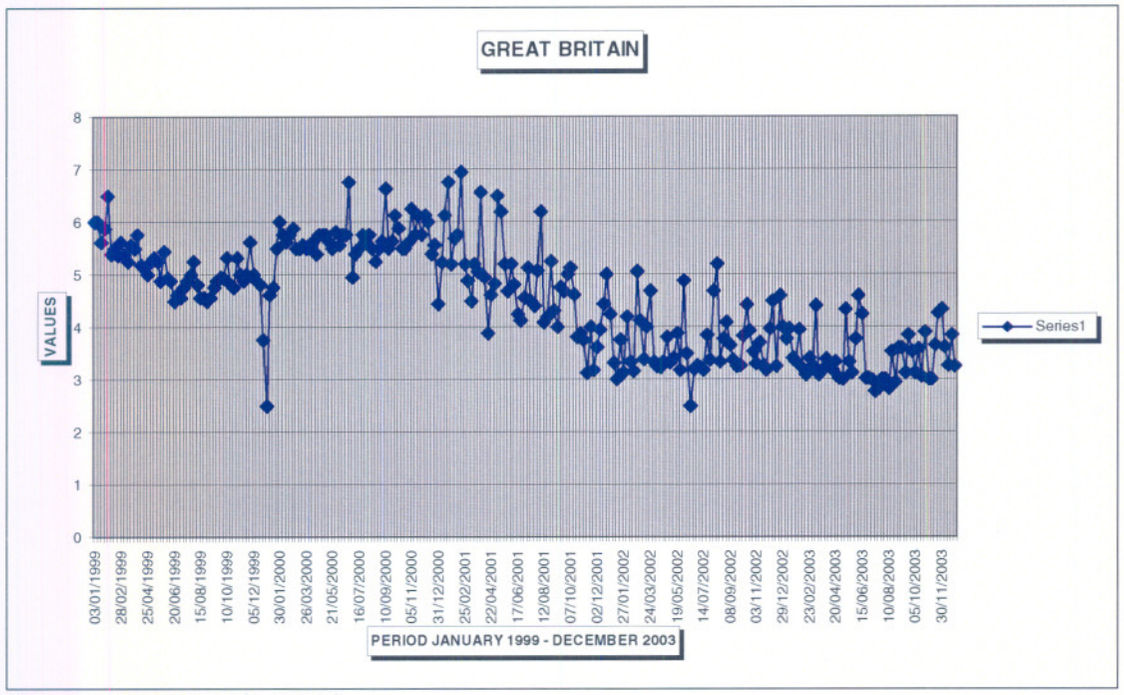
(Source: REUTERS, 2004).

Figure 5.15 Hungary's interbank overnight deposit rates



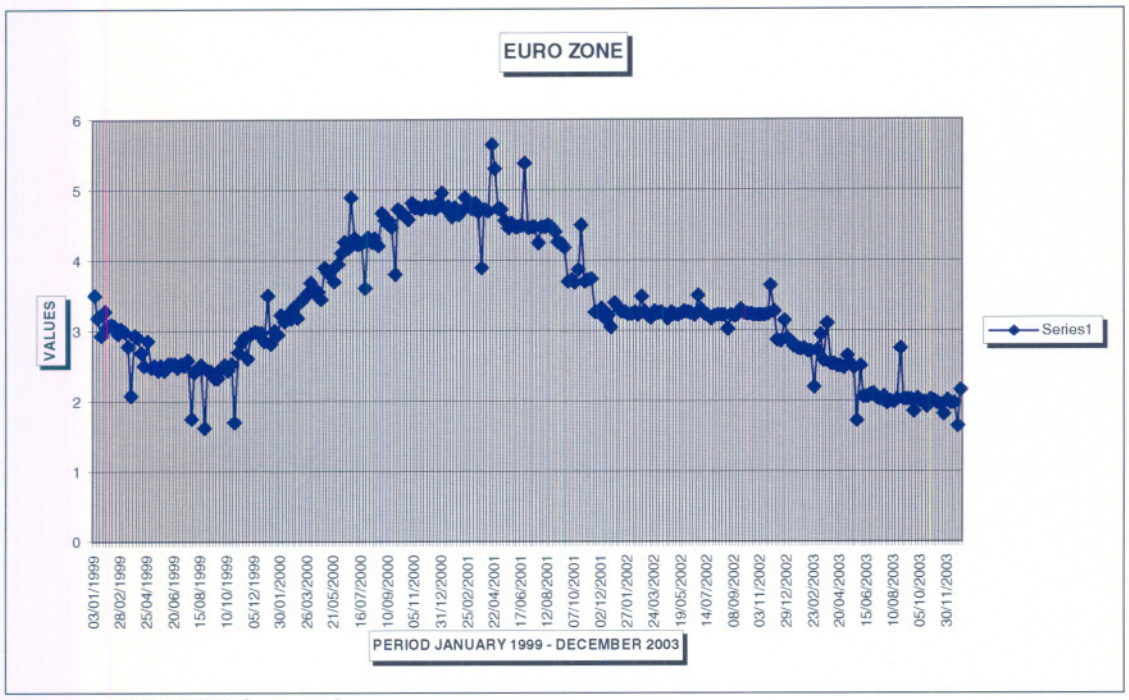
(Source: REUTERS, 2004).

Figure 5.16 Great Britain's interbank overnight deposit rates



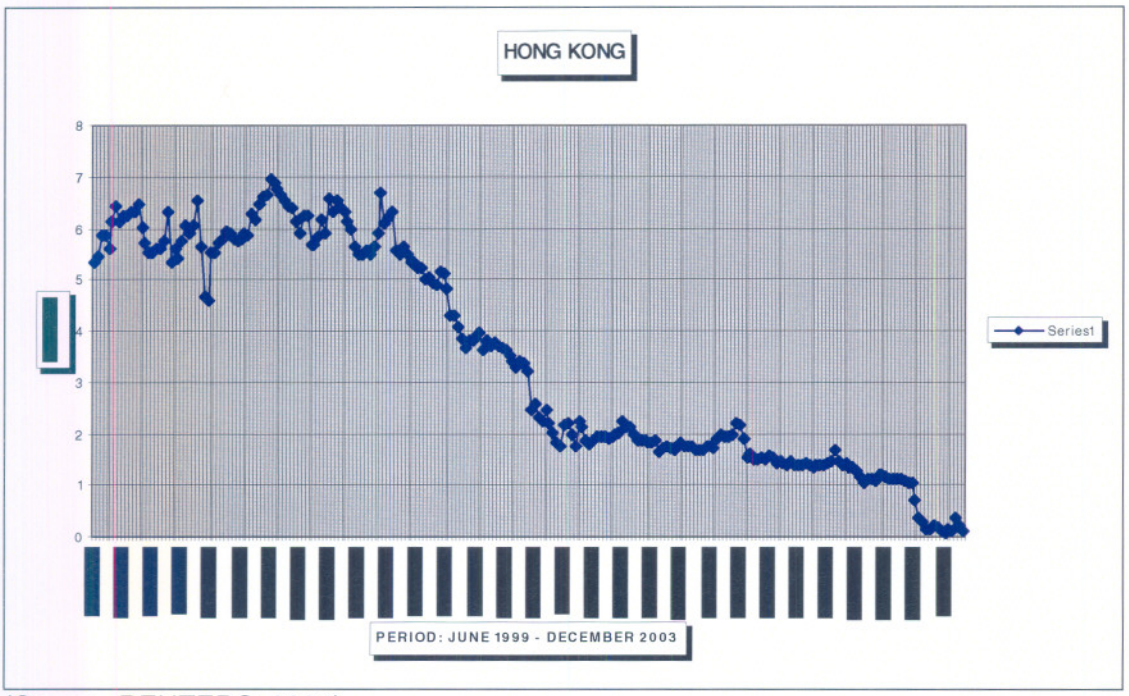
(Source: REUTERS, 2004).

