INVESTIGATING THE IMPACT OF CAPITAL ACCOUNT LIBERALIZATION ON ECONOMIC GROWTH: A CASE STUDY OF SOUTH AFRICA

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Abstract

The increased interest in capital flows has made it imperative to understand how they impact a particular economy. The Global drive for an interlinked world economy has increased the need for monetary authorities and Governments to able to effectively deal with any negative spins off from capital flows and also be able to take advantage of positive effects capital flows may have on an economy.

The study seeks to understand how the change to lift restrictions on capital flows into the South African economy may have impacted on economic growth. The study analyses the relationship that existed between capital flows, that is to say foreign direct investment (FDI) and portfolio investment (P_I) and economic growth under the period of capital controls (1975 Q1 to 1994Q1). Then study will then analyse the same relationship but this time under the liberalised period (1994 Q2 to 2010 Q2) and compare how the long run relationship has changed after capital account liberalisation.

The study uses an endogenous model to determine the relationship. The study will focus on a single economy, which is South Africa and not use panel data like most previous studies.

The study found that in the short run capital account liberalising aided economic growth as both FDI and P_I became significant, with positive coefficients and also found that there is long run relationship between economic growth and capital flows. In the long run FDI is significant while P_I is not. After liberalisation FDI adjusted faster in the long run than before liberalisation on its impact on economic output.

Also of note was that the study found that under capital controls the conditional variance was constant but after liberalisation the relationship between capital flows and economic growth became more sensitive to negative news and the conditional variance was not constant thus indication of increased volatility.

To maximise from opening up of capital accounts the economy should maintain sound macroeconomic policies. This will help shield the economy from the external shocks and this maintain economic growth.

Declaration

I, the undersigned, Khumalo Sibanisezwe Alwyn, hereby declare that the dissertation is my own original work, and that it has not been submitted and will not be presented at any other university for a similar or any other degree award.

Date: 30/04/2013

Signature: .....

Approved by:

Date: .....

Signature: .....

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CHAPTER 1
BACKGROUND OF STUDY

1.1 INTRODUCTION

The year 1994 in South Africa witnessed the election of a democratic Government of unity. One of the goals of the new Government was to integrate the South African economy with the rest of the world and this was done by removing the financial rand system that was in use. The financial rand was put in place as part of a policy to limit the impact of non-resident investors wanting to withdraw their capital from South Africa.

Stals (1996) the South African Reserve Bank Governor from 1989 to 1999 points out that the 1960's in South Africa were characterised by financial instability. Financial instability resulted in huge unexpected capital outflows which put a huge amount of pressure on the balance of payments and eventually on the countries' reserves. To counter the effect of negative capital flows Tswamuno, Pardee, & Phanindra (2007), note that the South African Government in 1961 formulated and enacted "The Exchange control regulations."

During the early 1990's when the political climate had changed for the better, and the need to re-integrate the South African economy with the rest of the world become more pronounced. The Exchange control regulations had to be changed and some of these changes included the relaxation of the restriction on non resident investors, the relaxation of the rules governing corporates and institutional investors, with the aim of increasing capital flows. The Government opted for a gradual approach to the removal of the exchange control regulations.

The year 1995 saw the beginning of capital account liberalisation in the South African economy. According to Farrell & Todani, (2004:22) Stals opted for a gradual approach as opposed to the big bang approach, which is a form of a cold turkey policy. The gradual approach in contrast to the big bang approach allows the capital account to be liberalized over time so as to allow the economy to adjust.

Liberalizing the capital account was done by the Government so as to attract international corporations to come and invest in the South Africa therefore increasing

external savings within the South African economy. The capital inflows and the domestic savings would together stimulate economic growth as capital inflows are expected to increase productivity, leading to improved production and ultimately an increase in economic growth.

Capital account liberalisation, though still relatively young in the post apartheid South Africa is a concept that has long intrigued economists. Over the years the focus on capital account liberalisation has began to shift from it being a requirement for economic development and growth, to it being viewed as a potential deterrent of economic growth, in the process adding to the uncertainty already surrounding its real effect on economic growth.

The study seeks to investigate the impact capital account liberalisation had on economic growth by using both quantitative analysis and qualitative analysis to analyse the relationship between capital flows and economic growth. The period under study will be from 1975 to 2010.

1.2 STATEMENT OF THE PROBLEM

Some economists argue that capital account liberalisation will lead to economic growth provided the financial sector is functional. Studies by Fischer (1997) Henry (2003) Levine & Zervos (1996) are of the view that capital account liberalisation aids the development of the financial sector by reducing differential risk, increasing the liquidity of equity and debt markets and efficiency within the financial sector and thus leading to economic growth.

In a book, Raghbendra,(2003:388) notes that another view on economic development is that some economists argue that financial development is detrimental for economic growth, therefore opening up of the capital account will lead to a financial instability and cause a financial crisis. Studies by Kaminsky & Reinhart (1999), Stiglitz (2000) and Aker and Aker (2009) are some those that support this argument. The contrast in views means the discussion on capital account liberalisation and its impact on economic growth is inconclusive.

1.3 THE HYPOTHESIS

The main hypothesis is

H_0: Capital account liberalisation aids economic growth.

H_1: Capital account liberalisation does not aid economic growth.

1.4 OBJECTIVES

The goal of the study is to be able to determine the type of relationship that exists between capital flows and economic growth within the South African economy that is before after a significant change in policy affecting capital flows. The goal is translated into the following sub objectives:

(i) To analyse the trends in capital flows and economic growth before and after capital account liberalisation to determine how they may have varied.

(ii) To determine the type of relationship that was in existence between capital flows and economic growth in South Africa prior to 1995 over the long run.

(iii) To assess the effect of a structural change in the economy on economic growth, this is in reference to the policy change that led to the liberalisation of the capital account. The assessment and analysis will be done using econometric techniques.

1.5 RATIONALE

The globalised world economy which is a result of inter-twined individual countries has made the relationship between capital account liberalisation and economic growth to be of great importance. Eichengreen (2004:49) referring to Capital account liberalisation says "….. remains one of the most controversial and least understood policies of our day". This statement highlights the need for better understanding of capital account liberalisation and its impact on an economy and how each economy reacts to such a policy given that there is not a uniform expectation for all economies.

It is therefore imperative to understand how capital account liberalisation affects the economic performance of South Africa, a country with a low savings culture and

whether it was able to aid economic growth. In the long run it is important for an economy to understand the levels of capital account liberalisation that yield the best results for an economy to grow. Economic growth is a variable that is of importance to the Central Bank and is vital to the implementation of the monetary policy. Therefore the need to understand the relationship that exists among these variables with in an economy is vital.

1.6 STRUCTURE OF THE STUDY

Chapter two will provide the background information on the study thus helping to define and provide views that will help explain the topic under consideration. Chapter three will be the review of literature that covers the study and also provide any empirical results from past studies on the topic. Chapter four involves the analysis of the topic. Under this chapter econometric and statistical methods will be used to produce any analytical evidence that will be used to make a conclusive comment on the topic. Chapter five will focus on the interpretation of the results obtained in chapter four and explain any findings. Chapter six will be the concluding chapter which will provide the answers to the set objectives based on the interpretations from chapter five and carry any recommendations.

CHAPTER 2
OVER VIEW OF CAPITAL ACCOUNT POLICIES IN SOUTH AFRICA

2.1 INTRODUCTION

In 1994 when the Government of national unity was elected and sworn into power, there was a huge shift in terms of Government policy. The new Government led by then president, Nelson Mandela was faced with various challenges, which included increasing Government debt, slow economic growth and a drop in GDP per capita, and social inequalities.

In an effort to address these and many other challenges the Government led by the African National Congress (ANC) came up with the Reconstruction and Development Programme (RDP). The RDP is a socio- economic policy frame work that was drawn up after wide spread consultations and was presented in parliament in 1994. The policy frame work was set up to drive the reversal of socio-economic problems that were a result of the preceding apartheid era.

According to the Government gazette, of 1994 one of the six principles that RDP was based on was "The RDP would link growth, development, reconstruction, redistribution and reconciliation into a 'unified program" (Government, 1994). Under this principle one of the areas of importance was the reduction of any areas within the economy that were a stumbling block to investment and private sector growth and thus negatively affecting economic growth. This principle was the base of one of the programmes Government undertook, the building of the economy.

The state of economy when the Government of National Unity was sworn in was deemed to be bad. At the time the government was highly in debt and dissaving. Most of the expenditure Government undertook was consumption expenditure thus little was directed at productive expenditure.

Other factors of note were that the rate of return was low in the country leading to high levels of capital outflows and not much in terms of capital inflows, which inhibited any private sector developments. The national current account was also in a bad state as

the level of imports far exceeded the level of exports thus negatively affecting the balance of payments account. These are some of the reasons that can be attributed to the drop in productivity levels.

According to O'Malley (2006) the programme aimed at building the economy included the reform of the financial sector. The financial sector then focused more on the already established sectors and was accessible to a minority of the population. This meant the development of the small and upcoming sectors and the informal sector was hindered and thus the black majority was always at a disadvantage.

To be able to help develop the private sector and improve the performance of the economy, the new government embarked the on the modification of the regulations that affected the financial sector. The modifications to the financial sector sought to develop a financial sector that would help aid the inflows of foreign savings into the South African economy. This meant that financial institutions had to be made more credible. This was done by changing regulations which would make the financial sector more credible and accountable.

By improving the credibility of the financial institutions they were able to be innovative in their goal of attracting foreign savings into the South African economy. The credibility of the financial sector meant that the allocation of resources within the economy would be done in an efficient manner. Thus this would have boosted the productivity of the economy.

One of the changes that occurred within the financial sector was capital account liberalisation. Capital account liberalisation according to Kose & Prasad (2004) is "in broad terms, refers to easing restrictions on capital flows across a country's borders." Prior to 1995 the South African economy was under restrictions which included exchange controls that directly affect the capital account. Therefore in 1994 the Government decided to make changes to "The exchange control regulations of 1961" so as to attract more capital inflows.

2.2 SOUTH AFRICA AND CAPITAL CONTROLS

Capital controls are measures that can be classified either as targeted controls or pervasive controls. According to Anderson(2003) targeted capital controls are short term in duration and are aimed at stabilizing mainly portfolio flows during a crisis. Targeted capital controls act as a braking mechanism to capital outflows. The goal is to minimise the impact of sudden and undesirable capital outflows. They are common where countries utilise fixed exchange rate regimes.

Capital controls can also be pervasive. According to Anderson (2003) this means that the measures set out are aimed at prohibiting capital movements so as to insulate the banking system from the volatility of capital flows. As early as the 1930s South Africa was under pervasive capital controls, which were quantitative restriction aimed at residents. The main idea behind controls on residents is to encourage local savings to be channelled to domestic investment rather than foreign investment. In the 1960s, the government then introduced dual exchange rate arrangements meant to target the non-resident investors and limit the effect of the volatile capital flows, mainly short term capital flows.

In 1961 the South African Government introduced an extra set of measures by amending the "Currency and Exchanges Act 9 of 1933". The measures implemented consisted of both targeted capital controls and pervasive capital controls. The "Currency and Exchanges Act of 1933" was the first regulation to affect South Africa though it was done under the collective name of the sterling area. The sterling area comprised of countries which adopted the British sterling or had their currencies pegged against British sterling. South Africa was under the sterling Area from 1933 till its demise in the mid 1970s. This was so even after the 14th of February 1961 when the South Africa economy changed from using the South African pound to the South African Rand.

In his article Henshaw (1996) highlights that South Africa benefitted from the sterling area because it was Britain's biggest source of agricultural produce at that time, and was able to export to Britain at constant rates, was able to sell its gold produce through

London which was a cheaper and more efficient system and Britain was a source of capital that was a vital to the development of the mining industry.

According to Schulze (p. 01) the "Currency and Exchanges Act 9 of 1933" was introduced to curb the outflows of capital to countries that were not in the sterling area. This means that at the time the countries within the sterling area could experience capital flows amongst themselves but not with a non member country. This maintained the amount of reserves held in the sterling area.

In 1960 the Sharpeville massacre, which was the climax of the build-up of political tensions and instability in the early 1960's was a trigger for the amendment of the "Currency and Exchanges Act 9 of 1933." The political instability negatively affected the credibility and ultimately the image of South Africa in relation to foreign countries. The Government had to make the amendment to try and limit the impact of a pending crisis which was brought about by capital flight.

Having built up its gold and currency reserves by participating in the sterling area, South African monetary authorities were faced with serious crisis whereby its foreign and gold reserves were falling. Reserves were falling as a result of the political instability. The unrestrained capital outflows were putting pressure on the capital account and ultimately the balance of payments, which forced the monetary authorities to use the reserves they had to finance transactions. The result was that the foreign currency reserves and the gold reserves dropped significantly. Table 2.1 shows the monthly foreign exchange reserves for South Africa for 1960 from January to December.

Table 2.1 Monthly foreign currency reserves for South Africa for the year1960 (R Millions)

Year	1960										
month	01	02	03	04	05	06	07	08	09	10	11	12
Foreign currency	137	125	108	77	51	50	50	42	48	46	44	45

reserves												

Adapted from South African Reserve Bank (SARB)

Although foreign reserves in 1960 were already declining, the drop in reserves during April was more pronounced. There was 29% drop in the month immediately after the massacres. The 29% drop was a significant in relation to the drops in February and March which were at 9% and 14% respectively. The drop in foreign currency reserves is attributed to the negative effect of a drop in capital inflows, which meant reserves, had to be used to finance the current account balance.

Table 2.2 Gold reserves for South Africa (R Millions)

year	1955	1956	1957	1958	1959	1960	1961
Gold reserves	150	159	154	150	169	126	212

Adapted from SARB

A look at table 2.2 shows that the level of gold reserves was fluctuating within a narrow band prior to 1961. The average level of gold reserves from the table prior to 1961 was R156 million. By the end of 1961 there level of gold reserves had dropped to R126 million. This represents a drop of 19% from the average of the five years prior to 1961 and a drop of 25% from the previous year. This unexpectedly large variation in the gold level is attributed to the political instability at the time.

In order to limit the damage that would be a product of uncontrolled capital outflows, the Government sought to implement measures that restricted capital outflows to foreign economies. The government amended the "Currency and Exchanges Act of 1933."The amendment was made by introducing the "Exchange control regulations of 1961". These controls were circulated under Act 9.

2.2.1 THE EXCHANGE CONTROL REGULATIONS OF 1961

The goal of the exchange controls was to limit the effect of capital flight on the balance of payment. The balance of payment (B.O.P) is a method of accounting for transactions that occur within the economy and with other economies. In its simplest form the B.O.P can be written as

B.O.P = Current account - Capital account.....2.1

The current account basically deals with the trade aspect of the economy and any income from foreign investment, while the capital account records the transactions that involve capital flows relating to financial assets and real assets and also the reserves held by the central bank. If there current account has a deficit the capital account is used to finance that deficit. The capital inflows or the reserves held by the central a bank are used to counter the deficit. Therefore the need to always have sufficient reserves within an economy is vital and cannot be over stated. Therefore to be able to maintain the reserve levels the government had to prevent the repatriation of funds by non-residents from South Africa. This was done by using the blocked Rand.