Figure 5.17 Euro zone's interbank overnight interest rates



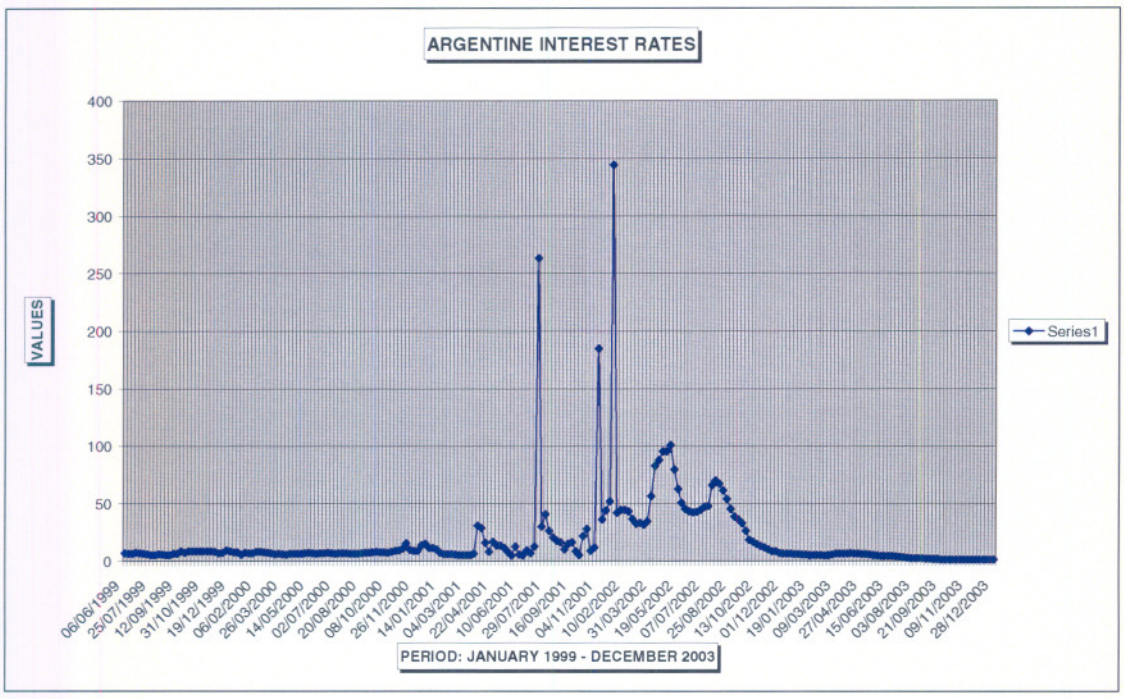
(Source: REUTERS, 2004)

Figure 5.18 Hong Kong's interbank overnight deposit rates



(Source: REUTERS, 2004).

Figure 5.19 Argentina's interbank overnight deposit rates



(Source: REUTERS, 2004).

From the above figures, one can observe the following:

- A downward trend in the interest rate for the United States can be observed from late 2000 until October 2001 in Figure 5.12, where a stabilisation of interest rates can be observed until October 2002.
- A slight increase in interest rates can be observed in Figure 5.13 in October 2001 until October 2002 in South Africa, namely during the period of the Argentine currency crisis. A sharp decline in the interest rate can be observed in the beginning of 1999 in South Africa.
- A downward trend in the period February 2001 to 2003 can be identified in Figure 5.14 for interest rates in Poland. Large jumps in interest rates are identified in 2000 in Poland, but no significant increase in interest rates can be identified during the Argentine currency crisis.

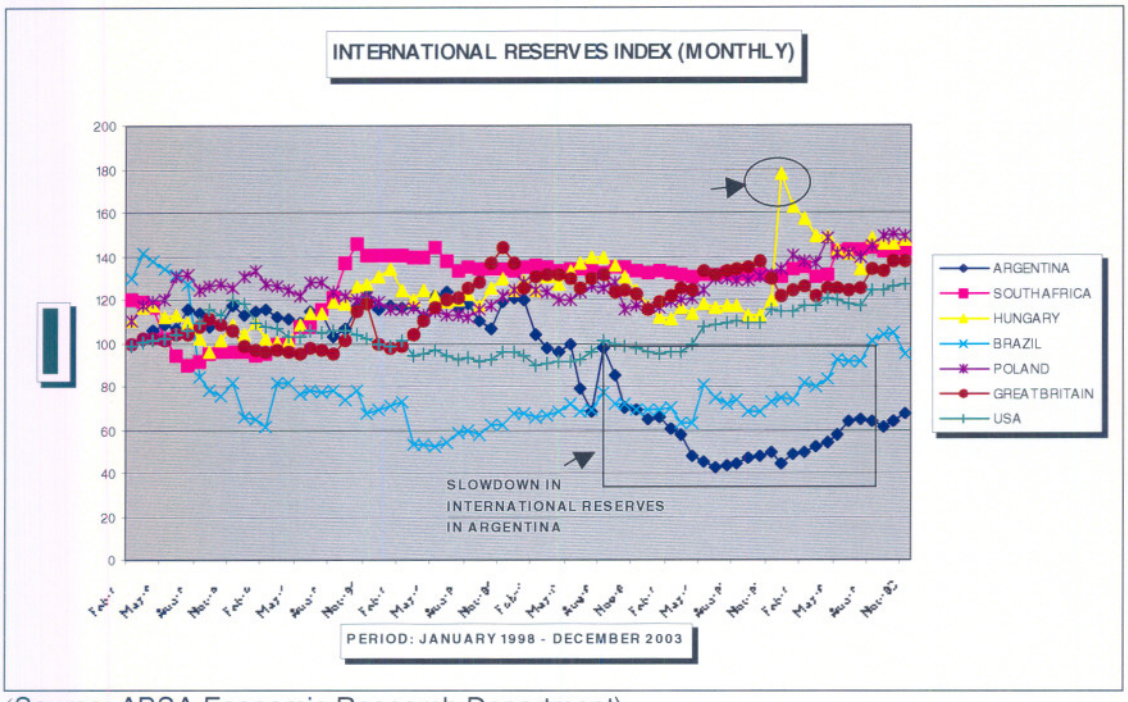
- A downward trend can also be identified in Figure 5.15 for Hungary in the period May 1999 to 2003. A sharp decrease in interest rates in Hungary can be identified in January 2003, but no significant increase in interest rates can be identified during the Argentine currency crisis.
- Interest rates in Great Britain remained stable during the period of the Argentine currency crisis, as illustrated in Figure 5.16.
- An upward trend in interest rates can be observed in Figure 5.17 in the Euro zone, starting in December 1999, sloping slightly downwards from the beginning of 2001.
- In Figure 5.18 it is apparent that interest rates in Hong Kong were sloping downwards from the end of 2000 to the end of 2003.
- A sharp jump in interest rates can be observed in Figure 5.19 for Argentina during the crisis period.

From the above observations it is apparent that emerging market countries, and especially those emerging markets in the southern hemisphere, were more affected by speculative attacks on interest rates than developed market countries.

5.2.1.4 International reserves

An index of international reserves was constructed for the period January 1998 to December 2003 for Argentina, South Africa, Hungary, Brazil, Poland, Great Britain and the United States of America. This index was constructed with reference to these countries' international reserves, starting at a single point in January 1998 equal to a hundred basis points, and tracing the diversity through the period to December 2003.

Figure 5.20 International reserves index (monthly data)



(Source: ABSA Economic Research Department).

As previously mentioned, Plata and Schrooten (2003) are of the opinion that a currency crisis is a situation in which a currency is under enormous pressure, leading to a sharp depreciation and/or a strong drop in international reserves. Argentina followed a fixed exchange rate system during the crisis period until January 2002, when it was abandoned and the peso depreciated dramatically. Under a fixed exchange system, monetary authorities are required to keep large stocks of foreign reserves in order to defend the fixed value of the currency (see section 2.3.1.3 in Chapter 2).

International reserves fell to $15 billion between August 2001 and November 2001 in Argentina. A slowdown in reserves can be identified in Figure 5.19 in Argentina during August 2001. Brazil, Hungary and Great Britain also show signs of a slowdown in international reserves during the crisis period in Argentina. A sharp increase in international reserves can be observed in Hungary at the beginning of 2003, after the crisis period in Argentina.

As mentioned in Chapter 2, active intervention under a managed floating exchange rate system in the foreign exchange market, results in changes in international reserves. Under a currency board exchange rate system, as in the instances of Argentina and Hong Kong, both the stock and flow of the monetary base must be fully backed by foreign reserves. Any changes in the monetary base must be matched by a corresponding change in reserves and the central bank must be passive in intervening (Boge, 2001).

In identifying speculative attacks on foreign exchange rates, interest rates and international reserves during the period of the Argentine currency crisis, large jumps in foreign exchange rates can be observed for Argentina, Brazil and South Africa, especially during the crisis period. Speculative attacks on these currencies affected interest rates and international reserves. From this observation it is evident that speculative attacks occurred on the countries and currencies mentioned. Countries operating with free-floating exchange rate regimes during the crisis period were more affected than those countries with fixed exchange rate systems. It is apparent that these speculative attacks tend to be regional, and occurred in emerging markets in the southern hemisphere. In addition to this observation, it is also evident that emerging market countries were more affected than developed countries during the period of the Argentine currency crisis.