Blocked Accounts

The Blocked Account was introduced under the exchange control regulations of 1961 specifically for non-residents. The blocked rand was deposited into the blocked account. The blocked rand was a mechanism that allowed the Government to have some control over the flow of capital from South Africa to other Countries. The Blocked Rand was used to prevent non residents from repatriating capital from South Africa. The mechanism allowed non residents to sell local securities and assets but could not transfer that capital to their respective countries but had to bank it into the South African banking system. According to Schaling (2005) the mechanism was to prevent the repatriation of funds previously invested in South Africa by non residents. According to the amended act, non residents that needed to repatriate capital had to first get permission from the treasury and this was done by authorised banks.

According to Marais (1998:84) the blocked account shielded the economy from the effects of the volatility of capital flows. The blocked rand allowed the official exchange rate, which under the Bretton Woods monetary union was measured against the U.S Dollar not to be pressured by capital flight. The pressures created by non residents when they sold their securities and assets would not be translated to the official exchange rate as the blocked rand would absorb the effect of the transactions by non residents. The blocked account would hold all the proceeds from the transactions of non residents.

The blocked rand became the currency for non residents who wanted to buy securities within the South African economy and securities listed on the JSE. The blocked rand could only be able to purchase a certain range of securities. Schaling (2005) Notes that non residents could use the blocked rand to buy and sell securities that were listed on the JSE and could also be traded outside South Africa. The securities could be traded between non residents as their subsequent sale by the non-residents would in essence not affect the balance held in blocked accounts within South Africa. This is so because when the securities are traded in South Africa, the non-resident will have to open a blocked account to deposit the proceeds from the sale of the securities.

The blocked rand could also be used to purchase some Government bonds more so the local Government bonds. According to Schaling (2005) the non resident investor will have to have to hold the bond for a minimum of five years till maturity. This would then entitle the non-resident to be able gain his proceeds at the official rate. Similarly the blocked rand could be used to purchase bonds that were issued by the Government especially for non-residents holding the blocked rand. The non residents had to hold the bonds for five years and to maturity. The proceeds would also be exchanged at the official rate.

Exchange limits on money, gold and securities.

Under the new amendments to the "Currency and exchanges Act of 1933", non residents and residents were restricted in terms of the movement of money, gold and securities. Money referred to both the local currency and foreign currency. Residents could not move money, gold or securities from South Africa to other countries unless they obtained authorization and used an authorised dealer. The authorisation was given by the treasury. These limitations were used to try and curb drop in the country's reserves.

How effective was the blocked account.

The blocked account was in used from 1961 to 1975.Its prolonged stay, as it was viewed as a temporary measure, had a huge economic impact. The blocked rand become the major channel through which foreign investors could access the South African economy. The law of South Africa limited any capital exchange between foreign investor s to the blocked rand. It was a preferred channel in comparison to the official exchange rate because it was providing foreign investors with better returns as it became an unofficial parallel exchange rate system.

Two main areas where the blocked rand had an impact was the South African exchange rate and portfolio investment within the South African economy.

The Blocked Rand and the Exchange rate system.

South Africa was a party to the Bretton Woods system. Countries under the Bretton Woods monetary union pegged their currencies and maintained them with a band that allowed for a one percent variation at most. The local currencies were pegged at what was deemed the fundamental value. Therefore this means that South Africa operated under a fixed exchange rate regime that was flexible and adjustable to a certain degree. The Bretton woods system adopted the adjustable peg regime of exchange rates to help counter the negative effect of the floating regime. According to Cohen the floating

exchange rate regime had resulted in destabilizing speculation and competitive depreciation.

The use of the pegged regime of exchange rates meant that there was a need for a reserve currency to help regulated the fundamental values of the country currencies involved. The most viable option was gold, as previously used in the gold standard era. Since the U.S dollar was still the only currency still directly linked to gold and could easily be converted to Gold it was then also adopted as an alternative currency to Gold to be used as a reserve currency. This meant the South African par value was determined against the U.S dollar.

Under the sterling area the South African pound was required to be pegged to the pound sterling. When the South African pound was replaced by the South African rand in 1961, the rand was trading at 1 : 0.5 quoted indirectly against the sterling pound and was pegged at 1.4 to the U.S dollar (van der Merwe, 1996). In order to protect the exchange rate system, there was need to insulate the exchange rate from the effect of capital flows. The blocked rand was introduced with the goal of protecting the exchange rate. The blocked rand allowed non-resident investors to de-invest but the effect of their transactions was not translated onto the official exchange rate. Although the blocked rand may have protected the official exchange rate, it helped created a parallel exchange rate that operated unofficially.

The blocked Account did not allow the direct transfer of the blocked rand from one non-resident to other non resident. According to Farrell & Todani (2006:91) because non residents could transact with brokers based outside South Africa using the blocked rand this essentially created an unofficial exchange rate for the blocked rand. The existence of the parallel foreign exchange market was driven by the need for investors to remove their returns and capital from South Africa. This meant they had to convert the blocked rand to other currencies so as to be able to repatriate their investments. The non-resident investors would buy shares quoted on the JSE via local stockbrokers, who in turn would sell to non-resident stock brokers outside South Africa but held blocked account in South Africa. The non-resident stock brokers would then resell the securities

to the local stockbroker who then credits the non resident's blocked account with the proceeds from the sale of the securities. The local stock broker would then sell the locally. The local stock broker would then pay the non-resident investor whose blocked rand was used originally to purchase the securities the proceeds from the sale in another currency, like the pound sterling.

To simplify the process local stock brokers would use a concept of securities lending, which Schaling (2005:7) illustrated. Since the brokers gained commissions for the transaction, the local and non-resident brokers negotiated the rate of exchange between the blocked rand and the foreign currency used by the non-resident stockbroker. This arrangement meant that the blocked rand always traded at a discount compared to the official Rand rate. This then created what De Kock in Farrell & Todani (2006:88) said "....we were instituting a dual exchange rate system." This was an unexpected effect of the controls.

The reason why the commercial exchange rate always traded at a premium in comparison to the blocked rand was because the local demand for the securities listed on the JSE was far higher than the demand from non-resident investors. Since non residents could not invest outside South Africa as and when they wanted this meant that they had to invest locally. This meant that there was always high demand for local shares quoted at the JSE as resident investors could not diversify by investing outside South Africa. The local demand coupled by the low demand from outside South Africa caused by the capital controls meant that in order for the blocked rand to make a market it had to be traded at a discount.

To compound the problem of the lack of demand from outside South Africa Windt, Schaling, & Huizinga (2007:13) note that a non resident could invest using the blocked rand if another non resident was willing to sell their securities. This meant there was a need for coincidence of wants. Essentially the amount of using the blocked rand meant that the level of foreign investment remained the same, what changed was the ownership of the blocked rand. Therefore any increases in the investment by non-residents can be attributed to the more conventional and direct method, the buying of

securities using foreign currency. This meant that any increases in non-resident investment were due to new foreign direct investment that did not utilise the blocked rand.

Non-residents preferred the blocked rand as it traded at a discount. This in essence limited the amount of foreign direct investment that could have been invested into South Africa. This was because most non residents would prefer to go via the parallel exchange rate which would reduce exchange rate risk whilst also improving the rate of return on the their savings. The parallel and unofficial exchange rate increased speculative activity as investors sought to gain from their investment. This mainly influenced portfolio investment.

Blocked rand and portfolio investment

Portfolio investment is a term used to describe a portion private capital funds that flow into the domestic economy from non residents investors. Portfolio investment refers to the capital that is invested into the domestic economy by foreign investors for the purpose of deriving quick sources of income. Investments in the stock market that are done without the goal of having control fall under the portfolio investment and are made by the private non banking sector. This is the portion of capital flows that is highly sensitive to changes in the macro environment and would have been the first to react to the political instability that ensued in 1960's.

Table 2.3: Net portfolio investment (NPI) for South Africa (R Millions)

YEAR	1960	1961	1962	1963	1964	1965	1966	1967	1968
NPI	(82)	(39)	(74)	(100)	(65)	39	(16)	3	149

YEAR	1969	1970	1971	1972	1973	1974	1975
NPI	19	204	289	238	60	194	481

Adapted from SARB

From table 2.3, the amount of net portfolio investment which is the difference between portfolio capital inflows and portfolio capital outflows continued to decline even after the introduction of the blocked rand. This could be that even though portfolio capital outflows where reduced by the introduction of the blocked rand, the portfolio capital inflows fell by a greater percentage compared to the drop in capital outflows.

As the world economy began to adjust to the blocked rand, and the system become more effective in reducing capital outflows, net portfolio investment bean to improve and became positive which continued till the blocked rand was altered into the securities rand.

The securities Rand (1976 -1979).

After evaluating the performance of the blocked rand, the monetary authorities realized that the blocked rand had unintended consequences which were negatively affecting their goals. Among the unintended effects of the blocked rand that Schaling (2005) named were the image of South Africa as a bad investment destination, the creation of a parallel market, limiting the inflow of capital.

In order to try and address these issues the monetary authorities opted not to do away with the control measures but to modify the technical aspects of the blocked rand. The goal was to make the blocked rand more appealing to the foreign world thus bringing back confidence to South Africa as an investment destination. The blocked rand had to be adjusted and made to be more liquid and easier to transfer but still have the same properties as the blocked in terms of controlling capital outflows by non residents.

According to Farrell & Todani (2006) the expectation was that the securities rand would boost the number of transactions involving non-resident investors buying securities domestically and that transactions that were being done outside south Africa could be completed within the South African economy. So by allowing the securities rand to be traded on the JSE via brokers, monetary authorities hoped to counter an unwanted arbitrage that would negatively influence the discount rate of the securities rand.

Since the era of the fixed exchange rate was being phased out and economies were being encouraged to allow currencies to float, the monetary authorities were able to make the securities rand trade under and official exchange rate. These they did to counter the effect of the undesired discount which was deemed to be above what would be the optimum discount rate. By making the securities rand trade officially meant that the monetary authorities could whenever they find it necessary could intervene in the mart to help stabilize it. The huge discount rate that the blocked rand traded at negatively affected the cost of capital.

By making the securities rand traded officially, the monetary authorities also were able to allow for the securities rand to be transferred from one non-resident account to another. The effect of the allowing non residents to easily and cheaply trade in the securities rand was meant to attract non-resident investors to invest in domestically. By increasing the available uses of the securities rand to non-resident investors the expectation was that this would increase its velocity and thus improve liquidity of the securities rand.

Evaluation of the securities rand

The securities rand was ineffective in trying to entice non-resident investors and brokers to carry out transactions within the confines of South Africa from foreign markets. The main market that was targeted was the London market. According to Farrell & Todani (2006) the London market was more advanced and a better preference for most non-resident investors. Though the securities rand enabled the non-resident investors to transact locally, the domestic market was not able to compete, thus there wasn't a significant change in the volume of transactions during the securities rand era.

The amount of transactions that occurred using the securities rand were not significant enough to help make the securities rand a tool that the monetary authorities could use to help influence the economy. The securities rand was affected by low levels of liquidity. This was because the supply of the securities rand, which was dependent on the new investment from non-resident investors, was far lower than expected. Non-

resident investors preferred to use the securities rand rather than go through the official exchange rate for the commercial rand.

The inability of monetary authorities to achieve their set goals meant that the securities rand was then replaced in 1979. The decision to replace the securities rand was done after an evaluation done by the de Kock commission. The commission suggested the use of a financial rand instead.

The financial rand (1979-1983) and (1985-1994)

The financial rand was introduced at a time when the fixed exchange rate regime that was in place in most of the world was being replaced by a more flexible and float exchange rate regime. Since the early 1970's when the US opted not to allow the US dollar to be pegged against gold, the decline in the use of the fixed exchange rate regimes was triggered. This scenario meant that the limitation the South African monetary authorities had previously encountered in terms of maintain a fixed exchange rate system was less pronounced. The monetary authorities could now officially allow for a dual exchange rate system which had one form of the local currency trading at a discount without negatively affecting the country's image internationally which would not have been possible if the fixed exchange rate system was still in place.

The de Kock commission according to Schaling (2005:23) advocated that in the short term rather than having a unified rand, where by the securities rand and the commercial rand were merged, the economy could employ a "more developed and formal system", in terms of the exchange rate. This meant that the commercial rand will be managed but generally left to be subject to the market forces of supply and demand while there will be also a financial rand which would be freely floating.

The de Kock commission found that because of the securities rand, the spot market for foreign currency was not as active. The huge discount was a contributing factor. According to van der Merwe (1996) the commission concluded that the spread was to wide for the spot market to be competitive. Therefore they suggested the unification of the rand.

The unification of the securities rand and the commercial rand would have meant that most restrictions placed on non residents would have to be done away with, which was the idea in the long run but not yet achievable in the short term. The commission according to van der Merwe (1996) noted that by unifying the rand, they would counter the inefficient allocation of foreign currency within the economy which would aid economic growth.

Since the financial rand was a floating currency. There was a need for the uses of the financial rand to be increased. This would allow the financial rand to function properly as part of a dual exchange rate system. Since the financial rand was meant for non-resident investors it meant it was going to mainly influence the capital account. The monetary authorities though did not limit the financial rand market to only non-resident but also did allow some resident transactions to be carried out in the financial rand market. Farrell & Todani (2006:94) note that some non-resident transactions which would be allowed in the financial rand markets included those involving both real and financial assets and any transactions involving immigration funds, while non-resident loans would be covered by the commercial rand. Resident transactions that were undertaken in the financial rand market included those involving travel allowances that were in excess of a set amount.

The central bank was allowed to intervene in the financial rand market so as not to allow the discount rate it traded at to be at an undesirable level. If the discount rate became too high, the effect would be similar to that of the blocked rand which raised the currency premium. Banks created a market for the financial rand by quoting 2-way prices and also the stock market through the JSE and the London markets created another major channel for the financial rand.

By allowing the central bank to intervene within the financial rand market, it created a mechanism to help ensure stability within the markets. The central bank would when require counter any destabilizing trends and movements of the financial rand. The stability of the financial rand was a necessity so as to help increased confidence within the financial rand market. The commercial rand was more managed than the financial

rand thus it experienced higher levels of intervention than the financial rand which was expected to be mainly freely floating.

The de Kock commission intended that the financial rand would be a short term measure and there was pressure to on the monetary authorities to stick to the plan that was suggested by the de Kock commission. Therefore the next step was for the monetary authorities to unify the rand. These would have done away with most of the restrictions imposed on non-resident investors. The problem that the monetary authorities faced with the unification of the commercial rand and the financial Rand was the discount rate the financial rand was expected to trade at. If unification is done when the discount rate was not conducive, that is if it was perceived to be high, the expectation was that non-residents would de-invest resulting in huge capital outflows.

Non-resident investors would de-invest because the unified rand will though stronger than the financial rand but because of the huge discount, it would still offer the non-resident investors some form of arbitrage, but if the discount rate was low, there wouldn't be any incentive for non-resident investors to disinvest as the unified rate will be slightly less than the commercial rate.

In 1983 the capital account was temporality liberalized as the rand was unified. According to Farrell & Todani (2006:100) the timing of the unification of the rand was not properly executed. At the time the discount on the financial rand was approximately around seventeen percent, which was still high for the discount rate. The economic and political climate was also not favourable for the unification of the rand and the result was a debt crisis in South Africa.

The year 1985 saw the reintroduction of the financial rand again. This was done I response to the debt crisis that occurred during the period 1983-1985. The financial rand was introduced to minimise the impact of the recall of loans by foreign banks and the drop in foreign investment caused by the unfavourable image South Africa had.

Evaluation of the financial rand

The financial rand according to Schaling (2005:31) just like its predecessors created what he termed "the closed pool argument". According to the study's analysis the financial rand was unable to create new investment but would basically maintain the same amount of investment that was in the system already. This means the financial rand was a hindrance to a large in attracting new capital inflows and even though would also hinder capital from moving out of South Africa the economy did not experience the required net inflows.

Schaling (2005) also found that the financial rand was able to protect the commercial rate from the effect of capital flight. This allowed the commercial rand to be stable even though it was not at its fundamental value. This was so because the capital controls that were tied to the financial rand allowed the commercial rand which was officially allowed to float to be insulated from changes in capital flows.

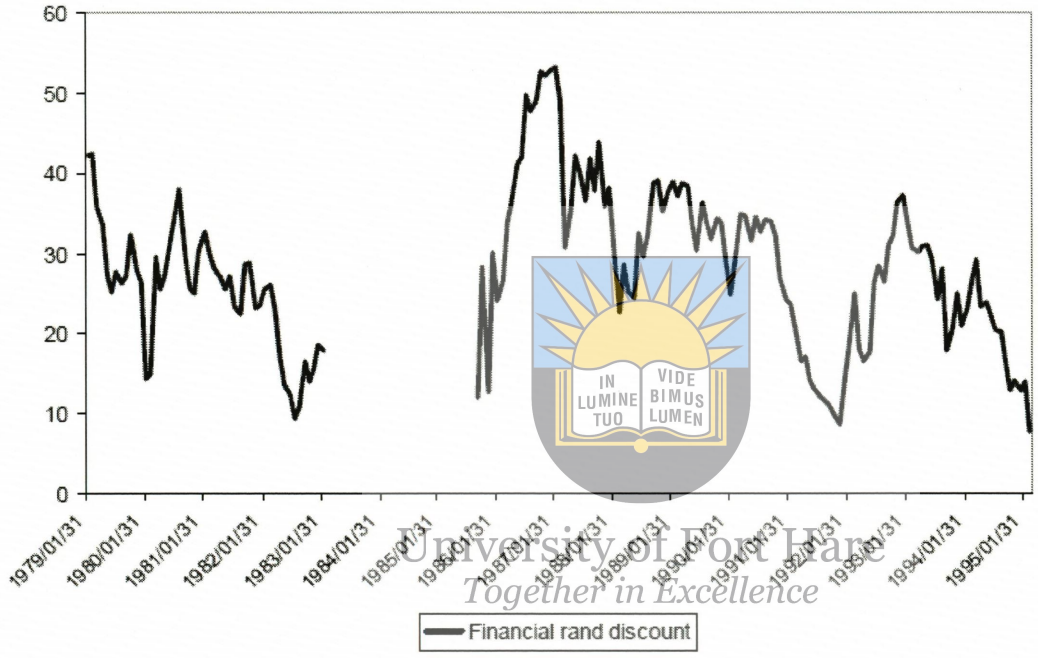
The financial rand discount

According to figure 2.1 when the financial rand was introduced the discount rate was at approximately forty percent. The introduction of the financial rand saw the discount rate, which first appeared under the blocked rand drop gradually. Although it fluctuated the trend was a drop in the discount rate. The financial rand was able to some extend reduce the discount rate. The lowest discount rate that was achieved prior to the unification in 1983 was around ten percent. When the first unification occurred the financial discount rate was close to twenty percent, which according to Farrell & Todani (2004) was still too high for the unification to help boost economic activity. Although the unified rand would trade at a lower rate than the commercial rand, it was still quite significantly trading at a higher level than the financial rand, thus this meant that non-resident investors still had an incentive to de-invest.

When the financial rand was re-introduced after the first unification in 1985, the discount rate was relatively low but began a climb which saw it peak at over fifty percent. This was exacerbated by the instability in the political and economic environment. It later

come back and settled in the twenty to forty percent range and when the financial rand was done away with, the discount rate was approximately around ten percent.

Figure 2.1: The financial rand discount rate



Source: (Farrell & Todani, 2004)

Capital account liberalisation (1983-1985)

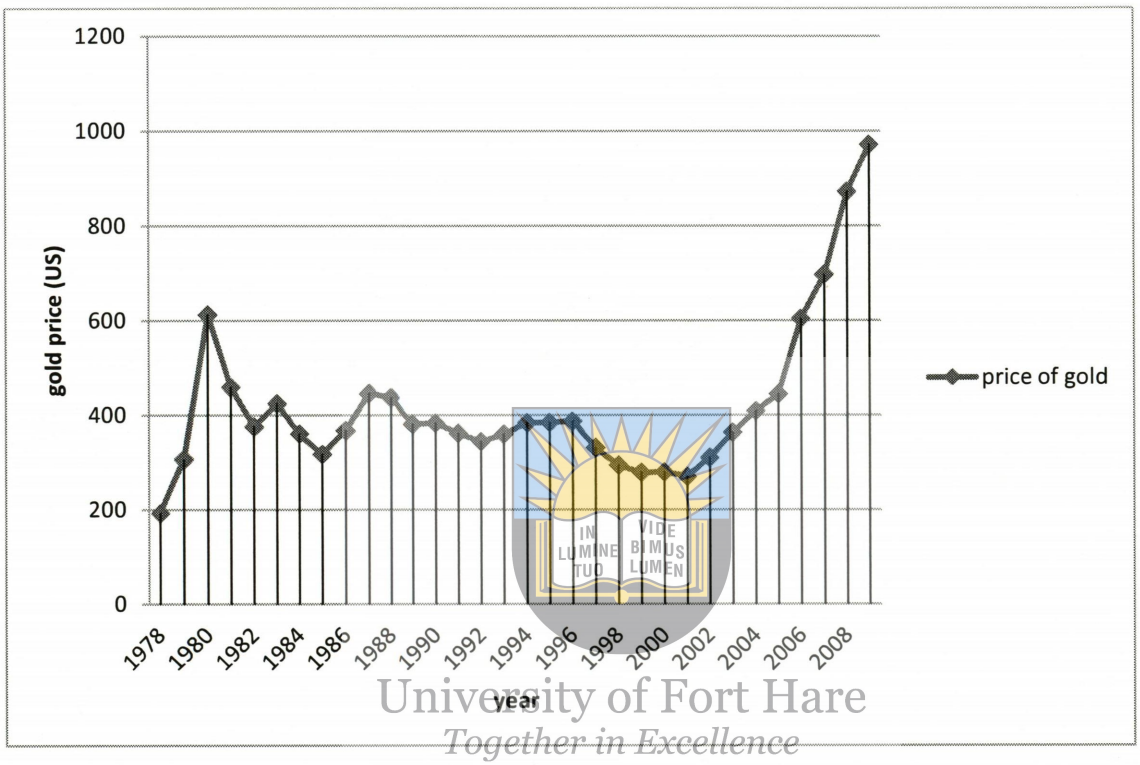
The period 1983 to 1985 in South Africa was the first time on over twenty years that the economy did not have a dual exchange rate system, though quantitative restrictions for residents were still in place. According to Mathieson & Rojas-Suarez (1993:07) if there is a lack of realistic stabilization in reform policies, the removal of capital flows restrictions will trigger capital flight and currency substitution. These is the view that is portrayed by Farrell & Todani (2006:105), who highlight that because of a lack of credible policies the then government had to resort to drastic measures such as issuing a freeze on transactions involving debt payment and as a last resort re-introduced the

financial rand which was removed two years back to control the debt crisis the country had sank into.

The debt crisis was a result of a number of factors which came into play after the removal in operation of the financial rand. When the commercial rand and the financial rand were unified in 1983, the financial rand discount was at about seventeen percent, which meant non-resident investors could still gain from arbitrage by de-investing from South Africa. The result was capital flight from South Africa.

Another factor that was analysed by Farrell & Todani (2006) was the unexpected depreciation of the rand. The unforeseen factor was the drop in gold price from a high of $600 in 1980 as shown in figure 2.2. The drop in the price of gold meant that the rand was weakened as the gold was a reserve that was used to back up the value of the rand. Gold dropped to its lowest value in 1985 of around $300 causing the rand to depreciate by over fifty percent against the US dollar.

figure2. 2: Price of gold in US Dollars



Source: adapted from SARB

The unexpected depreciation of the rand then meant that foreign debt increased by almost one hundred percent from 1980, when gold was at a high to 1984 midway through the period of a unified exchange rate. Farrell & Todani (2006) Say that foreign debt was around $16 billion in 1980 and by the end of 1984 was at approximately $26 billion.

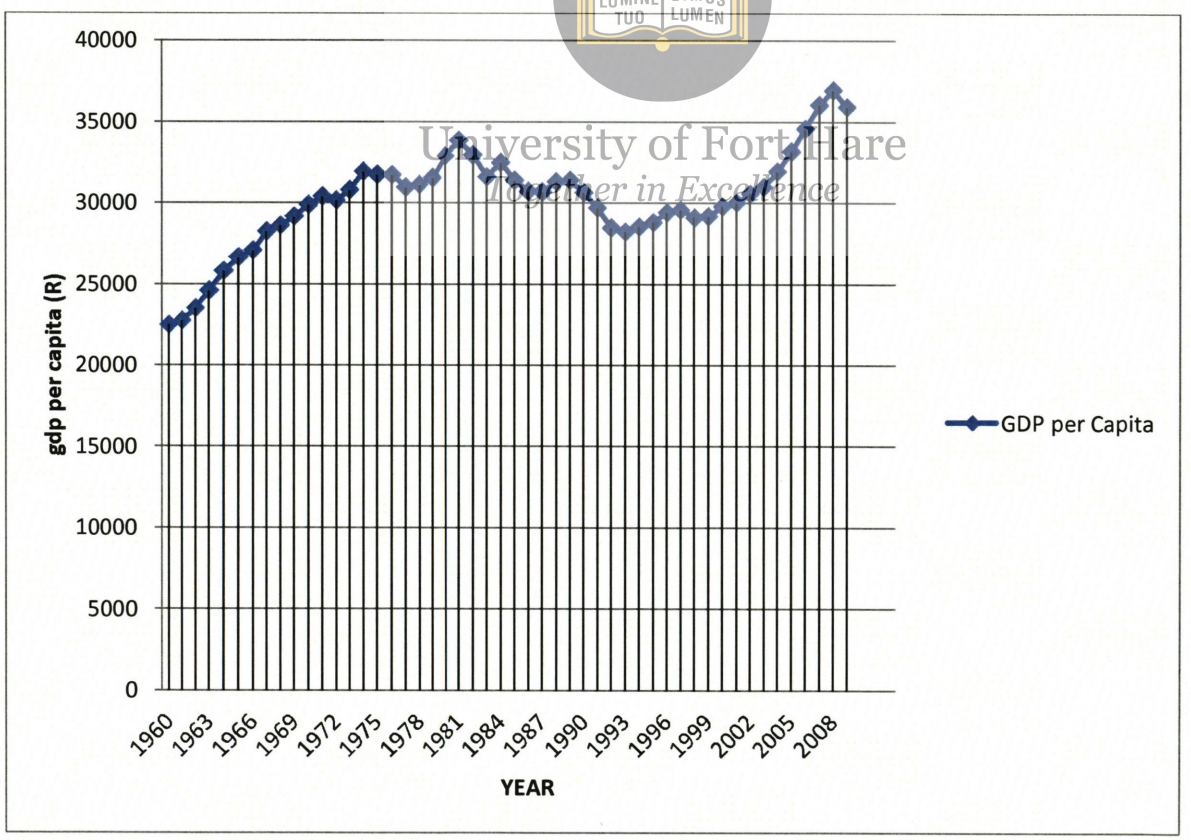
The increase in foreign debt, political uncertainty and the lack of significant credible policies triggered the recall of foreign loans issued by foreign banks. This negatively affected the balance of payments. The outflow of capital and the repayment of debt meant that the reserves of the South African economy where being depleted. The financial account balance was free falling. This triggered the Government to intervene and in July 1985 there was an announcement of a state of emergency.

The state of emergency was expected to help normalize the political environment and the economic state of the country. The measure failed to ignite confidence in the world as foreign banks were unwilling to renew any loans. These then forced the government to re-introduce the financial rand to limit the effect of the debt crisis alongside other measures that included a freeze on payment of debt.

2.3 Capital account liberalisation (1995- 2009)

The post apartheid was ushered in by a Government of national unity. The Government sought to normalize the country and rebuild it. Under the reconstruction and development policy, the Government saw the need to restructure the economy. The debt crisis, high unemployment levels and falling GDP per capita

Figure 2.3 GDP Per Capita



Source: adapted from SARB

From figure 2.3 after peaking in 1981, the GDP per capita was generally on a downward trend. The trend changed in the mid 1990s and began to improve. The downward trend was a result of the slowdown in domestic output which is attributed to the poor economic policy implementation, the political instability and the lack of confidence in South Africa as a viable and credible investor destination.

The Government chose to take a less radical approach to removing the controls that were present in the economy. The controls were affecting both the current account and the capital account. The approach chosen was the gradually approach. The gradual approach allowed for the sequential removal of controls on the capital account that existed in the economy based on the strength of structural economic reform. The monetary authorities based their choice on the recommendations made by studies such McKinnon (1993) and Edwards (1984).

Grové highlights the general sequence that was followed focused on the non-residents, then the current account, then resident institutions and the residents.
To kick start the process, the financial rand was replaced by a unified currency. Just as in 1983, the dual exchange rate system scrapped. The difference this time was that the political climate was in a better state and the financial discount was around ten percent as can be deduced from figure 2.1. The timing of the liberalisation of the capital account in 1995 was better than in 1983. The timing of capital account liberalisation is an aspect that is vital to the success of the policy. The table below highlights some of the relaxations that have been carried under the gradual opening up of the capital account.