In the following section, contagion will be measured and identified for the period of the Argentine currency crisis on a selection of emerging and developed countries and their currencies.

5.3 Defining and measuring contagion

The theoretical literature of the field considers a number of reasons for financial crises. Firstly, the theory of "monsoonal effects" suggests that crises appear to be contagious because the underlying macroeconomic causes are related. Secondly, financial crises may be transmitted between countries via "spill-overs". Monsoonal effects and spill-overs are examples of interdependence. Crises resulting from interdependence should be largely predictable using macroeconomic fundamentals. Finally, the theory of "pure contagion" holds that the market jumps from a good to a bad equilibrium. Jumps between equilibria are more highly correlated during crises times (Pasaran & Pick, 2003).

As mentioned in Chapter 3, Calvo and Reinhart (1996) distinguish between fundamentals-based contagion, which occurs when the infected country is linked to other countries via trade or finance, and "true" contagion, which is the kind that occurs when common shocks and all channels of potential interconnection are either not present or have been controlled. "True" contagion is often associated with herding behaviour on the part of investors.

Forbes and Rigobon (1999:5) define contagion as a significant increase in cross-market linkages after a shock. As discussed in Chapter 3, section 3.4.1, cross-market linkages can be measured by anything from the correlation in asset returns, to the probability of a speculative attack, to the transmission of shocks or volatility. Forbes and Rigobon (1999) hold that this definition implies that, if two markets are highly correlated after a shock, this does not necessary constitute contagion.

The empirical literature concerned with testing whether contagion exists uses the same definition of contagion as specified by Forbes and Rigobon (1999). The empirical literature identifies four different approaches used to measure the transmission of shocks and test for contagion: analysis of cross-market correlation coefficients, GARCH frameworks, co-integration and probability models. These four approaches will subsequently be reviewed.

a) Analysis of cross-market correlation coefficient

Tests based on cross-market correlation coefficients are the most straightforward approach. These tests measure the correlation in returns between two markets during a stable period as well as a significant increase in this correlation coefficient after a shock. A significant increase in the correlation coefficient suggests that the transmission mechanism between two markets or countries has increased after the shock and contagion occurred (Calvo & Reinhart, 1995).

Cross-market correlation analysis uses the framework to test for contagion in stock indices, currency prices, interest rate and international reserves. The empirical analysis in this chapter is based on the analysis of cross-market correlation coefficient in measuring contagion.

b) GARCH frameworks

The second approach used in testing for contagion is based on ARCH or GARCH frameworks to estimate the variance–covariance transmission mechanism across countries. This approach examines whether conditional variances of financial variables are related to each other among markets in different countries during the crisis. The GARCH model measures the spill-over in volatility – cross-market movements in the second movement of asset prices (Collins & Biekpe, 2003).

c) Co-integration

Co-integration is the third approach used in testing for contagion and focuses on changes in the long-run relationship between markets instead of any short-run changes after a shock. This approach uses the same basic procedures as the GARCH framework, but instead of the variance-covariance matrix, it tests for changes in the co-integration vector between stock markets. If the tests show that the co-integrating relationship has increased over time, this could constitute a permanent shift in cross-market linkages instead of contagion. This approach is not an accurate test for contagion, since by focusing on such long time periods; this set of tests could miss brief periods of contagion.

d) Probability models

The fourth approach used to test for contagion uses simplified assumptions and exogenous events to identify a model, and directly measures changes in the propagation mechanism. In a study conducted on the impact of daily news (exogenous events) in one country's stock market on other countries' markets during the Asian crisis in 1997/1998, Baig and Goldfajn (1998) found that a substantial proportion of a country's news impacts on neighbouring economies. Kamisky and Reinhart (1998) estimated the conditional probability that a crisis will occur in a given country and found that this probability increases when more crises are occurring in other countries (especially in the same region).

Dungey and Zhumabekova (2001) concur that a popular and straightforward test for the presence of contagion in financial asset returns has been to examine changes in the correlations of those returns between "crisis" and "non-crisis" periods. A statically significant change in the correlation is interpreted as evidence of contagion. This approach has been applied in the equity market data.

There is no exact date for the beginning of the Argentine currency crisis. In January 2002, the Argentine currency board came to an end and the Argentine peso depreciated dramatically. This study focuses specifically on identifying contagion by constructing matrix models to measure correlations in the stock market and exchange market on the selected countries and their currencies. A measurement will be performed in this section on how correlations among stock markets and foreign exchange markets changed during the crisis. According to Rzepkowski (2003), the historical correlation between two exchange rates observed in a quiet period should increase significantly during the crisis period if contagion is present. Substantial increases in the correlations after the onset of the crisis are consistent with contagion effects. This study makes use of correlation on stock indices and foreign exchange rates to identify contagion in 6 month-periods.

5.3.1 Contagion in selected emerging and developed market countries: period 1998 – 2003

5.3.1.1 Data

The following data was used in the analysis:

- The sample covers the period from 1 November 1999 to 30 September 2003. Daily dollar denominated returns data on stock indices was supplied by Morgan Stanley Capital International (MSCI) for Argentina, South Africa, Hungary, Hong Kong, Brazil, Poland and the United States of America.
- Monthly and daily foreign exchange rates for South Africa, Argentina, Brazil, Hungary, Hong Kong, Poland, Great Britain and the Euro zone during the period 1 January 1998 to 31 December 2003, was supplied by ABSA Bank Economic Research Department. Identifying contagion is calculated for the period October 1998 to September 2003 regarding correlations in foreign exchange rates.

In order to identify contagion of emerging and developed markets, calculations were conducted to measure correlations between growth rates of stock indices and daily percentage changes of foreign exchange rates on a selection of emerging and developed countries and currencies during a specific period.

Contagion is measured on the following correlations:

- <0.25 - low correlation
- Between 0.25 and 0.75 – average/moderate correlation
- Above 0.75 – high correlation
- Above 0.90 – very high correlation
- 1 is correlated.

In order to determine whether the changes in correlations between stock indices and currencies of selected emerging and developed economies are statistically significant from one period to another, this study makes use of Fishers z transformation in order to perform a one-sided hypothesis testing.

The comparison of the two correlation coefficients that are used is the following:

$H_0 : p_1 = p_2$
$H_a : p_1 \neq p_2$

The test statistic makes use of the Fisher z transformation for each of the two sample correlation coefficient. Let z'_1 and z'_2 denote the Fisher z values for r_1 and r_2. The test statistic then is:

$$z^* = \frac{z'_1 - z'_2}{\sqrt{\frac{1}{n_1 - 3} + \frac{1}{n_2 - 3}}}$$

Fisher z values for r_1 and r_2 is calculated as followed:

$$z'_1 = \frac{1}{2}\ln\left(\frac{1+r_1}{1-r_1}\right) \quad \text{and} \quad z'_2 = \frac{1}{2}\ln\left(\frac{1+r_2}{1-r_2}\right)$$

If $|z^*| \leq z(1-\alpha/2), concludeH_0$

If $|z^*| \geq z(1-\alpha/2), concludeH_a$

If $z^* > 1.96$, it indicates that a significant decrease in the correlation coefficient are present. If $z^* < 1.96$, it indicates that a significant increase in the correlation coefficient are present (Neter *et al.*, 1996).

The following abbreviations will be used in the matrix models used to identify contagion:

Table 5.1 Abbreviations of countries and currencies in the sample

A	*Argentina*	**ARS**	*Argentine peso*
SA	*South Africa*	**ZAR**	*South African rand*
H	*Hungary*	**HUF**	*Hungarian forint*
B	*Brazil*	**BRL**	*Brazilian real*
P	*Poland*	**PLN**	*Polish zloty*
USA	*United States of America*	**USD**	*US dollar*
		EUR	*Euro*
HK	*Hong Kong*	**GBP**	*British pound*
		HKD	*Hong Kong*

5.3.1.2 Stock indices

Daily data on the price index in US dollar terms was used to calculate correlations on asset prices for the purpose of identifying contagion. Eight periods between November 1999 and September 2003 were identified and are subsequently analysed and reviewed.

Appendix 1.1 contains the Fisher transformation tables for stock indices in six month periods starting in November 1999. The significant changes in correlation is indicated by a star (*) in the tables below. Note that although some of the correlation coefficients are still low, the increase or decrease in correlation can be significant, and this is what is determined by the Fisher transformation (indicated by the star).