Table 2.4 A summary of relaxations on controls

01/04/1995	• Resident companies could invest abroad and raise foreign funds against their balance sheets
14/07/1995	• The use of asset swaps was by institutional investors was allowed. The institutional investors still had to get approval to be able to invest in foreign assets using the swaps.
21/06/1996	• The amount of foreign assets an institutional investor could acquire via swaps was increased to 10% from 5%. • The purchase of outright foreign investments was legalized and limited to 10% of an institutions total asset value.
01/07/1997	• Registered fund managers offering private client asset management were included into the list of institutional investors.
22/07/1997	• Only asset swaps transactions that involved an exchange in cash or portfolio assets were allowed.
21/02/2001	• The asset swap mechanism for new transactions was terminated. • New foreign investments by log-term insurers, pension funds and unit trust management companies were, however, limited to 10 per cent of the net calendar 2000 inflow, subject to the overall asset limits.
23/02/2001	• Individual residents above 18 years could invest up to R750 000 abroad.
2003	• Dividends from foreign arms of resident companies could be used to invest in foreign direct investments after approval by authorities. • Allow resident companies to open foreign currency accounts.
07/10/2009	• Foreign Capital for residents increased to R4 million from R2 million • Increase company limit to invest abroad from R50 million to R500 million • Scrapping of the 3:1 ratio for local borrowing on non residents who

	own 75% stake and over in companies.

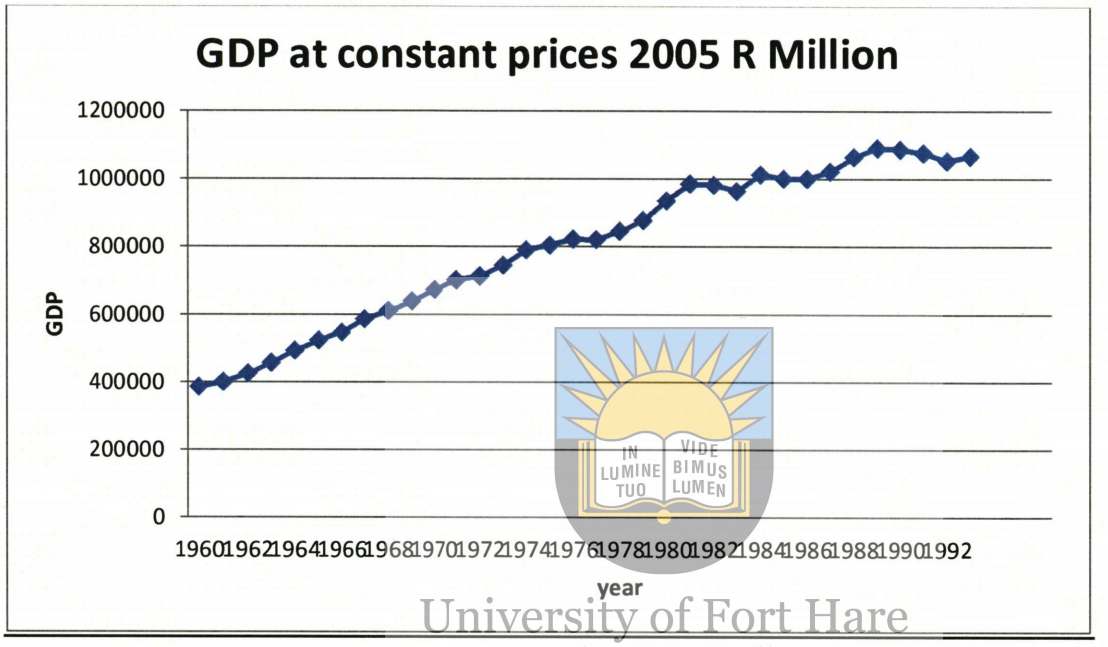
2.4 ECONOMIC GROWTH

Economic growth is a one variable that is used to measure the performance of economies. Central banks and government use the variable in formulating socio economic policies. One way to measure economic growth is by calculation gross domestic product (GDP). GDP is a measure that considers output produced within a given locality, for example a country's economy regardless of the ownership of the factors of production. The output represents goods and services produced in that locality. Economic growth would therefore be represented by the difference between the GDP of two consecutive time periods. The change can be negative, thus showing negative economic growth and positive difference showing an increase in output. Economic growth can be in nominal terms which mean inflation had not been factored in the prices of the goods and services and economic growth can be in real terms meaning inflation has been adjusted for.

There are various factors that can be attributed to economic growth such as technological innovation and positive externalities. In South Africa the economic growth also has been influenced by the political environment. In 1996 the government replaced RDP with a new macroeconomic policy called Growth employment and redistribution (GEAR). The goal of this policy was to focus and socio economic development. The Government sought to increase economic growth and thus trigger a domino effect which would result in improved stand of living for the majority, low unemployment and a provide basic services such as health care and education in a political stable environment. The fifteen years prior to independence in 1994 are generally summarized as being some of the worst years of economic growth. The GEAR was meant to counter effects of the apartheid policies.

Economic growth under capital controls

figure 2.4 GDP at constant prices (2005) R Million



Source: adapted from SARB

Under capital controls the economic output increased in a linear form. Looking at the graph above output attained in 1960 was within doubled in 14 years. Fedderke & Simkins (2009:26) note that using growth accounting the main driver of economic output growth was capital accumulation. The increase in output is attributed to the increased use of physical factors of production. This is in line with the growth theory that was put forward by economists such as Harod and Domar who are credited with the Harod-Domar framework, which basically was of the view that to increase output the factors of production and to also be increased in the same proportions as substitution between factors of production was not possible.

The economy experienced an improvement towards infrastructure in the mining sector which led to increased output in mining, and the discovery of more mineral deposits helped increase the output in mining. The increased capital realized from mining was

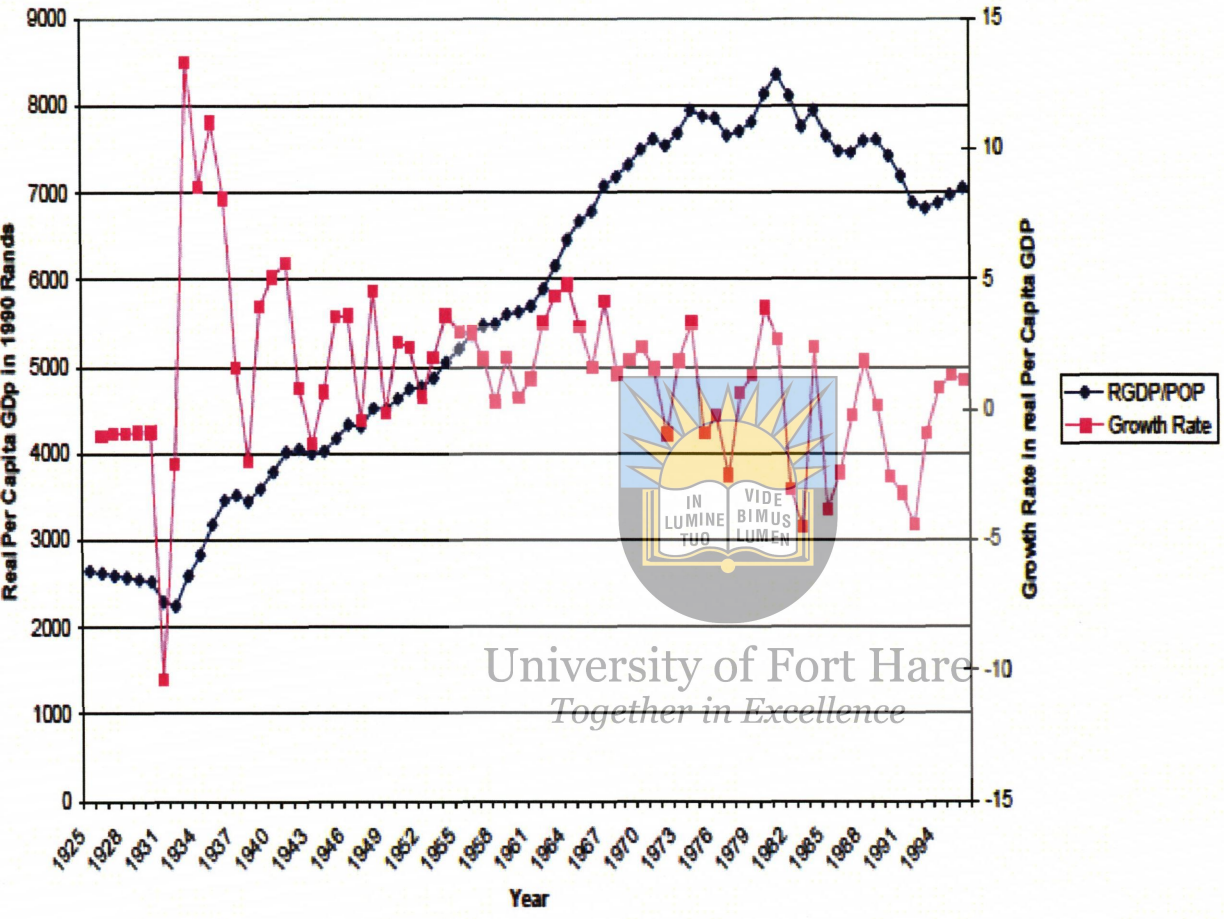
then used to for diversification by the venturing into agriculture and manufacturing, as was noted by Hackland (1980:03).

Manufacturing grew at it fastest during the 1950s. The development of new industries within manufacturing was the main reason for the increase in manufacturing within South Africa. The development of motor industry, the diamond, the steel industry and even the textile industry all contributed to the growth. The increased investment in factories and in the use of factors of production including labour meant capital accumulation was vital under capital controls. The supply of labour was readily available therefore the cost of production was cheap with regards to labour input. The focus on the factors of production is what drove the growth of output prior to capital account liberalisation.

For the period from 1960 – 1980 the amount of investment the government and public corporations spent on capital accumulation was almost always equal to what the private sector was spending. This highlights that the focus of the government and its policies was towards capital accumulation and it helped encourage the private sector do the same.

The period under 1980 – 1994 saw the economy experienced a slowdown in terms of economic growth. The increase in gold price which helped the economy in the early 1980s boosted the growth of the economy but with its subsequent drop, the performance of the economy began to decline. The uncertainty that existed at the time was a catalyst for drop in economic growth. According to Fedderke & Simkins (2009) the 14 years prior to independence in 1994 saw the economic growth slow to an extent that GDP per capita fell by approximately eighteen percent. This can be seen from the diagram below.

Figure 2.5 GDP rate and real GDP per capita



Source: (Fedderke & Simkins, 2009, p. 02)

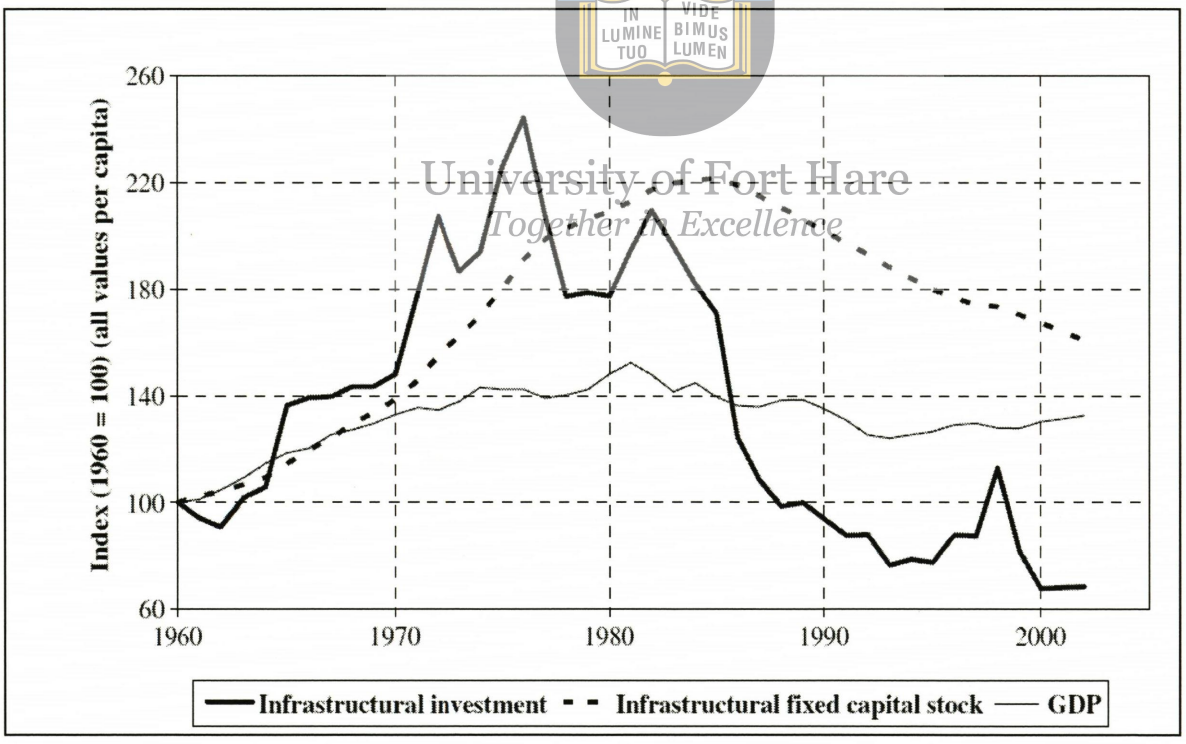
The rate of increase as can be seen from the graph above shows that after in a period of fourteen years from 1960, the output doubled but form 1980 to 1994, the rate of growth was significantly slower relative to the 14 years period from 1960. One reason for this drop in economic output could because of the drop in investment per capita. The graph below shows that investment per capita fell from the mid 1970s until the mid 1990s, resulting in the drop of fixed infrastructural capital stock.

A look at the graph below, the graph representing infrastructural investment shows that the mid 1970s was when infrastructural development as at its peak. Infrastructural development is one aspect that facilitates the growth and expansion of the economy. It

is a facet that is always a driving factor for foreign investment. The drop in infrastructural development from its peak in 1970 led to a reversal in capital stock within the South African economy.

Capital stock which has a medium to long term lifespan began to decline in the mid 1980s. This meant the based for economic growth from the investment point of view was shrinking, and thus did not predict a good future trend for economic growth. The graph of economic output shows that it has been on a decreasing trend, although that trend has been reversed after the turn of the century.

Figure 2.6 Infrastructural Investment in South Africa



Source: (PERKINS, FEDDERKE, & LUIZ, 2005)

A look at the break of the contribution of gross capital formation shows that when infrastructural investment was peaking, foreign investment was the highest contribute among three sources of capital, namely household saving, corporate savings and foreign investment. Household savings and corporate saving can be combined to be known as domestic savings. With foreign investment towards capital formation after capital account liberalisation, the reversal of the effect of drop in infrastructural investment has begun. The expectation is that for the period under 2005-2009 infrastructural investment will increase as will economic output.

Table 2.5 Financing of gross capital formation (% of GDP) (R million)

period	1960-1969	1970-1979	1980-1989	1990-1994	1995-2004	2005-2009
Household saving	0.10266	0.1793	0.38335	0.81358	0.45523	(0.19449)
Corporate saving	0.03945	0.16203	0.7939	2.076776	3.21219	2.60875
Foreign investment	0.0055	0.7132	(.219684)	(0.4239)	0.65854	6.34206

Source: adapted from SARB

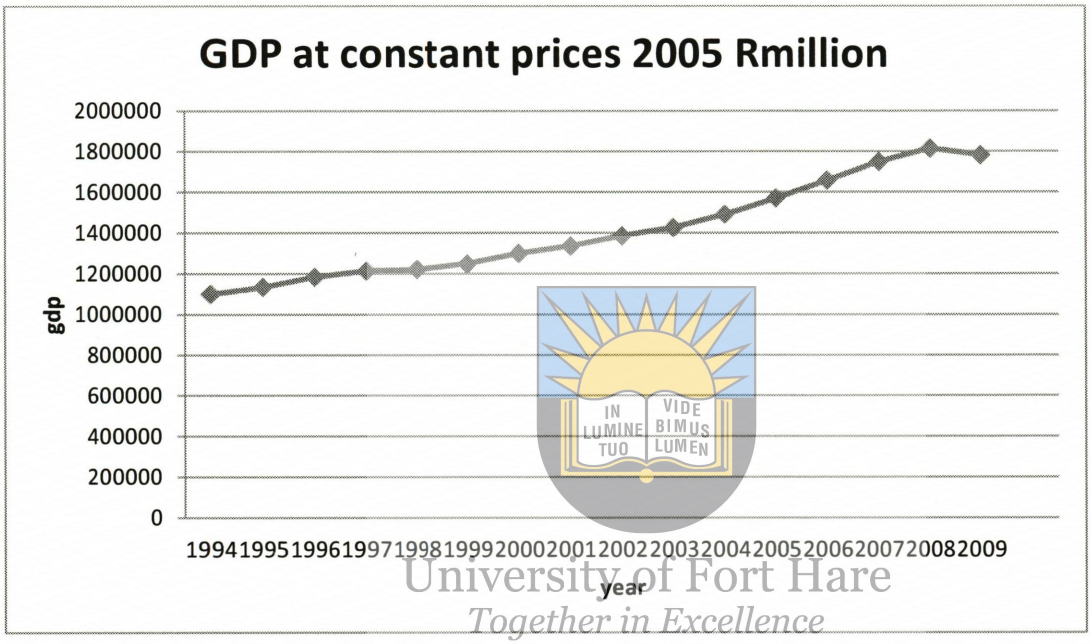
Economic growth under Capital Account Liberalisation.

From the graph after a period of a slow rate of change in terms of GDP, the start of the process of capital account liberalisation is also the beginning of a period were by the rate of increase in GDP improves. Within ten years the economic output had increased by approximately fifty percent. This is in contrast to the fourteen year period prior to capital account liberalisation.

This increase in economic output occurred when investment on infrastructure was declining just as was the case fourteen years before capital account liberalisation. This means the effect of investing in factors of production can be said to have been reduced. Therefore the probable effect that was now dominating can be said to be productivity of

the available factors of production. Du Plessis & Smit (2007:07) list total factor productivity (TFP) as the main driver of growth in economic output.

Figure 2.7 GDP constant prices 2005 1994 - 2009



Source: adapted from SARB

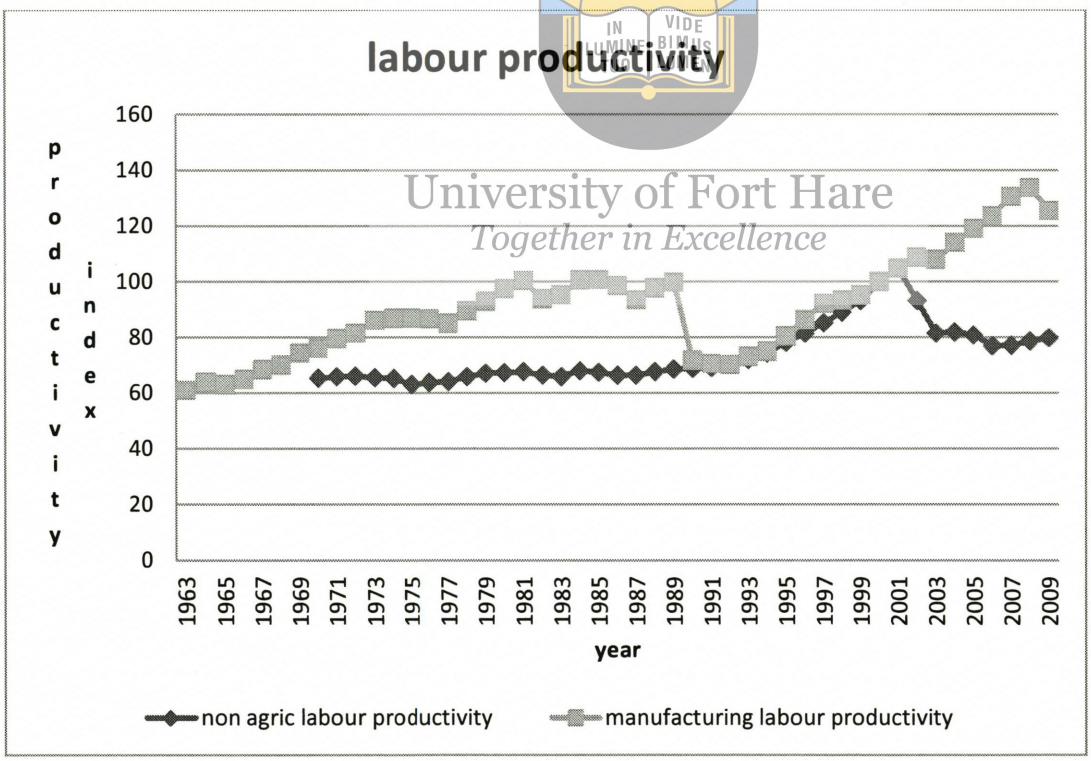
TFP is driven by efficiency and improvements in technological processes rather an increase in factors of production. This means for a given level of factors of production, the output can be increased if changes are made to processes and attention is given to efficiency.

One aspect of productivity that has come to the fore in South Africa is labour productivity. The graph below shows that towards independence in 1994, the productivity levels within the labour force were beginning to pick up. After capital account liberalisation productivity in non agriculture sectors began to increase significantly, while the productivity levels of manufacturing which had dropped after the debt crisis had began also improved to previous levels. At the beginning of the 21st century manufacturing labour productivity continued to increase to new highs but then dropped in 2009 while the non agriculture sectors experienced a dip in labour

productivity at the turn of the century which stabilized at were maintained at the approximate level of 80 in the index.

The combined improvement in labour productivity was part of the driving factor behind the increase in economic output. This trend is in line with the increase in foreign investment coming into the economy. Although some of the foreign investment was used for infrastructural development the main benefactor of this investment looks to have been the TFP side. The existing infrastructure was used to increase economic output while in previous years the output had stagnated or even declined. This is attributed to TFP.

Figure 2.8 Labour productivity in South Africa

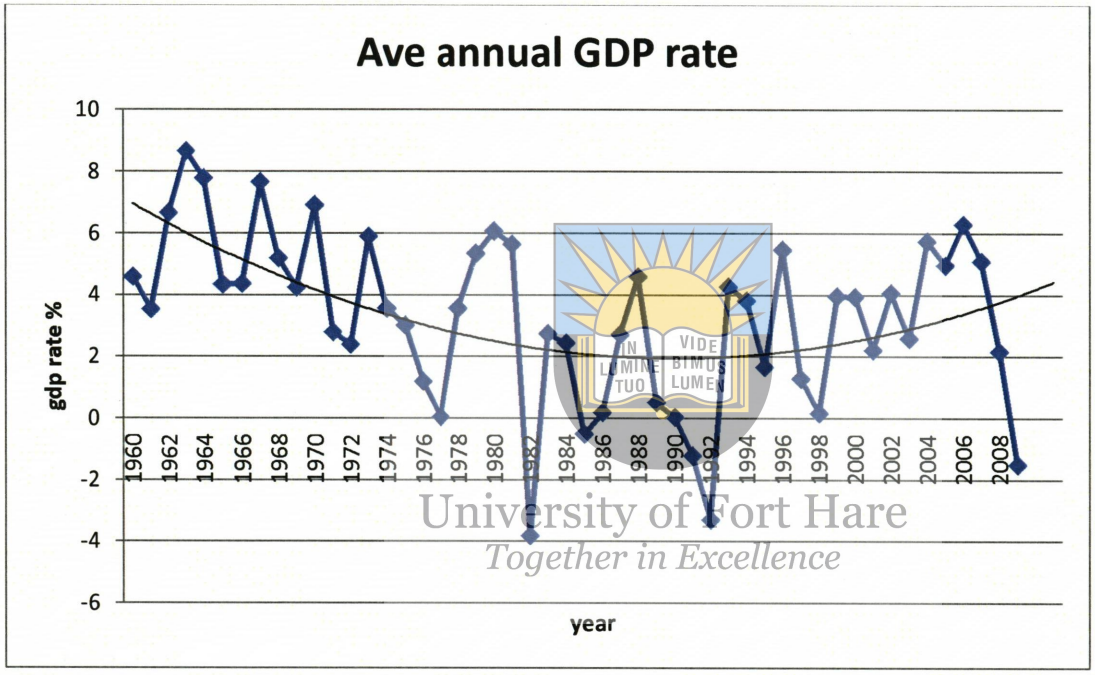


Source: adapted from SARB

Looking at the average annual GDP rate, the trend line shows that prior to 1994, GDP was on a general decline but post 1994 the trend has been one of an increase. This can be attributed to the number of factors which include the political environment and

macroeconomic policies. Before 1994 the variation of the levels of the GDP rate was wide. The standards deviation is higher than that of post 1994. Post 1994 shows stability within the levels of GDP growth rates.

Figure 2.9 Average annual GDP rate for South Africa



Source: Adapted from SARB

2.5 THE FINANCIAL SYSTEM

One channel that is vital in the transmission mechanism for capital inflows is the financial sector. According to Fourie, Falkena, & Kok (1996) define the financial system as a set of arrangements between financial institutions and non financial economic agents to transfer excess funds from surplus units to deficit units in an efficient approach. Of importance to the study will be the Banking sector and the capital markets specifically the JSE.

According to comments made by Bond (2003:254) the banking sector in South Africa can be said to have started in the 1790s. The banking sector was there to provide long term credit. The banking was run by the Government. Only around 1836 is it believed

that the private sector was allowed to participate within the Banking industry in the form of private banks. Since then the banking sector has developed and evolved.

Of importance to the study is the development of the banking industry, the focus being on its intermediation and liquidity and its liberalisation with the focus being on de-regulation.

The beginning of the 1950s ushered in the use of short term instruments. The banking sector previously had to utilise the London money market to be able to profit from the short term deposits they received from lenders. This made the central bank less influential in trying to manipulate economic behaviour as it could not influence the money market activities.

The development of the money markets helped encourage the establishment of more banks both commercial and merchant and also the introduction of discount houses. These helped improve the intermediation role of the banking sector.

Under the period 1965-1980, Fourie *et al* (1996:73), note that the use of regulation like as the credit ceilings were initiated. The credit ceilings were put in place to help improve the inflation outlook which was deemed to be negatively affected by the high levels of spending. The high levels of domestic spending were being experienced because of the increased levels of intermediation, which allowed borrowers to access short term funds.

The ceiling and also the liquidity requirements, which were constraints that were introduced, meant that the banking industry experienced a drop in its ability to intermediate. Banks experienced a drop in deposits and the expansion of the banking sector was brought to a halt. According to Singleton & Verhoef (2010:543) the South African economy had about 56 registered banks in operation.

The use of the register of co-operation meant that the banks within the economy of South Africa were limited in terms of being competitive against each other. The lack of competition led to inefficiencies within the banking sector and this was also reflected in the high levels of profit margins (Fourie *et al* 1996:74).

The need to have the banking sector in line with international standards meant that there was need to deregulate the sector and this began in the 1980s. The influence of exchange controls and the subsequent occurrence of the debt crises exposed the banking sector and it was weak in relation to the international standards.

The monetary authorities set out to make the monetary policy more effective via the financial markets and thus the banking sector reforms took place. The sector become more competitive and the use of ceilings and liquidity constraints were changed. The sector was set to move towards the Basel standards. The banking industry was transformed. According to Singleton & Verhoef (2010), by the year 2000 only 34 bank controlling financial serves companies existed and these included the big 4, Absa, Standard bank, Nedbank and First Rand ltd. A major improvement was the allowing of foreign ownership within the banking industry. This improved the levels of investment within the industry.

The JSE – (stock exchange)

Another segment of the financial sector which is of interest to the study is the stock market. The JSE is the platform created for the trading of equity securities within the South African economy. Established in the 1880s, this market has evolved and developed over the years. The JSE has various roles but the one that most relevant to the study is the one that involves the direct would be the one that involves harness of savings and investment. Fourie *et al* (1996:145), refer to this role as the "creation of capital resources and their allocation between various investment opportunities". The JSE is vital when it comes to attracting Foreign Direct Investment (FDI) and Portfolio Investments from non residents as it is able to provide investors with the returns they need for their savings.

The JSE helped with the development of gold mining companies which were the ones listed on it when it was created in 1887. They were sixty-nine companies listed when the JSE was formed. Investors that were investing in companies on the JSE were mainly interested in gold mining. By 1960, the JSE had approximately 620 companies and according to Beer & Keyser (2007), 77 of these companies were into mining. The

economy had developed and the JSE also had industrial companies and financial companies listed.

The introduction of capital controls on non-resident investors did have a major role in the performance of the JSE. Liquidity was affected as it become difficult to trade as and when an agent wanted to at the price they wanted. The period under capital controls saw the JSE experience a boom but then this was quickly followed by a crush and a slow recovery which was hampered by the slow economic growth of the 1980s. The surge in the gold price after the collapse of the Bretton woods system helped the performance of mining companies on the JSE, but the recovery was experienced in the short term.

The period after capital account liberalisation also still experienced low levels of liquidity although the JSE had began to recover from the low economic growth period in the 1980s. Non-resident investors still found that the JSE was illiquid and had a low price – earnings ratio. This was not an attractive picture for non-resident investors but the JSE found that non-resident investors were the highest purchasers of shares on the JSE.

The introduction of new regulations also helped boost the participation of non-resident investors. The protection of investors helped boost the attractiveness of share on the JSE and this uplifted the image of the JSE to be closer to those of major markets.

2.6 CONCLUSION

Having looked at the overview of the South African economy in relation to the study being undertaken the following section will provide a theoretical and empirical analysis on the capital account liberalisation and how the link to economic growth has been explained.