Table 5.2 Stock indices correlation coefficients for period: 1 November 1999 – 31 March 2000.

	A	SA	H	B	P	US	HK
A	1						
SA	0.136748	1					
H	0.22337	0.265543	1				
B	0.479272	0.408405	0.287822	1			
P	0.096891	0.358343	0.358275	0.23876	1		
US	0.327392	0.220243	0.093207	0.493976	0.089028	1	
HK	0.036064	0.239894	0.350248	0.163801	0.295654	-0.08341	1

* *Statistically significant change in correlation on a 95 per cent confidence level.*

Table 5.3 Stock indices correlation coefficients for period: 1 April 2000 – September 2000

	A	SA	H	B	P	US	HK
A	1						
SA	0.245269	1					
H	0.321326	*0.48703	1				
B	*0.628269	0.32512	0.248822	1			
P	0.175063	0.505648	0.340205	0.192731	1		
US	*0.610428	0.184633	0.060618	0.626133	0.00083	1	
HK	0.075592	*0.52323	0.228949	0.252405	0.468134	0.021628	1

* *Statistically significant change in correlation on a 95 per cent confidence level.*

Table 5.4 Stock indices correlation coefficients for period: 1 October 2000 – March 2001

	A	SA	H	B	P	US	HK
A	1						
SA	0.230659	1					
H	0.392088	0.560424	1				
B	0.637633	0.231039	0.351054	1			
P	0.115042	0.373581	0.421966	0.204958	1		
US	0.475443	*0.376109	*0.381272	*0.443977	*0.295312	1	
HK	0.114486	0.426127	0.36787	0.138324	0.499601	0.150515	1

** Statistically significant change in correlation on a 95 per cent confidence level.*

Table 5.5 Stock indices correlation coefficients for period: 1 April 2001 – 30 September 2001

	A	SA	H	B	P	US	HK
A	1						
SA	0.146224	1					
H	*0.093143	0.546858	1				
B	*0.435833	0.208487	*0.05954	1			
P	0.012644	0.416339	0.385872	0.138701	1		
US	*0.240115	0.459047	0.30951	*0.231773	0.241631	1	
HK	-0.08716	0.403397	0.294329	*-0.10205	*0.19274	0.306202	1

** Statistically significant change in correlation on a 95 per cent confidence level.*

Table 5.6 Stock indices correlation coefficients for period: 1 October 2001 – 31 March 2002

	A	SA	H	B	P	US	HK
A	1						
SA	*-0.16446	1					
H	*-0.11519	*0.27374	1				
B	*0.053741	*0.126112	0.043814	1			
P	-0.06219	0.217238	0.45031	0.258562	1		
US	0.040931	*0.148137	0.258618	0.400737	0.283876	1	
HK	-0.07661	*0.175839	0.254916	*0.175632	0.305158	0.18744	1

** Statistically significant change in correlation on a 95 per cent confidence level.*

Table 5.7 Stock indices correlation coefficients for period: 1 April 2002 – September 2002

	A	SA	H	B	P	US	HK
A	1						
SA	*0.175177	1					
H	0.08078	0.408413	1				
B	0.079101	0.208344	0.14105	1			
P	0.016799	0.315254	0.447935	0.115359	1		
US	-0.0171	0.106982	0.117892	*0.212	*0.057885	1	
HK	*0.179682	0.192751	0.238794	0.0716	0.127139	0.067035	1

* *Statistically significant change in correlation on a 95 per cent confidence level.*

Table 5.8 Stock indices correlation coefficients for period: 1 October 2002 – March 2003

	A	SA	H	B	P	US	HK
A	1						
SA	0.086238	1					
H	0.039828	0.289903	1				
B	0.229606	0.189455	0.061402	1			
P	0.12232	0.280671	0.562543	0.131976	1		
US	*0.253614	0.231959	0.179062	0.365072	0.208877	1	
HK	0.110835	0.170288	0.242871	0.130072	0.270269	0.241236	1

* *Statistically significant change in correlation on a 95 per cent confidence level.*

Table 5.9 Stock indices correlation coefficients for period: 1 April 2003 – 30 September 2003

	A	SA	H	B	P	US	HK
A	1						
SA	-0.08264	1					
H	-0.0014	0.30769	1				
B	0.161659	0.214078	-0.01598	1			
P	-0.00814	0.236639	*0.12597	0.224672	1		
US	*-0.01494	0.207505	*-0.12925	0.33023	0.170567	1	
HK	0.064839	0.196073	0.163815	0.128852	0.23558	0.098868	1

* *Statistically significant change in correlation on a 95 per cent confidence level.*

The correlation coefficient of stock indices for Argentina, South Africa, Hungary, Brazil, Poland, the USA and Hong Kong is calculated by means of correlations between the percentage changes of daily dollar denominated returns data on stock indices for the period November 1999 to December 2003. These correlation coefficients were constructed into matrix models for eight different periods. When analysing the above matrix models used to identify contagion, the following can be concluded:

- During the period from 1 November 1999 to 31 March 2000, a high correlation coefficient was present between Argentina's stock exchange prices and those of the USA. Towards the end of 1999, there was a slowdown in growth in Argentina, and the country experienced a recession. At the beginning of 2000, external debt increased in Argentina.
- During the period from 1 April to September 2000, a statistically significant increase in the correlation coefficient can be observed between South Africa's stock exchange prices and those of Hungary and Hong Kong. A statistically significant increase in the correlation coefficient can also be identified during this period between Argentina and the USA. As illustrated in Table 5.3, the correlation coefficient increased between Argentina and Brazil, as well as between Argentina and the USA. An increased correlation between Brazil and the USA can also be observed during this period. Furthermore, an increase in the correlation coefficient was present for Hong Kong and Poland during this period.
- From 1 October 2000 to March 2001, it is clear that a statistically significant increase in the correlation coefficient can be identified between the USA and Hungary, as well as a correlation coefficient between the USA and Poland. A statistically significant decrease can be observed between Brazil and the USA. Argentina experienced a liquidity crisis in November 2000, which led to an increase of 4.49 per cent in their central bank lending rates. No statistically significant increase or decrease can be identified between Argentina and any other country in the sample for this period.

- During the period April 2001 to 20 September 2001, the first signs of a currency and financial crisis can be observed in Argentina when the current account deficit decreased to 2 per cent. During this period, Argentina still functioned under a fixed exchange rate regime. As mentioned in Chapter 4, the aim of a currency board is to bring about price stability – in the case of Argentina, from the USA. During this period, a statistically significant increase in the correlation coefficient of the stock exchange prices can be identified for Argentina with Hungary, Brazil and the USA. The first signs of contagion can be identified due to the problems in Argentina that spread to emerging markets in and beyond the region. A statistically significant increase in the correlation coefficient of stock exchange prices between Hungary and Brazil, as well as between Hong Kong and Poland, can be identified. The highest correlation coefficient in this period is noticeable between Argentina and Brazil, and between South Africa, and Hungary and the USA.
- The peak of the Argentine currency crisis occurred during the period from October 2001 to March 2002. A statistically significant increase in the correlation coefficient in stock exchange prices can be observed between Argentina and South Africa and Brazil. According to this calculation, it is evident that the situation in Argentina was spreading to emerging market economics, including South Africa and Brazil, through the phenomenon called contagion. A statistically significant decrease in the correlation coefficient of stock exchange prices can be observed between Brazil and Hong Kong. No contagion between these two countries was present during the Argentine currency crisis period. A statistically significant increase in the correlation coefficient of stock exchange prices between South Africa with Hungary, the USA and Hong Kong can be identified. Contagion from problems in Argentina was spreading to other emerging market countries.

- During the period from 1 April 2002 to March 2003, after the Argentine currency crisis, it is evident that a statistically significant decrease in the correlation coefficient of stock exchange prices between Argentina and South Africa, as well as between Argentina and the USA and Hong Kong, can be identified.

From the above observations, it is evident that a statistically significant increase in the correlation coefficient was present, especially during the period of the Argentine currency crisis. Contagion was therefore present during the crisis period in the countries mentioned. In the following section, contagion will be measured with regard to foreign exchange rates, using the same method as applied to identifying contagion of stock indices.

5.3.1.3 Foreign exchange rate contagion effect

Daily data concerning foreign exchange rates was used for calculating correlation coefficients to identify contagion. Each currency in the sample is measured against the US dollar. Ten periods can be identified between October 1998 and September 2003, and these will subsequently be reviewed.