CHAPTER 3
REVIEW OF LITERATURE

3.1 Introduction

This chapter provides an insight into the different theoretical views on capital flows, capital controls and capital account liberalisation. The chapter will provide definitions and how economic theory explains the mechanical aspects capital flows on the economy, that is how they are expected to work and their impact. The chapter further explores how differing schools of economic thought deal with the aspect of controlling and influencing capital flows into an economy. The chapter then provides an insight into how studies have tested these economic views and the results they have obtained.

3.2 Theory on capital flows

Capital flows have been classified as either being portfolio capital funds or foreign direct investment. The main distinguishing factors are the time period and the goal of ownership and management. Portfolio investment can be loosely said to be the opposite of foreign direct investment. Portfolio investment refers to the capital that is invested into the domestic economy by foreign investors for the purpose of deriving quick sources of income. Investments in the stock market that are done without the goal of having control and managing productive assets fall under the portfolio investment and are made by the private non banking sector. While on the other hand foreign direct investment covers capital that is long term in nature and is used to attain the goal of attaining ownership of productive assists in a foreign economy, with the aim of taking part in management decision making.

Felipe (2000:20) notes that Tornell (1990) puts forward the theory that if a large amount of capital flows are highly speculative portfolio funds, they can lead to a harmful effect on the outlook of productive investment which can lead to a fall in future economic output. The reason being, the instability caused by speculative activities will be translated onto the exchange rate and result in an unstable real exchange rate. Instability in the real exchange rate makes it risky for investors. Investors find it difficult to ascertain the level of return they will receive from investing in an economy with an unstable exchange rate. Eichengreen (2004:13) says that because there is information

asymmetry as information is not complete the markets are imperfect. This leads to capital flows becoming subject to speculation and thus become volatile.

Rakshit (2003) suggests that theoretically capital flows require full employment of resources within an economy and that the movement of capital be governed by long term returns for the markets not to have uncertainty. Thus the markets become less risky for investors. Thus when markets do not conform to the requirement of full employment, the use of capital controls is vital.

The main goal for portfolio investors is to make a quick return, therefore instability in the exchange rate over the short term increases risk levels. Therefore this will reduce the confidence investors have on the economy and this will reduce the level of investment.

On the other hand Foreign direct investment is said to be less volatile as compared to short term capital inflows and thus are more benficial to developing economies. Foreign direct investment is viewed as the long term inflows and outflows of capital in an economy. Stanic (2008) calls foreign direct investment "a form of importing capital".

Foreign direct investment has been noted to have the following major effects on the economy, the accumulation of foreign reserves, increased competition within the economy and the importation of technology. It is through these angles that economists base their arguments that foreign direct investment will lead to economic growth.

Stanic (2008) is of the view that foreign direct investment has a greater impact on economic growth via the technological route, using the term "spill over effects". In the article Stanic (2008) explains his reasoning basically as, technological improvements in one sector will translate to other economies via the externalities route. These externalities will result in improved efficiency in various sectors of the economy and thus an increase in productivity within the economy. Of imporatnce is that the effects of the FDI should be incoporated in the general policies of the economy. This means for the economiy to benefit from the "spill overs effects", the authoritises should provide the necessary conditions within the economy to fully utilise these gains.

On the down side it is possible to have a situation whereby instead of there being a spillover effect there could arise a situation whereby the industry that receives the inflows develops in isolation becoming a developed sector in a developing economy.

Singh (2003) points out that the rise to prominence of derivatives has weakened the case of economic theory that FDI is less volatile than portfolio investment has somehow been weakened. The influence of derivatives cannot be undermined in terms of their effect on the investments made by Multi Nationals Corporations and other long term investors. The ability of long term investors to be able to use derivative instruments allows them to be almost able to de-invest as quickly as portfolio investors. This is a view supported by Claessens *et al* (1995) who concluded that there were no statistically significant differences in the time series properties of the different forms of capital flows including FDI. Long-term flows were often as volatile as short- term flows.

3.3 Economic theory on capital controls

Economic theory explains differing ways through which capital controls affect the economy. Capital controls are used in various ways. The main role of capital controls is centred on addressing policy issues. According to Ariyoshi, Habermeier, Laurens, Otker-Robe, Canales-Kriljenko, & Andrei Kirilenko (2000) capital controls can help the monetary authorities overcome the problem of having in limited influence on the economy via the monetary policy. Large uncontrolled capital flows can make the monetary authorities lose control over the running of the economy. The ability of the authorities to use interest rates or the exchange rate as nominal anchors to influence economic activity can be limited by the ability of foreign investors to increase or reduce capital flows as and when they want. This will result in foreign investors in having the ability to manipulate the tools used by the monetary authorities Therefore by controlling capital flows the monetary authorities can also retain the effectiveness of the monetary policy.

3.3.1 Importance of capital controls

Epstein (2005), comments on capital controls highlighting that economic theory expects capital controls to curb the effect of capital flight. Epstein (2005), defines capital flight as a transfer of assets because of Government measures to avoid a loss. Capital flight and

unwanted capital inflows have undesired effects on the level of capital in an economy therefore capital controls will hinder the capital flight to limit any unwanted change in capital levels. Capital flight will result in a drop in funds available for investment and force economies to borrow from external source thus increasing the level of foreign debt. Huge foreign debt puts pressure on the county's foreign reserves

Undesired changes in capital flows can influence the exchange rate and interest rates. Economic theory highlights that the effect of capital flows on the exchange rate is far more pronounced when the exchange rate is flexible. The changes in capital flows will influence the real exchange rate. In the short run before prices and wages can be adjusted, the impact of capital flows will be of a higher intensity. Therefore capital controls help protect the real exchange rate an economy, encouraging stability within the economy.

According to Rajan & Prasad (2005), when a situation arises whereby there are sudden inflows of short term capital, the effect is that the economy can not adjust fast enough and thus leading to a pressure situation. One such pressure situation is when there is the unexpected and uncontrolled appreciation of the exchange rate which will have have major macroeconomics implications for the economy. To remedy such a situation the Governemnt will have to aid the economy and sterilize it so as to try and keep reserves to a satisfactory level. If the governement wants to avoid such a scenario, capital controls could be one option they can use.

3.3.2 Consequences of capital controls

Economic theory also highlights that capital controls are not desirable. According to neo classical economists capital controls can be viewed in the same light as tariffs on goods. They are expected to have the same effect of distorting the efficient allocation of resources within the economy. Capital controls are expected to relax the level of discipline within the economy and thus encouraging inefficient use of resources.

Economic theory also puts forward the view that capital controls will increase the cost of capital by affecting the supply of capital. Edwards (2007) quotes Forbes (2005) who says the drop in the supply of capital leads to an increase in financing constraints and

this largely affects borrowers that are not able to access international markets. Non-resident private capital flows are expected to make a major positive contribution to the economy because the capital flows are expected to reduce the savings gap, smooth consumption enhancing stability within the economy thus positively influencing economic growth. This is explained by Seth & Varma (2009) who utilise the "two gap" theory.

According to the "two gap" theory the growth of an economy is subject to what economists term the savings gap and the trade gap. The savings gap comes about as a result of the short fall in domestic savings required to attain a given level of economic growth. Economic theory highlights that if there is a savings gap, this means the amount of domestic savings within the economy is not adequate for the targeted rate of economic growth for the domestic economy, and therefore there will be need for foreign capital inflows to supplement the domestic savings. The "two gap" theory seeks to explain the growth of an economy by tying it to the savings rate, which is not only internal but also external and the purchasing power in the economy. Therefore capital controls will reduce the level of savings within an economy and thus limit the investment levels within the economy.

When the supply of capital in an economy is reduced, there is a constraint that is levelled on the economy. To be able to meet the local demand for credit, the cost of credit will go up. If the domestic cost does not go up then the shortfall is financed by foreign debt. The economy is then expected to increase debt capital financed by foreign loans. Foreign loans will be provided at a higher cost than domestic loans. This increases the debt levels within an economy. Firms in the economy could have their leverage ratio negatively affected as they increase debt finance via foreign loans. This raises their cost of capital and lowers their returns. This makes them unattractive when sourcing FDI and thus the capital controls could trigger a domino effect that will further curtail economic output, thus stunting economic growth.

According to Eichengreen (2004) because capital controls hinder free capital mobility, they will result in a situation whereby the rest of the world interest rate and the domestic interest rate are not at par. The rest of the world interest rate will be far lower as it is

determined by global market forces, thus this will increase the demand for the domestic currency thereby causing the domestic currency to appreciate and if this appreciation is not in line with the monetary policy, this will result in a time inconsistency problem for the monetary authorities.

3.4 Economic theory explaining financial intermediation.

Financial intermediation is viewed as important for the reduction of transaction costs and limiting the effect asymmetric information within the economy. In other words the financial sector plays the role of bringing together ultimate saver and ultimate borrowers who would otherwise not be able to transact with each other. Though this was the main view, economic theory also has increasingly began to highlight that financial intermediation plays a huge role in risk reduction and risk management. The financial system has become increasingly important in creating value for the economy and economic agents.

Economic theory impresses that financial intermediation is only needed when there are imperfect markets. Under imperfect markets there is information asymmetry, there are transaction costs and such markets are deemed not to be in equilibrium.

Scholtens & Wensveen (2003:09) note that imperfect markets are in contrast to the perfect neoclassical model for the economy. The perfect model for the economy was explained under the Arrow Debreu model. Under the perfect model no one can individually influence the market, there are no transaction cost and information costs, full information is readily available to all and the securities and assets are homogenous.

Liberalisation helps move an economy from the imperfect state towards a perfect state. This arises because information becomes more readily available and technological advancements lower costs and moves the products to being closer to homogeneity

Economic theory highlights that when an economy is developing the financial sector should grow at a faster rate than the growth of the economy.

Economic theory notes that a well developed financial system is a requirement for the growth of an economy. A well developed financial system encourages efficiency within

the economy aiding economic growth and increases the levels of investment and savings. (Vitols 2001)

3.5 Economic theory on capital account liberalisation

When defining capital account liberalisation Henry (2007:1) highlighted that it is a shift in Government policy from a system that limited capital flows to and from foreign economies to a system that encourages capital flows to and from foreign economies. This means there should be a well pronounce and clear move from any previous policy that encouraged controls.

Economic theory says that capital account liberalisation is expected to result in a situation whereby capital from capital rich countries will flow to capital poor countries based on the view that capital account liberalisation leads to the efficient allocation of resources. Economic theory highlights that the expectation is that capital will from low rate of return economies which are usually the developed countries to the developing which have significantly higher levels of return.

Henry (2003:4) comments on the possibility of classifying capital account liberalisation, into liberalisation of debt flows and equity flows. Razin, Sadka, & Yeun (2000) say that debt flows involve the investments that arise from bank and institutional loans made by investors, while equity flows arise from Capital invested in equity markets.

Henry (2003:4) highlights the example of the Asian crisis. The dominant activity that South Korean Indonesian and Thailand institutions were engaged in was accessing loans from foreign banks so as to be able to invest in domestically. This was after the capital account was liberalized. The capital flowing in was in the form of loans used to fund investment. The article puts forward the analysis that Asian institutions including banks and companies took short term loans denominated in the US dollar, from foreign banks. The focus was more on the accessibility of loans rather than the encouragement of the purchase of securities within the capital markets which is the other common channel of foreign funds infiltrating into the economy.

Fischer (1997:4) highlights how the possibility of capital account liberalisation influences the policies within the local economy. Capital account flows are believed to be sensitive to macroeconomic policies, therefore the policies set out by authorities within the

economy will have a huge influence on capital flows. In order for the capital flows within the economy not be negatively affected by market forces the policies implemented should be good policies as inappropriate policies will have a disastrous effect on the economy.

It has to be acknowledged that for the liberalisation to be effective there is the need for sound macroeconomic policies as highlighted by Fischer (1997). There is a need to properly manage the interest rate, the exchange rate and the performance of the economy as a whole so as to aid in the growth of the economy. This means that the performance of the financial system is of the utmost importance. The stability of the financial system will be a priority, highlighting the importance of regulation and monitoring of the financial sector by the authorities. Free capital accounts rely less on bureaucrats and empower the monetary policy authorities, thus avoiding the problem that arises out of poor resource allocation by bureaucrats.

3.5.1 Importance of capital account liberalisation

When capital controls are removed, the result is there will be an inflows and out flow of capital. The capital flows will be either short term capital or long term capital, popularly refered to as foreign direct investment. Economic theory is divided on the effects of short term capital. The neo-classical theorists are of the view short term capital will improve the balance of payments. They say that short term capital has similar effects as trade liberalisation. In reference to opening up the capital account the neo-classical economist are of the view that short term free capital inflows have a similar effect as trade liberalisation, that is are beneficial to an economy. Gray & Dilyard,(2005) in their book highlight that, neo classical economists are of the view that external free short term capital flows will result in a general improvement in aggregate consumption pushing the demand for goods and services up, which will translate to an improvement in production. Based on the effect of trade in the Hecksher –Ohlin framework, Epstein (2005) notes that economic theory expects that capital account liberalisation will result in an increase in productivity via the factor of production which is abundant.

Eichengreen (2004) notes that economic theory is of the view that capital flows will bring into an economy resources technological knowhow and also mould the local institutions into better models that will improve economic performance and economic output.

Capital account liberalisation is anticipated to aid the development of financial markets because of its positive effect on the liquidity levels of the different asset in the financial markets. Shirakawa (2009:1) notes that the liquidity of the financial markets has become a concept, which cannot be sidelined when creating polices for the economy and points out that the bank of Japan in its capacity as the lender of last resort has the role of being the caretaker of liquidity within the Japanese economy. Capital account liberalisation will affect the financial markets, influencing the liquidity levels of the different asset classes in the financial markets. The main asset classes are grouped as capital, equity and money.

Another way Capital account liberalisation aids the development of financial markets is through the technological transfers, as it gives foreign investors the right to purchase shares and bonds in the country's markets, while simultaneously allowing domestic investors the right to invest abroad. The ability to trade in foreign securities is a process economists has termed migration of securities activities, will require that financial markets be more interlinked. The integration of the domestic financial markets and the foreign financial markets means gives rise to competition and improved efficiency, which is achieved through the improvement of technology which the domestic financial markets import from the foreign financial markets and thus improve on their intermediation..

Gruben & McLeod (2001), note that capital account liberalisation in itself will help regulate the monetary policy as it will lead to a situation whereby if there is a loose monetary policy then, capital account liberalisation will discipline the authorities. Since capital account liberalisation will result in the local market accessing external markets with the ability to invest and thus diversify portfolios a loose monetary policy will mean it is possible for the local currency to depreciate as local demand for foreign currency increases and the reserves drop within the economy. An out of control depreciation of the local currency can result in inflation. One of the goals of the Central bank is to achieve price stability and economic growth. The monetary authorities aim to achieve

these goals by using the monetary policy. The monetary policy is a set of measures that influences the quantity of money that is the money supply and availability of money or the rate of interest with the aim of attaining price stability, full employment and economic growth. The monetary policy is expected to work through the use of transmission mechanisms. The transmission mechanisms are channels through which the measures set out by the central bank are filtered into the economy by influencing various prices in the different markets, so as to be able to attain the goal the central bank has set out. Mohan (2009:220) acknowledges that the need for efficient price duscovery in well functioning finacial markets is vital for the transmssion mechanism.

Economists have tied capital account liberalisation with the development of financial markets. Bacchetta (1992:466), in an article pointed out that it is possible to have the liberalisation of the financial markets and the capital account occur at the same time. The article further states that the liberalisation can be in two ways, either as a policy decision whereby the authorities voluntarily remove restriction in the financial sector that are coupled with the capital account restrictions. Also the liberalisation of the financial markets can be a result of market forces that arise because of the liberalisation of the capital account as the local market becomes in direct competition with the external markets. The liberalisation of the financial markets can be in a number of forms, but Dulbecco, Courbis, & Allegret (2003:74) note the following as the main forms (i) the deregulation of interest rates (ii) the introduction of competition between the different channels of financing and (iii) the external opening of the finacial system.

According to Fischer (1997:3) capital account liberalisation is the trigger for the development of an economy that is why all developed economies have open capital accounts. In other words in order for an economy to develop it will need to have an open capital account. Fischer (1997) was of the view that for an economy to develop, it has to be integrated with other economies. This would enable it to benefit from the transfers made by the other economies. His view was in line with the observation that all developed countries had open capital accounts.

Henry (2003) notes that cost of capital is composed of two variables, the risk free rate and the risk premium. Both these variables are expected to fall as a result of capital

account liberalisation. Epstein (2005;17) notes that opening capital accounts should increase growth by enhancing the potential for risk diversification. The fall in the risk free rate is attributed to the increased potential for risk diversification. The drop in the risk premium is attached to the domestic market and Economic theory highlights that financial liberalisation which improves financial depth and development of the domestic market can arises through indirect channels as a result of capital account liberalisation. Therefore capital account liberalisation is expected to reduce the cost of capital.

3.5.2 Possible consequences of capital account liberalisation

Singh (2002:4) highlights that the theory on free trade which is advocate for by the neo classical economists has its shortcomings. The shortcomings are viewed from the point of view of being operational as the article highlights that there is need for stringent policies which are not traditionally adopted.

Other economists argue and say short term capital is extremely volatile and thus if an economy relys on short term capital inflows, it is likely to experince a financial crisis especially with developing economies, which are still likely to be still developing their finacial systems. This is a view supported by Rajan & Prasad (2005), who highlight the possibility of the domestic currency appreciating to unanticipated levels when a situation arises whereby there are sudden inflows of short term capital, the effect is that the economy can not adjust fast enough and thus leading to a pressure situation. This is one example of an external shock that is not well dealt with by the financial sector, and the result will be the unanticipated appreciation of the domestic currency.

Yew (2008) in a book highlights how the new Keynesian theory postulates that in general the information available to borrowers is not the same as that available to lenders. With capital account liberalisation this scenario becomes more pronounced as the borrowers the domestic economic agents will have more knowledge as compared to the lenders who are foreign economic agents in relation to the domestic market. This will raise the problem of adverse selection. In order to protect themselves lenders will then only invest in projects that they deem will give them a predetermined rate of return, which in most cases tends to be very high and excludes a significant investments

projects. This will result in the economy failing to attain the optimal level of economic welfare.

Economists against the neo classical view put forward the view that the short term capital flows are volatile and subject to abrupt changes and thus have negative effects on the economy. The argument goes on to pronounce that capital account liberalisation dependent short term inflows will result in the possibility of a financial crisis particularly in developing countries. (Gray & Dilyard 2005)

Loayza & Schmidt-Hebbel (2002) notes that any shocks, be they external or internal that can derail the attainment of the goals of the monetary policy will result in adjustments to the monetary policy tools so as to the able to influence the macroeconomic objectives. The effect of the changes in the monetary policy which then filter through the economy to eventually influence the economic goal, move via the transmission mechanism. The effectiveness of a particular transmission mechanism will vary from economy to economy, as each economy reacts differently to different stimulations because of the structure of the economy.

Capital account liberalisation will expose the economy to external shocks, which will lead to the problem time inconsistency of the monetary policy. Crockett (1994) highlight what he terms the impossibility theorem. The theorem says that it is impossible for authorities to pursue the goals of free capital mobility, fixed exchange rates and an independent monetary policy all at the same time. Therefore the monetary authorities cannot prioritise all three goals, and thus reducing the ability of the monetary authorities to influence economic performance.

Drazen & Bartolini (1997) note that capital is expected to move to where the returns are higher, in accordance with the purchasing power parity theory. This is especially prominent in the case of portfolio investment. If an economy has higher rate of return it will be an attractive option in terms of investment. This was the case as capital was seen to flow from developed economies to developing economies which had higher levels of interest rates. This was the trend when integration of economies was at its infancy.

3.6 Theory on Economic Growth

Economic growth explains how GDP varies on a yearly time scale. The variation is usually explained as a percentage change from the previous year. Although the change is measured on a yearly basis, the main aim of analyzing economic growth is to understand the long run growth path within an economy. The need is to be able to maintain good economic growth to have a sustained improvement in living standards of the population.

Various theories explain how sustained economic growth can be achieved, with the main contributors being factors of production and productivity within the economy. The main idea being that an increase in factors of production should lead to a simultaneous increase in GDP or similarly an increase in productivity should lead to an increase in GDP.

3.6.1 The Solow growth model

The Solow growth model is a neoclassical model that is used to explain long term economic growth. This model is in the form of the Cobb-Douglas function and assumes that economic output is a function of capital (K) and labour (L), that the economy is closed, there is a constant rate of depreciation which occurs in every period, constant returns and there is full employment.

$Y = f(K,L)$

$Y = K^{\beta} L^{1-\beta}$

The model also assumes constant returns thus for output to double the economy will have to provide twice the amount of inputs, which in this model are capital and labour.

According to Chamberlin & Yeuh (2006) the Solow model aims at predicting the steady state of the economy. The steady state of the economy is the optimal point where the economy is at equilibrium and the expectation is that the economy cannot grow any further. The economy will not grow any further because the level of capital and the level of labour are at their optimum. At this point it is said that there is no change in the capital-labour ratio, thus growth is maintained.

The model uses the production function and the capital accumulation function to be able to determine the steady state. The production function is made up of output per worker and capital per worker, while the capital accumulation function is made up of the savings of the population, specifically the workers as the economy is assumed to be closed.

According to the Solow model, capital accumulation will be determined by the level of saving in the economy, the rate at which the capital will depreciate. The higher the savings rate the higher the level of capital stock, holding all else constant. The model assumes that whatever savings workers make on their disposable income, they are translated into capital as the savings are invested into the economy. All the savings remain within the economy as it is assumed to be closed.

According to the Solow model, when the rate of saving per individual worker is higher than the required amount of capital per worker, the economy experiences what Chamberlin & Yeuh (2006:550) termed "capital deepening". Capital deepening is when the economy experiences an increase in the ratio of capital to labour. This means there is an increase in capital per worker.

Capital deepening is expected to occur until the steady state of the economy is reached. This means that as the capital to labour ratio increases it will approach a level where it the economy is expected to be functioning at its optimum. Therefore the economy will grow until the steady state is achieved.

The economy is expected to grow as the output per worker is dependent on the amount of capital per worker. The higher the capital per worker, the higher will the level of output per worker. Therefore as long as capital deepening occurs the economy will increase output and grow and will stop growing when the steady state has been reached.

3.6.2 Endogenous growth theory

The Endogenous growth models are used to explain the growth of the economy via improvements in the level of technology which then drives the improvement in

productivity. The improvement in productivity leads to the increase in production in the overall economy. The two main models are the AK model and the Romer model.

The AK model

The AK model is a linear model that is a variation of the Solow model. the theory explains growth of production in the economy as a function of capital and a constant determinate (A). The model seeks to establish that the change in economic production is influenced by the change of A.

The theory assumes constant rate of return to capital unlike the Solow growth model which assumes that there is diminishing returns with each additional unit of capital. According to Chamberlin & Yeuh, (2006:564) the AK model has a constant marginal rate of return on capital. This means that the economy is able to grow to any levels as long as the level of capital accumulation increases. The utility derived from each extra unit of capital is the same as the previous units. The expectation is that the level of economic growth is the same as the growth of capital.

The AK model is in the form

$Y = AK$

where K is capital.

Capital is determined by the level of investment, that is to say the investment rate and also the depreciation rate. As long as the investment rate is higher than the depreciation rate the economy will experience capital accumulation. The rate of capital accumulation will be the same as the rate of economic growth. The model highlights that as the capital per worker increases the production will also increase at the same rate since there is a constant rate of return.

$K = sY - dK$

where sY is the investment rate

dK is the depreciation rate.

The AK model has its shortcomings. The model does not provide a reason for the constant rate of returns. The failure to account for the constant returns weakens the model expectation that the economy will grow at the same rate as capital accumulation.

Chamberlin & Yeuh (2006) note that there is a view of spill over effects that arise from capital, this therefore is not consistent with the assumption that there are constant returns.

The Romer model

This is a model that was developed by Romer. According to this model, the ability of the economy to come up with new technological ideas through research and development will drive the growth of the economy. Technological advancement is thought of as an input in the Romer theory of growth and the production function can be expected to exhibit increasing rate of return as technological advancement has a possibility of a multiplier effect. According to Chamberlin & Yeuh (2006) technological advancement is "non-rivalrous "in nature. This means that the benefit of technological can multiple as it will benefit many other people not just one individual.

The Romer model is a variation of the Solow model. The Romer model has similar capital and labour functions as the Solow model. The Romer differs in that it does not treat the technological advancement of technology to be an external variable but one that is influenced within the economy. The Romer model has in addition to the Solow model a technological function, which determines the growth of technological ideas within the economy. The Romer model has a set of labour (L_a) in the economy that produces technological ideas.

$A = \emptyset L_a$

where Ø is the rate of discovery

A is the number of ideas produced.

Also the faster the population grows the faster will the level of capital increase holding other aspects constant. Depreciation will reduce the level of capital at any point in time.

3.7 Empirical evidence on capital flows and economic growth

3.7.1 Positive correlation

According to Borensztein, Gregorio, & Lee (1998) the economy should have the required amount of human capital to be able to exploit any improvements in the level of technology provided by the increase in foreign direct investment so as to be able to improve on productivity and thus eventually economic growth. Using cross sectional data for the period covering 1970-1989, for a combination of developed and developing economies the study focused on the link between FDI and economic growth via the technological channel. The results found that FDI had a positive overall effect on economic growth but this would vary depending on the level of human capital. Their study also found that FDI stimulate domestic investment rather than crowding out domestic investment. This assertion was based on the estimation coefficients of FDI in relation to total fixed investment. The coefficients ranged from 1.5- 2.3, thus the study's conclusion supports the notion that economic growth is likely to increase if FDI improves the levels of technological effects rather than through the accumulation of capital.

Hermes & Lensink (2003) analysed the effect of the pre-condition that financial systems have to be well developed in order for FDIs to have a positive effect on the economic output. They are of the view that developed financial markets are better equipped to encourage technological diffusion. The study examined 67 countries, of which 37 had at least fairly developed financial systems over the period 1975-1995. The hypothesis that was tested was FDI and financial markets are complementary in encouraging technological diffusion. The estimation found a positive and significant relationship which was in support of the hypothesis, further aiding the argument of the need for well developed financial markets when capital account liberalisation is carried out.

Durham, (2004) provide evidence that only countries with well-developed financial markets gain significantly from foreign direct investment (FDI) in terms of their growth rates. These studies acknowledge that the economy will grow because of foreign direct investment but to maximise the economy will have to be supported by a developed financial sector which should be able to carry out the role of intermediation to the best possible level.

Xu (2000) did show that foreign direct investment brings in new technology into the economy, which they found to lead to higher growth but only when the host country has what they referred to as minimum threshold stock of human capital. This means that unlike the view that Fisher (1997) gave of the capital account liberalisation automatically lead to economic development, some economists found that there have to be certain economic fundamentals that would aid the effect of capital account liberalisation towards achieving an increased growth in the economy.

Seth & Varma, (2009) in their paper examined the relationship between capital account convertibility and growth covering seventeen developing countries over the period 1970-2000, thus used panel data. They used a de-jure measure of capital account convertibility and found that among these countries there is a positive association between capital account convertibility and growth. Their study used two measures of growth, real GDP growth and total factor productivity growth. The study found foreign direct investment to play a major role in developing countries but investment was insignificant in relation to growth and thus the conclusion that there is need for proper supervision needed to turn an investment into positive economic growth.

Levine & Zervos (1998) looked at the relationship between capital account liberalisation and the development of the share market. The study focused on 16 emerging economies covering the period from the mid 1970s to mid 1990s. The objective was to determine whether the share market will react to liberalizing capital flows. The focus was on the size of the equity market, the volatility liquidity and its ability to improve integration within the world markets. The analysis done by the study found that the size liquidity volatility and the level of integration all increased after the liberalisation of the capital account. Therefore the study concluded that capital account liberalisation will have a permanent impact of the share markets. This means the development of the equity markets can be improved by having open capital accounts. This according to economic theory is one channel through which the economic can increase output and aid economic growth.

Klein & Olivei (2005) in their study examined the financial sector as a channel through which capital account liberalisation influences economic growth. The study covers the

period from 1975-1995 and had 21 OECD countries and 74 non-OECD countries. Using the IMF exchange arrangement and exchange restrictions measure, the study found there a link between capital account liberalisation and financial depth a measure used to account for the level of development in the financial sector. The study further found that there is a positive and significant link between financial depth and economic growth. This then supported the view that capital account liberalisation increases economic growth. The countries with open capital accounts in the study experienced significantly higher increases in financial depth than countries with capital restrictions. The level of economic growth among economies with open capital accounts was higher than those with capital restrictions.

Edwards (2001) analysed the link between capital mobility and economic performance specifically if there is a positive relationship between capital mobility and economic growth and if this link differs for emerging economies and advanced economies. The study covered developing and developed economies an covered the period from 1975-1997. The conclusion based on estimation focusing on data for the 1980s found that the relationship between capital flows and economic growth is positive if the economy has experienced a given level of development. The study notes that the financial sector should be the area of focus in terms of development. Based on this the strength of the relationship will differ for emerging and developed economies as they are at differing levels of development.

Arteta, Eichengreen & Wyplosz (2001) sought to find out if there is a positive relationship between capital account liberalisation and economic growth. Altering a model used by Edwards (2001) the study used the IMF exchange arrangements and exchange restrictions sampling sixty one countries over the period from 1973 to 1992 they performed cross sectional analysis. The study made an interesting observation saying that financial depth does not play a role in aiding the economy to benefit from capital account liberalisation. This was in contrast to Klein and Olivei (2000). The Arteta et.al (2001) note that capital account liberalisation will aid economic growth provided the macro economic imbalances are removed and is the sequencing of trade and financial liberalisation are done in the right order.