Appendix 1.2 contains the Fisher transformation tables for daily foreign exchange rates on six month periods starting on October 1998. Again the significant changes in correlation are indicated by a star (*) in the tables below.

Table 5.10 Foreign exchange rate correlation coefficients in period: 1 October 1998 – 31 March 1999

	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ARS	1							
ZAR	-0.021217	1						
HUF	0.167341	0.223818	1					
BRL	-0.035864	-0.022538	0.073439	1				
PLN	0.194015	0.28834	0.525628	-0.03124	1			
GBP	-0.116578	0.046298	-0.092003	0.083254	-0.01913	1		
EUR	-0.202055	0.075583	-0.342757	-0.021697	-0.20829	0.453854	1	
HKD	0.065487	0.090859	0.047882	-0.059348	0.060523	-0.04704	0.067295	1

** Statistically significant change in correlation on a 95 per cent confidence level.*

Table 5.11 Foreign exchange rate correlation coefficients in period: 1 April 1999 – 30 September 1999

	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ARS	1							
ZAR	-0.102184	1						
HUF	0.033408	*-0.009817	1					
BRL	-0.103244	-0.041632	-0.091814	1				
PLN	*-0.051159	0.132257	0.453998	0.019221	1			
GBP	0.030223	-0.055392	-0.265082	-0.024801	-0.08601	1		
EUR	-0.04049	-0.029204	*-0.59884	0.166634	-0.13945	0.488437	1	
HKD	0.001767	-0.082892	-0.054976	0.040732	-0.03437	0.048297	0.167347	1

** Statistically significant change in correlation on a 95 per cent confidence level.*

Table 5.12 Foreign exchange rate correlation coefficients in period: 1 October 1999 – 31 March 2000

	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ARS	1							
ZAR	-0.033689	1						
HUF	0.062638	0.151002	1					
BRL	0.031497	0.105767	-0.101977	1				
PLN	0.009723	0.241942	0.473901	0.020586	1			
GBP	-0.091769	-0.008017	*-0.58617	0.116458	-0.22198	1		
EUR	-0.067798	-0.092579	*-0.914849	0.146833	*-0.46056	0.609366	1	
HKD	0.049279	-0.094172	-0.05491	0.105526	*0.200387	0.0898	0.02706	1

** Statistically significant change in correlation on a 95 per cent confidence level.*

Table 5.13 Foreign exchange rate correlation coefficients in period: 1 April 2000 – 30 September 2000

	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ARS	1							
ZAR	*-0.145701	1						
HUF	*-0.196092	0.300605	1					
BRL	-0.006567	0.097759	*0.033659	1				
PLN	*0.173882	*0.226576	*0.188139	0.259917	1			
GBP	0.030534	-0.216355	*-0.448284	-0.025171	*-0.17307	1		
EUR	0.203588	-0.27411	*-0.970008	-0.068523	*-0.16247	*0.477363	1	
HKD	0.001326	-0.009212	-0.045817	-0.062349	0.14596	0.098667	0.042733	1

* *Statistically significant change in correlation on a 95 per cent confidence level.*

Table 5.14 Foreign exchange rate correlation coefficients in period: 1 October 2000 – 31 March 2001

	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ARS	1							
ZAR	-0.056793	1						
HUF	-0.043981	*0.347471	1					
BRL	0.120095	0.142465	0.134828	1				
PLN	-0.046631	*0.338922	*0.575435	*0.227623	1			
GBP	*-0.087497	-0.279588	*-0.579665	-0.209174	*-0.38221	1		
EUR	0.033587	*-0.347336	*-0.981783	-0.151744	*-0.58928	*0.601368	1	
HKD	-0.045948	0.109194	0.10777	0.053797	0.120496	-0.163495	-0.110604	1

* *Statistically significant change in correlation on a 95 per cent confidence level.*

Table 5.15 Foreign exchange rate correlation coefficients in period: 1 April 2001 – 30 September 2001

	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ARS	1							
ZAR	-0.054282	1						
HUF	-0.037867	0.212725	1					
BRL	0.094946	0.227476	*0.057594	1				
PLN	0.060559	*0.188262	*0.303698	*0.073576	1			
GBP	0.021837	-0.117227	*-0.461449	0.072108	*0.007103	1		
EUR	0.067321	*-0.166266	*-0.697092	0.086326	0.017655	*0.632006	1	
HKD	0.06034	0.048483	0.092923	-0.047748	0.004162	-0.085149	-0.107309	1

* *Statistically significant change in correlation on a 95 per cent confidence level.*

Table 5.16 Foreign exchange rate correlation coefficients in period: 1 October 2001 – 31 March 2002

	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ARS	1							
ZAR	0.015255	1						
HUF	-0.026776	*-0.044593	1					
BRL	0.101567	*-0.172021	-0.077485	1				
PLN	0.031604	0.00491	0.325724	-0.002947	1			
GBP	0.023052	0.024535	-0.547459	0.119376	*-0.24045	1		
EUR	0.028611	*0.189244	*-0.789737	0.227376	*-0.18788	0.603741	1	
HKD	0.133605	0.036592	*-0.188823	-0.000893	-0.13582	0.049191	*0.129848	1

** Statistically significant change in correlation on a 95 per cent confidence level.*

Table 5.17 Foreign exchange rate correlation coefficients in period: 1 April 2002 – 30 September 2002

	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ARS	1							
ZAR	-0.041355	1						
HUF	-0.080304	0.142342	1					
BRL	0.077289	*0.185311	*0.144138	1				
PLN	0.020987	*0.245224	0.47983	0.136688	1			
GBP	0.040271	-0.119793	*-0.699146	-0.058577	-0.31813	1		
EUR	0.04493	*-0.18478	*-0.869966	*-0.092752	*-0.4343	*0.801685	1	
HKD	0.034711	-0.011582	0.015699	-0.111021	-0.00949	-0.107178	-0.009952	1

** Statistically significant change in correlation on a 95 per cent confidence level.*

Table 5.18 Foreign exchange rate correlation coefficients in period: 1 October 2002 – 31 March 2003

	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ARS	1							
ZAR	-0.026681	1						
HUF	-0.017332	0.187907	1					
BRL	-0.013555	*-0.134461	-0.053662	1				
PLN	-0.165542	0.166668	0.457259	0.021721	1			
GBP	0.067423	-0.115095	*-0.354488	0.000701	-0.36298	1		
EUR	0.136507	-0.20027	*-0.577525	0.042407	-0.36801	*0.649134	1	
HKD	0.056154	0.00327	-0.058889	0.071567	-0.20277	0.103645	0.051226	1

** Statistically significant change in correlation on a 95 per cent confidence level.*

Table 5.19 Foreign exchange rate correlation coefficients in period: 1 April 2003 – 30 September 2003

	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ARS	1							
ZAR	-0.019178	1						
HUF	-0.004605	0.269678	1					
BRL	0.101052	*0.088481	0.020915	1				
PLN	*0.055585	0.263927	*0.686493	0.13054	1			
GBP	-0.009531	-0.226841	-0.415933	-0.02187	-0.45334	1		
EUR	0.005863	-0.297113	-0.693091	-0.110937	*-0.57779	0.655281	1	
HKD	-0.054169	0.172792	0.039405	-0.012141	-0.09	*-0.122345	-0.095703	1

** Statistically significant change in correlation on a 95 per cent confidence level.*

The correlation coefficients between foreign exchange rates for Argentina, South Africa, Hungary, Brazil, Poland, Great Britain, the Euro zone and Hong Kong were calculated by means of the correlations of the percentage change in daily foreign exchange rates for the period October 1998 to September 2003. These correlation coefficients were constructed into matrix models, in ten periods of six months each. Analysing the matrix models regarding correlations between these currencies, the following can be concluded:

- During the period from April 1999 to March 2000, a statistically significant decrease in the correlation coefficient of foreign exchange rates can be identified for currencies in the European region.
- In the period between April 2000 and September 2000, a statistically significant increase in the correlation coefficients between the Argentine peso and the Polish zloty can be identified. Both these countries are classified as emerging market countries where both of them made used of some form of fixed exchange rate regime in this period. Poland moved from a fixed exchange rate system towards a floating exchange rate system in 2000. A statistically significant decrease in the correlation coefficient of foreign exchange rates can be observed between the Hungarian forint and the

Brazilian real, as well as between the euro and the Hungarian forint and the Polish zloty. A statistically significant increase in correlation coefficients can also be identified between the Hungarian forint with the Polish zloty and the British pound.

- From October 2000 to March 2001, a statistically significant decrease in the correlation coefficient in foreign exchange rates can be identified between the Argentine peso and the British pound, as well as between the euro and the rand, the Hungarian forint and the Polish zloty.
- As mentioned in Chapter 3, Rzepkowski (2003) argues that historical correlation between two exchange rates observed in a quiet period should increase significantly during the crisis period if contagion is present. During the period between April 2001 and September 2001, a statistically significant increase in foreign exchange rates can be identified between the South African rand and the Polish zloty. Both these currencies make use of floating exchange rate systems. A statistically significant increase can also be identified between the Polish zloty with the Brazilian real and the Hungarian forint. All three of these currencies are classified as currencies from emerging market countries. Developed market currencies that show signs of a statistically significant increase in the correlation coefficient in this period include the euro and the British pound. Thus, investors could distinguish between emerging market economies and developed market economies, especially during the time of the Argentine currency crisis.
- In the peak period of the Argentine currency crisis, from October 2001 to March 2002, a statistically significant decrease in the correlation coefficients of foreign exchange rates can be observed between the South African rand and the Hungarian forint and Brazilian real, as well as between the Hong Kong dollar and the Hungarian forint, and the Polish zloty and the British Pound. In January 2002, as previously mentioned, the Argentine fixed exchange rate was abandoned and the peso was devaluated. According to the observation on correlations between foreign exchange rates, it is apparent

that no statistically significant increase in the correlation coefficients between the Argentine peso and the currencies in the sample can be identified.

After having measured and identified contagion on stock indices and foreign exchange rates during the period during the Argentine currency crisis, it has become apparent that identify contagion was more accurate with regard to stock indices than foreign exchange rates. Countries that were influenced by contagion from Argentina included South Africa and Brazil. Both of these countries are classified as emerging market countries that operate with free-floating exchange rate systems, and both make use of a monetary framework that includes inflation targeting. As mentioned in Chapter 2, the advantages of a free-floating exchange rate system include that changes in the nominal exchange rate should adjust to foreign and domestic shocks, and high international reserves are not required. Contagion spreading from Argentina to Brazil and South Africa was caused by trade links and neighbourhood effects. Hernadez and Valdes (2001:207) suggest that neighbourhood effects reflect institutional practices in the international financial system, where institutional investors view all countries from the same region as equal, without noticing the difference in their fundamentals (see section 3.4.2 , in Chapter 3, on contagion channels).

Kodres and Pritsker (2001:23) refer to conclusions regarding contagion, and mention the following:

- Contagion can occur between countries whose long-run asset values are driven by different macroeconomic fundamentals, provided they are linked by sharing common macroeconomic fundamentals with a third country or countries.
- Differences in information asymmetrically between developed and emerging markets may explain why emerging markets were hit hard by contagion while developed markets remained relatively unscathed.

- In some circumstances, higher quality markets (in the sense of less information asymmetry and less country-specific risk) in developed countries may worsen the contagion among emerging markets.
- More information asymmetry within a country's asset market increases the magnitude of that market's price response to contagion from abroad. The changes in exchange rate regimes from fixed to floating experienced in emerging markets during financial crises, increase parameters that are linked to increased vulnerability to financial market contagion.
- Currency crises cannot be explained solely by looking at economic fundamentals and regional contagion effects as well as speculative behaviour of investors may also be important determinants

While identifying speculative attacks and contagion during the Argentine currency crisis, this study reiterates the argument that, in order to prevent the recurrence of a financial and currency crisis, most emerging market countries should adopt either a free-floating or a super-fixed exchange rate regime.

Bubula and Otker (2003) propound that fixed exchange rate regimes are more susceptible to currency crises than floating exchange rate regimes. Some countries that do not implement sound macroeconomic policies will be forced to adopt more flexible exchange rate regimes. The upturn in capital flows to emerging market economies has put substantial upward pressure on exchange rates and has complicated the conduct of monetary policy under fixed exchange rate regimes. Eichengreen (1999) suggests that countries that have liberalised capital flows should either adopt more flexible exchange rate regimes, or generally, are more at risk of being forced to abandon fixed exchange rate regimes.

The emerging markets' experiences concerning currency crises over the last decade highlight the risk of opening the capital account before adopting a flexible exchange rate. Many countries, including Mexico, Brazil and Argentina, were forced off fixed exchange regimes after sudden reversals of capital flows under open capital accounts. Other countries, including Poland, faced heavy capital inflows and upward pressure on fixed exchange rates, and had to allow exchange rate flexibility to avoid overheating the economy. Thus, even under favourable economic conditions, opening the capital account before introducing exchange rate flexibility can destabilise domestic liquidity conditions, create macroeconomic imbalances and precipitate speculative attacks (Duttagupta & Fernandez, 2004).

Changing from a fixed to a floating exchange rate regime creates the need for a new nominal anchor and monetary policy framework, both of which involve lengthy processes. Preparations for an alternative nominal anchor such as inflation targeting includes reforms in the central bank law, improving monetary policy transparency and communication to the public (Duttagupta & Fernandez, 2004).

Under any exit strategy, moving from fixed to floating or alternative exchange rate systems, it needs to be stated that each step should ensure two-way risk in exchange rate movement. For example, when a band is used, the band should be wide enough to ensure that the exchange rate moves in both directions around the central parity and creates the perception of exchange rate risk (Duttagupta & Fernandez, 2004).

As mentioned in Chapter 2, the choice between a fixed and floating exchange rate regime depends in part on the characteristics of the economy, and in part on its inflation history. The choice of a fixed exchange rate system makes sense for countries with a long history of monetary instability and for a country closely integrated in both its capital and current account transactions with another or a group of economies (Fischer, 2001).

5.4 Conclusion

Recent financial and currency crises in the 1990s, including the Argentine currency crisis, have affected many emerging and developed markets through contagion and speculative attacks on their currencies. The main aim of this chapter was to identify speculative attacks and contagion in Argentina, Brazil, South Africa, Poland, Hungary, Hong Kong, the United States of America, Great Britain and the Euro zone in the period 1998 to 2003, and more especially during the period of the Argentine currency crisis.

Under section 5.2, speculative attacks were identified on foreign exchange rates, interest rates and international reserves on the countries in the sample. Two methods were used to identify speculative attacks on foreign exchange rates, namely an analysis of currency movements on monthly foreign exchange data, and the construction of an index of currencies that summarises changes of foreign exchange rates in the period January 1998 to December 2003. Identifying speculative attacks on interest rates was performed by constructing an index of central bank lending rates, and by means of plotting the interbank overnight deposit rates for the countries in the sample on a graph in order to identify large jumps in interest rates. An index was constructed of international reserves, with reference to international reserves for a selection of the countries in the sample, starting at a single point in January 1998 equal to a hundred basis points, tracing the diversity through the period to December 2003 to identify speculative attacks.

The empirical literature identifies four different approaches to measure the transmission of shocks and to test for contagion, namely: analysis of cross-market correlation coefficient, GARCH frameworks, co-integration and probability models. Under section 5.3, calculations were performed to measure correlations on growth rates of stock indices and foreign exchange rates by means of the construction of matrix models in order to identify contagion in the period 1998 to 2003 on emerging and developed markets. In order to determine whether the correlations between stock indices and currencies of selected emerging and developed economies were statistically significant, this study made use of Fishers z transformation in order to conduct a one-sided hypothesis testing. Correlations between two exchange rates observed in a quiet period increased significantly during periods of crises.

From these observations it has become apparent that currencies with free-floating exchange rate regimes were more affected by the currency crisis in Argentina, than those countries following fixed exchange rate regimes. Countries in the southern hemisphere were also more affected by the Argentine currency crisis than those in other regions and continents. Currency crises cannot be explained solely by looking at economic fundamentals; regional contagion effects as well as speculative attacks should also be taken into consideration. Changing from fixed to floating exchange rate regimes includes the need for a new monetary policy framework and nominal anchor.

Chapter 6 provides a conclusion to this study, which includes recommendations and areas for further research.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Introduction and concluding statements

During the past few years, many countries have suffered severe currency and financial crises, with a staggering toll on their economies, particularly in emerging markets. The financial and currency crises of emerging markets during the second half of the 1990s have changed many economists' views with regard to exchange rate policies. Modern literature on exchange rate regimes for different countries emphasises the existence of fixed and floating exchange rate regimes. The appropriate exchange rate regime for each country depends on the specific circumstances of the country, which includes the classic optimum currency area.

The 1990s will be remembered in economic history as a decade of currency crises, including the Mexican crisis (1994), the Asian crisis (1997/1998), the crises in Russia and Brazil (1999) and, more recently, the Argentine currency crisis (2001/2002). Traditional models suggest that currency crises are caused by deteriorating economic fundamentals, while more recent models link crises to self-fulfilling prophecies and contagion effects.

This study focused on the Argentine currency crisis and aimed to shed light on the popularly held view that emerging market countries should either adopt a super-fixed or free-floating exchange rate system.

The first objective of this study was to determine the importance of an international monetary system; in other words, whether a country should follow a fixed or floating exchange rate regime. One of the first things that became apparent regarding the importance of the international monetary system (IMS) is that especially during periods of crises, most people become aware of the existence and significance of the international monetary system. The international monetary system plays an important role in the maximisation of total world output and employment, and must have the ability to offer safeguards against the occurrence of crises of confidence.

Recent currency crises have affected countries with fixed and flexible exchange rate regimes. It is evident that a country's exchange rate system provides an important foundation for the implementation of other economic policy measures. The current fashionable view suggests that emerging countries should freely float or adopt a super-fixed exchange rate regime. Different exchange rate mechanisms are employed by countries to cater for adjustments in their balance of payments. Adjustments can be effected by means of fixed exchange rate regimes or free-floating exchange rate regimes with no intervention in the market by the central bank, which entail adjustment taking place primarily through changes in exchange rates which affect the prices of import and exports.

Floating exchange rate arrangements are not confined to major industrial countries; many developing and emerging markets also function with floating exchange rate systems, including South Africa. Concerning the investigation regarding the choice of fixed or floating exchange rates for emerging markets, it was apparent that when a country conducts the bulk of its foreign trade with a single country, the preferred policy could well be to fix its exchange rate to the

currency of the particular trading partner. On the other hand, a country with a diversified foreign trade pattern should perhaps be more inclined to let its exchange rate float against other currencies. It has also become evident that countries suffering from high inflation should consider fixing their exchange rate, as in the case of Argentina. However, fixed exchange rate regimes may be vulnerable to speculative attacks, which can lead to damaging consequences for monetary stability in the country's economy. The choice of an exchange rate regime is not limited to simply choosing between fixed and floating exchange rate systems. There are a spectrum of options and a variety of alternative exchange rate regimes, which including free and managing floating exchange rate regimes, floating with a band, sliding bands, crawling bands, crawling pegs, fix-but-adjustable exchange rate systems, currency boards and full dollarisation.

The second objective this study set out to achieve was to determine the causes of a currency crisis, speculative attacks and contagion. A loss of foreign reserves, capital outflow and the sudden depreciation of the exchange rate were some factors observed in unfolding of crises. Signals from some variables are better than other in predicting a currency crisis. A speculative attack on a currency can also develop as a consequence of a predictable future deterioration in economic fundamentals. Macro-economic volatility (external and internal), exchange rate regimes, contagion across markets and countries, and a lack of market liquidity are some of the factors that have contributed in a significant way to currency crisis over the past few decades. However, currency crises can be predictable as well as unpredictable. A possibility in preventing a currency crisis would be for countries to follow sound and consistent economic policies, so that they are not prone to attack by speculators.

During recent years, both developed and developing countries have experienced speculative attacks on their currencies. Two types of models, the so called "first generation" and "second generation" models, dominate the existing literature on the determinants of speculative attacks and devaluations. These studies construct indices of speculative pressure to identify attacks on emerging market and developed market countries' currencies and are weighted averages of reserves, exchange rates and interest rate changes.

A prominent feature of financial crises in emerging markets during recent years was the spread of financial difficulties from one economy to others in the same region and beyond, in a process that has come to be referred to as contagion. In accomplishing the second objective of this study, it is suggested that currency crises cannot be explained solely by looking at economic fundamentals, and that contagion effects as well as speculative behaviour of investors may be important in determining currency crises.

The main objective of this study was to evaluate the impact of a currency crisis, and specifically the Argentine currency crisis, on selected emerging markets, including South Africa. The collapse of the Argentine experience with a currency board in 2002, has greatly affected the debate on fixed versus floating exchange rate regimes for emerging market countries.

In the case of the Argentine currency crisis, the existence of a currency board did not force politicians to maintain a prudent fiscal policy and did not result in a lasting low-inflation equilibrium. It was also argued that massive capital flows plays a dominant factor in emerging market crises. The choice of an exchange rate regime needs to take into consideration not only current account issues, but also the greatly increased mobility of capital and international integration of financial markets.

The second last objective that this study set out to achieve was to determine the link between emerging markets and developing markets in a currency crisis. A number of recent financial and currency crises have been accompanied by episodes of financial market contagion, in which many countries have experienced increases in the volatility and co-movement of their financial asset markets. In identifying speculative attacks and contagion, an empirical analysis was performed regarding emerging markets and developed market countries and it was evident that emerging markets were hit harder by currency crises in recent years.

The last objective of this study was to analyse the role of contagion and speculative attacks during periods of currency crises. In order to achieve this objective, an empirical analysis was performed, which aimed to identify speculative attacks and contagion during periods of currency crisis, specifically regarding the Argentine currency crisis.

The methods used to analyse and identify speculative attacks included the construction of a monthly index for foreign exchange rates, interest rates and international reserves on selected emerging market and developed market countries.

The second method used to identify speculative attacks included plotting foreign exchange rates and interest rates on graphs and picking up large jumps. It has been concluded that a speculative attack can be associated with a depreciation of the exchange rate and/or an increase in interest rates in the specific country. While identifying speculative attacks on foreign exchange rates, interest rates

and international reserves during the period of the Argentine currency crisis, it became apparent that large jumps in foreign exchange rates could be observed for Argentina, Brazil and South Africa, especially during the period of the crisis. Countries that operated with free-floating exchange rate regimes during the Argentine currency crisis were more affected than those operating with fixed exchange rate regimes. It was also apparent that these speculative attacks intended to be regional, and occurred in emerging markets in the southern hemisphere.

In identifying contagion of emerging and developed markets, calculations were performed to measure correlations in growth rates of stock indices and foreign exchange rates. This study made use of Fishers z transformation in order to perform a one-sided hypothesis testing to determine whether the correlations between stock indices and currencies of selected emerging and developed economies were statistically significant. This test indicated that correlations increase between markets if contagion occurs. Countries that were affected by contagion from Argentina included Brazil and South Africa. Both these countries are classified as emerging market countries that operated with free-floating exchange rate regimes during the crisis period in Argentina. It has been concluded that contagion spreading from Argentina to Brazil and South Africa was more regional and was caused by trade links and neighbourhood effects.

The empirical findings indicated that lending booms, real exchange rate misalignment and reserve inadequacy increase the probability of a speculative attack on a currency. The results also provided support for the idea that currency crises could be contagious. A super-fixed exchange rate regime (in the case Argentina with a currency board) is not on its own a solution to a country's macroeconomic problems.

6.2 Areas for further study

The following focus areas can contribute to further study of the impact of the Argentine currency crisis on selected emerging markets:

- Research should focus on why markets are so highly integrated during periods of relative stability, as well as during periods of crises.
- Crisis periods could be used as windows to help identify transmission mechanisms, instead of interpreted as periods which generate new types of transmission mechanisms.
- Empirical research can focus on why some countries are vulnerable during periods of crises.
- Research can be conducted on why many markets of such different sizes, structures and geographic locations generally show signs of contagion. Are these countries linked through trade and finance?

Economists and policymakers have been interested in forecasting crises for a long time. The GARCH and the ACH (autoregressive conditional hazard) model could be a powerful tool in predicting currency crises. The ACH model estimates the probability of an event that would happen in a given period of time. This can be used successfully for future research.

It remains an open question whether external factors (contagion) and/or domestic events (political factors) have influenced expectations of investors in an empirically measurable manner. Analysing a broader set of currencies would be a natural extension of this study.

Appendix 1.1

Fisher z transformations for stock index correlation coefficients:

Z* Transformation Stock indices: 1 April 2000 - September 2000

Z*	A	SA	H	B	P	USA	HK
SA		1					
H	-0.8072	-1.98208	1				
B	-1.64995	0.734115	0.32032	1			
P	-0.60728	-1.38604	0.156839	0.367975	1		
USA	-2.81731	0.282999	0.249844	-1.47628	0.673922	1	
HK	-0.3022	-2.56139	1.01084	-0.70635	-1.54642	-0.80193	1

z* Transformation Stock indices: 1 October 2000 – March 2001

Z*	A	SA	H	B	P	USA	HK
SA	0.122922	1					
H	-0.64403	-0.80398	1				
B	-0.12401	0.810196	-0.89286	1			
P	0.486804	1.303993	-0.76006	-0.10104	1		
USA	1.5281	-1.65686	-2.70545	2.046674	-2.40932	1	
HK	-0.31157	0.997096	-1.21343	0.942656	-0.32619	-1.03214	1

z* Transformation Stock indices: 1 April 2001 - 30 September 2001

Z*	A	SA	H	B	P	USA	HK
SA	0.695354	1					
H	2.546684	0.155271	1				
B	2.278794	0.188096	2.437017	1			
P	0.816814	-0.40224	0.342428	0.542122	1		
USA	2.160393	-0.79836	0.647236	1.913764	0.459332	1	
HK	1.606275	0.217917	0.656078	1.917825	2.806564	-1.30712	1

z* Transformation Stock indices: 1 October 2001 - 31 March 2002

Z*	A	SA	H	B	P	USA	HK
SA	2.486354	1					
H	1.659843	2.643	1				
B	3.280329	0.6731	0.12516	1			
P	0.594601	1.766039	-0.62029	-0.99189	1		
USA	1.618746	2.753186	0.439543	-1.49589	-0.36025	1	
HK	-0.08431	1.984427	0.338416	-2.22147	-0.9526	1.005383	1

z Transformation Stock indices: 1 April 2002 - September 2002*

Z*	A	SA	H	B	P	USA	HK
SA	-2.32789	1					
H	-0.21603	-2.4409	1				
B	-1.12561	0.074092	2.728581	1			
P	0.19209	-1.40872	-1.72966	2.454683	1		
USA	-0.47449	0.559034	1.131069	-0.30056	2.045869	1	
HK	-1.44468	-1.55236	-1.93649	-0.5704	-1.01663	-0.53392	1

z Transformation Stock indices: 1 October 2002 - March 2003*

Z*	A	SA	H	B	P	USA	HK
SA	-0.04371	1					
H	0.313487	-0.69207	1				
B	-1.72557	1.070432	3.34527	1			
P	-1.11367	-1.43962	-4.12043	0.656223	1		
USA	-0.61728	-0.32659	0.496902	-2.47338	-0.66936	1	
HK	-0.8851	-1.36761	-1.97092	-1.04035	-2.20418	-1.9571	1

z Transformation Stock indices: 1 April 2003 - September 2003*

Z*	A	SA	H	B	P	USA	HK
SA	0.975684	1					
H	1.870296	-1.00382	1				
B	-0.31935	0.564412	5.189508	1			
P	2.126707	-0.03938	0.432408	1.225976	1		
USA	1.003893	-0.30698	3.004606	-1.68819	0.834289	1	
HK	-0.51638	-1.57981	-1.31465	-1.03048	-1.90941	-0.78887	1

Appendix 1.2

Fisher z transformations for exchange rate correlation coefficients:

Z* Transformation. Foreign exchange rates: April 1999 - September 1999

z*	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ZAR	0.645448	1						
HUF	1.075543	1.884955	1					
BRL	0.537597	0.151709	1.314725	1				
PLN	1.966074	1.299438	0.748934	-0.40061	1			
GBP	-1.16946	0.807824	1.42313	0.859208	0.532515	1		
EUR	-1.30454	0.832905	2.651938	-1.50726	-0.5637	-0.3529	1	
HKD	0.506493	1.382572	0.817114	-0.79506	0.753831	-0.75727	-0.80591	1

Z* Transformation. Foreign exchange rates: October 1999 - March 2000

0.125491

z*	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ZAR	-0.54857	1						
HUF	-0.23348	-1.29079	1					
BRL	-1.07673	-1.17793	0.081756	1				
PLN	-0.48551	-0.90684	-0.20212	-0.01088	1			
GBP	0.974258	-0.37796	3.189423	-1.12993	1.111729	1		
EUR	0.218263	0.507068	6.894095	0.161768	2.850058	-1.38582	1	
HKD	-0.37893	0.090601	-0.00053	-0.51929	-1.89268	-0.33236	1.130513	1

Z* Transformation. Foreign exchange rates: April 2000 - September 2000

0.12574

z*	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ZAR	1.665863	1						
HUF	1.830542	-1.62256	1					
BRL	0.129561	1.183112	3.828669	1				
PLN	-2.12896	-1.89752	-6.85715	-1.18523	1			
GBP	-0.78293	1.009892	-8.54089	1.376478	-2.57031	1		
EUR	-1.24984	1.486002	16.20382	1.38819	2.919164	-3.41594	1	
HKD	-0.01055	0.073264	0.364636	0.496501	-1.16916	-0.78725	-0.34006	1

Z* Transformation. Foreign exchange rates: October 2000 - March 2001

0.125988

z*	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ZAR	-1.12559	1						
HUF	0.297188	-2.09935	1					
BRL	0.436464	0.691622	0.43459	1				
PLN	0.612824	-4.54569	-9.03389	-2.03875	1			
GBP	2.335098	0.047095	-11.3541	1.140396	1.894836	1		
EUR	-0.25616	2.803437	18.2465	0.718286	6.536866	-4.73297	1	
HKD	0.364958	-0.87017	-0.85874	-0.42741	-0.96108	1.309451	0.881503	1

Z* Transformation. Foreign exchange rates: April 2001 - September 2001

0.125988

z*	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ZAR	0.081958	1						
HUF	1.258558	-0.57611	1					
BRL	-1.12628	0.963167	4.746111	1				
PLN	-1.17753	-3.79219	-7.74318	-2.27019	1			
GBP	0.093339	-1.9418	-14.6485	-1.78715	-5.42639	1		
EUR	-0.90011	2.202234	7.697651	-0.25949	0.82093	-7.22073	1	
HKD	-0.47952	-0.38513	-0.73969	0.379277	-0.03303	0.677489	0.85503	1

Z* Transformation. Foreign exchange rates: October 2001 - March 2002

0.125988

z*	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ZAR	-0.55237	1						
HUF	-0.08813	2.068824	1					
BRL	-0.05306	3.216778	1.073897	1				
PLN	0.23033	1.473349	-0.19406	0.608439	1			
GBP	-0.00965	-1.12954	0.917507	-0.37872	2.003034	1		
EUR	0.308001	-2.85247	1.659759	-1.14994	1.649313	0.363025	1	
HKD	-0.58732	0.094558	2.256628	-0.37219	1.117788	-1.06825	-1.89152	1

Z* Transformation. Foreign exchange rates: April 2002 - September 2002

0.12574

z*	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ZAR	0.450419	1						
HUF	0.427032	-1.49465	1					
BRL	0.19465	-2.8728	-1.77183	1				
PLN	0.084498	-1.95176	-1.46911	-1.11735	1			
GBP	-0.13708	1.152467	1.995243	1.420327	0.670467	1		
EUR	-0.12997	3.01002	2.085338	2.580248	2.187393	-3.21535	1	
HKD	0.792775	0.383259	-1.6448	0.8795	-1.01142	1.247198	1.117685	1

Z* Transformation. Foreign exchange rates: October 2002 - March 2003

0.12574

z*	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ZAR	-0.11684	1						
HUF	-0.50217	-0.37261	1					
BRL	0.723708	2.566859	1.581534	1				
PLN	1.495703	0.652828	0.23003	0.921143	1			
GBP	-0.21657	-0.03788	-3.93717	-0.47196	0.40364	1		
EUR	-0.73488	0.127938	-5.36186	-1.07724	-0.62876	2.620569	1	
HKD	-0.17089	-0.11812	0.59375	-1.45674	1.55979	-1.68292	-0.48691	1

Z* Transformation. Foreign exchange rates: April 2003 - September 2003

0.12574

z*	ARS	ZAR	HUF	BRL	PLN	GBP	EUR	HKD
ZAR	-0.05971	1						
HUF	-0.10123	-0.68673	1					
BRL	-0.91422	-1.7814	-0.59353	1				
PLN	-1.77129	-0.81189	-2.76326	-0.87137	1			
GBP	0.612824	0.916561	0.57418	0.179526	0.863551	1		
EUR	1.045823	0.821827	1.551928	1.223384	2.171347	-0.08507	1	
HKD	0.87828	-1.36212	-0.78243	0.666701	-0.91756	1.805153	1.171205	1

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