Bekaert, Harvey, & Lundblad (2001) in their study investigated whether financial liberalisation spurs economic growth and if it does how does financial liberalisation increase economic growth and why there are cross country differences on the liberalisation effort. The study uses panel data and applies the General Method of Moments (GMM). Using four samples comprising of ninety five, seventy five, fifty and twenty eight countries they investigate the named aspects of the link between financial liberalisation and growth. The study finds that most countries had higher economic growth rates five years after liberalisation than the five years prior to liberalisation and that economies that had open capital accounts had an average growth rate of 2.3%, while those that never liberalized had an average growth rate close to 0%. The study says that approximately 40% of the increase in economic growth is attributed to liberalisation. The study also found that the ratio of investment to GDP increased after liberalisation while the levels of consumption in relation to GDP and the trade balance was negatively related to economic growth after liberalisation.

Glick, Guo, & Hutchison (2004) Seeking to counter estimation bias so as to have an effective evaluation platform the study uses the matching and propensity score methodology. The particular estimation bias arises from the "selection on observations" problem, which occurs when non-random selection is used. The sample used is made up of sixty-nine developing countries chosen based on the criteria that a country has GDP data available for ten consecutive years between1975-1997. The study notes that the five year period between1975-1979 had the highest level of occurrence of currency crisis while the five year period between1985-1989 had the lowest level. The study found that with liberalisation currency crisis occurred 6.8% while with restrictions occurred 12.7%. The study concludes that capital restrictions tend to be more associated with increases probability of a currency crisis and those countries that have liberalized will be more likely to avoid a currency crisis.

3.7.2 Negative correlation

Financial crises in Asia, Russia and Latin America have shifted the focus of attention from when countries should liberalize to if they should do so at all (Henry 2003).It is

possible that capital account liberalisation can lead to a currency crisis, because the sudden and huge increase in capital inflows and outflows coupled with the possibility of external shocks can lead to a situation whereby the local currency loses its ability to be a medium of exchange and a store of value. An article by Kawai (2007), gave possible ways by which capital account liberalisation can lead to crisis.

(i) First generation model: Worsening economic fundamentals (for example expanding money supply due to large budget deficits) can cause a currency crisis.

(ii) Second generation model: Expected policy change (for example macroeconomic stimulus due to recession or high unemployment) can induce a crisis.

(iii) Third generation model: Presence of double mismatches, liquidity constraints on firms with external debt, and speculative runs on banks can cause a currency crisis.

An IMF report compiled by Ishii & Habermeier (2002) refers to a survey that focus on 35 economies and of those economies 24 had experienced a financial crisis and of those 24, 13 had liberalized their capital account at most 5 years before the crisis. Financial crisis is a broad term used to accommodate any failures that occur within the financial sector. These failures will include currency crisis, banking crisis, stock market crashes or even a combination also referred to as twin crises. Surveys such as these have strengthened the argument brought forward by economists against capital account liberalisation and supporting the view that capital account liberalisation has detrimental effects on economies. This is so because there has been considerable loss in terms of welfare with regards to large sections of the specific country populations.

The study done by Ferreiro, Correa, & Gomez (2008) focused on what they termed "the consequences of the general process of capital account liberalisation". The study focused on Latin American economies and using ANOVA found that between 1980 and 1991 only 13 out of the 24 countries had significant changes in the growth rate while after 1991 only 3 had significant growth rates. Their conclusion was that capital account

liberalisation as a single factor will not lead to a sustained increase in capital flows over the long run and thus will not translate to improve economic performance

According to a study done by Aker and Aker (2009), they analysed seven developing countries' economies that had experienced one form of financial crises. They focused on the capital flows under a fixed exchange rate regime and floating exchange rate regimes under liberalized capital accounts. The study analysed the period before the financial crises and after the financial crises. The exchange rate of a country at a particular time will depend on authorities economic goals. The study found that liberalisation can lead to financial crises as free capital movements are noted to have a huge influence on macroeconomic variables. Capital flows can negatively affect economic growth, if the currency is restricted form freely float as this will lead to a financial crises thus being counterproductive for economic growth.

Licchetta (2006) focusing on emerging markets sought to understand why fully open capital accounts as a policy are no longer being pushed as a must for emerging countries. Analyzing various past studies the investigation came up with a number of points of note. The first is that past evidence shows that emerging economies do not necessarily have to have fully open capital accounts to grow. The study mentions that the best performing emerging economies in the past forty years have restrictions in place. Examples include China and India. The study also notes that the worst performing economies in terms of growth are not liberalized. The second point of note is that the study found that when capital accounts were opened the level of consumption volatility increased and the third point the study found was that after fully opening capital accounts the level of macroeconomic volatility increased. This is evidenced by the presence of increased financial instability which is then observed as either a currency or banking crisis.

Milesi-Ferretti & Grilli (1995) using panel data covering sixty one countries, the study investigated the determinants of capital controls and the effect capital controls have on economic growth in the long run. The study had a number of findings but the most relevant aspect to the current study is the effect capital controls on economic growth. The study found no robust correlation between capital controls and economic growth.

Reinhart & Kaminsky (1999) the study analysed the link between banking crises and currency crises. Of importance to the study is the association of financial liberalisation with banking crises. Focusing on the period 1970-1995 the study highlights that financial liberalisation is a catalyst for a banking crises, which in turn becomes a precursor of a currency crises. Using a combination of developed and developing countries totaling 20, the study found that the link between banking crises and a currency crisis increased after financial liberalisation. Also found that the banking crises are preceded by financial liberalisation. The effect of financial liberalisation can be counter by having strong bank supervision and good regulation.

Detragiache & Demirgüç-Kunt (1998)examined the performance of 53 countries either developed or developing over the period 1980-1984. The study found that in the event of capital account liberalisation banks are more exposed to external forces and shocks. This exposure increases the chances of a banking crisis occurring if there is financial liberalisation. Also of importance is that there a likelihood of increased competition within the banking sector which then increases the level of moral hazard which arises from increased risk taking by the banks. The study also suggests that there is a mutual between banking crises and currency crises. The effect does not necessarily flow from one crisis to another but can go both ways.

3.7.3 Inconclusive

Alfaro, Chanda, kalemali-Ozcan, & Sayek (2004), looked at the role played by the development of financial markets in the relationship between FDIs and economic development. Using data from 71 countries over a period of extending from 1975-1995, the study does highlight that there is a positive relationship between FDIs and financial development. The estimation done by the study did not out rightly support the view that FDIs will automatically aid economic development. The results were not conclusive in that regard but did find that an economy will benefit more from FDIs if the financial markets are well developed. This conclusion brought to the fore, the realization that country specific conditions will determine how effective the foreign capital flows are in aiding and growing the domestic economy.

A study by Tang, (2006) aimed at exploring the finance and growth relationship focusing on Asia Pacific Economic Cooperation (APEC) countries both developed and

developing over the period spanning from 1981 to 2000. The study sought to investigate whether financial development would promote growth and whether financial infrastructure influences growth. The study using a modified growth model focused on how the stock market, banking sector and capital flows would as three facets of financial development affect economic growth. The results showed that the stock market rather than the banking sector development would promote growth in developed countries, which was expected as capital inflows boost the liquidity of the capital markets which is used by investors to raise more capital for investment opportunities, which are then expected to lead to economic growth, but the study also found that an increase in capital flows wouldn't guarantee an increase economic growth among APEC countries directly.

Rodrik, (1998) assessed the need for open capital accounts. Observing twenty three developing countries listed under the IMF that had experienced open capital accounts at any point since 1973, the study found that the economic performance was mixed and therefore the conclusion drawn was that there is no correlation between capital account liberalisation and economic growth. To further substantiate this conclusion a the study examines the relation between capital account liberalisation and the following variables, economic growth investment and inflation in a sample of 100 developed and developing countries from 1975 to 1989. Rodrik estimates regressions with average growth rates of GDP per capita and Share which is a measure used to assess capital account liberalisation and finds no statistically significant correlation between growth and share. This is in line with what was observed in the twenty three developing countries. The conclusion is that there is no evidence to suggest that countries with fewer restrictions on capital movements grow faster, or invest more, than countries with greater restrictions.

Edison, Levine, Ricci, & Sløk, (2002) focused on international financial integration. The study investigates the influence unrestricted cross border transaction have on the level economic growth within an economy. The study uses a variety of indicators of capital account openness, different measures of capital flows and additional measures not used in past literature on international financial integration. To counter the simultaneity bias and bias arising from omission of country specific variables the study uses three

estimation methods, namely ordinary least squares, two stage least squares and the generalized method of moments. The data used was from 57 countries and covered a period of 25 years from 1976. The study did find that there is a link between economic growth and international financial integration. The results though also highlight that the strength of the relationship is not convincing and therefore cannot be certain of economic growth.

Kraay (1998) the aim of this study was to investigate the medium to long term macroeconomic benefits that arise from capital account liberalisation on economic growth, levels of investment and the level of inflation. The study used the IMF exchange arrangements and exchange restrictions, the Quinn measure and also the levels of capital flows to proxy financial openness. The study covered one hundred and seventeen countries both developed and developing over the period 1985-1997. Using ordinary least squares and event study analysis the study found that there is little evidence to support the theory that capital account liberalisation leads to higher economic growth. To understand this outcome the study further went on to look at the possible reason and found that the increased volatility that accompanies capital account liberalisation leads to the benefits having a smaller impact and also there is need for supportive policies and good institutions.

3.5 CONCLUDING REMARKS

The literature indicates the interest that the relationship between capital flows and economic has generated. The literature is not conclusive in its position and because of the different techniques used the comparison of the results to determine the most probable argument is made even more difficult.

Most studies used panel data in their analysis and thus the view that country specific conditions play a major role in determining the relationship that will exist between capital flows and economic growth becomes stronger.

The study will focus on South Africa and thus should be able to incorporate the country specific conditions that are relevant to South Africa in determining the relationship between capital flows and economic growth.

CHAPTER 4
EMPIRICAL ANALYSIS

4.1Introduction

The study seeks to be able to determine the behaviour of the given data set that is the behaviour of GDP in relation to changes in capital flows, before and after a structural change in the economy. The structural change in this case represents the policy change from a closed capital account to a more open capital account.

The first step in analyzing the data is to have a model that is based on economic theory and the second step is the use of statistical, econometric tests to analyse the nature of the variables.

To be able to draw up a good conclusion in analyzing the relationship between capital flows and economic growth, a good model has to be used. A good model has a theoretical base and should be able pick up vital characteristics of the variables and be able to provide a strong basis for any explanation that is drawn from the results of the model. A good model will provide an analysis that is greatly able to explain the behaviour of the variables and minimise any significant behaviour that is not explained. The unexplained behaviour is then captured in the error terms.

Modelling of data is a tool used to cover the variations that are present in the characteristics of the data. These variations in the individual character of a variable make it difficult to draw a credible analysis of the relationship that exists between the variables as the link between variable is considered imperfect when there these variations.

4.2 The Theoretical Model

An endogenous growth model is a good option to use for the study. This is because theoretically it links any changes to capital flows to the changes that occur to economic growth. An endogenous model basically will assume that any changes that occur to GDP will be the result of the interaction of the variables in the model and therefore this relationship can be observed over the long run. According to Romer (1994) the endogenous growth theory is an alternative explanation to the neo classical exogenous

growth model. The most basic proposition of this growth theory is based on the production function:

$$y = f(x) \quad \ldots\ldots 4.1$$

where x represents the factors of production

Since endogenous growth model seeks to explain the long run behaviour of the growth theory thus the concept of diminishing marginal returns plays a critical role in the adaptation of the production function to an endogenous growth theory. When adapting the production function to apply to economic growth, the assumption is that the growth of output will be a function of technological advancement, subject to the available resources within the economy. When technology is held at a constant level over the long run, the concept of diminishing marginal returns means with time the growth rate will drop as the expectation is an increase in population. Therefore in order to be able to constantly have a growth rate greater than zero there must be a continuous improvement on technology.

The other assumptions for the endogenous model include the one that states that there should be two sectors namely, a goods-producing sector and a research and Development (R&D) sector which is the source of production knowledge. Therefore to be able to write out the function it can be written as

$$Y = f(K, L) \quad \ldots\ldots 4.2$$

where K represent the capital side of the productive sector, which can be said to be the country specific factors

L represents the labour side that performs the R&D, and is influenced by the spill over effects of the capital flows.

The rate of technological improvements which are expected to drive the economic growth are tied to R&D. R&D is a result of Government measures and policies that lead to higher levels of competition in the markets and a higher rate of innovation which are expected to permanently raise a country's economic growth rate.

One such policy is capital account liberalisation which is expected to have the ability to permanently raise a country's economic growth rate. By liberalising the capital account the expectation is that an economy will experience an increase in capital flows which result in the spill over that will cause technological advancement, the transfer of managerial and institutional regulations which are expected to lead to economic growth against the country given factors.

Endogenous growth theory model predicts the long run behaviour of the growth of the economy based on changes which originate within the economy. This means that any increase in capital flows will filter into the economy via the spill over effects and it is only these externalities that are expected to result in a positive growth rate for the economy when considered under the given country specific factors. The increase in economic growth will be because of the development of a high valued-added knowledge within the system of the economy which will develop the local industries and improve on efficiency and productivity within the economy.

With the endogenous model the long run growth rate is not determined separate from the model but is determined by the model itself. The advantage of the endogenous model is that it has the underlying assumption that there are non decreasing returns based on the selected factor of production as highlighted by Seth & Varma (2009). This allows the study to predict that any long run growth changes in South Africa under the period under review will be as a result of changes in capital flows. The model is a linear relationship between growth rate and the independent variables in the form

$$Y = f(K, L)$$

.Adapting the linear growth model to the study it will follow the set up for the basic benchmark growth regression, which was used by Epstein (2005), whereby the study seeks to regress economic growth against capital flows and the country specific conditions, which will also include the financial sector development variables. The basic set up for the benchmark growth regression is in the form:

$$Y = \alpha + \beta X_t + \gamma CAL + \varepsilon_t \quad \text{.....4.3}$$

Where

Y represents GDP growth

CAL refers to the variable for capital flows

X represents a vector of control variables

The "two gap" theory explains the importance of the savings gap and the import gap in relation to economic growth. The vector of control variables will have to represent channels within the economy that will facilitate the effect of savings, and the effect of imports in influencing economic performance.

The financial sector is the main channel through which the effects of change in the policy relating to the capital account will filter into the South African economy. The development and performance of the financial sector magnifies the effect changes in capital flows will have on GDP. The main aspects of the development and performance of the financial sector will be its ability to link ultimate lenders with ultimate borrowers which is the intermediation aspect, also the performance of the banking sector in relation to its depth and also the liquidity of the capital markets.

The ability and efficiency with which the local banking sector can mediate between ultimate lenders and ultimate foreign borrowers influences the confidence foreign investors have in an economy. This means the ability of foreigner investors to invest locally borrowed funds on domestic capital projects is also dependent on how well developed the financial sector is.

Gorton & Winton (2002:04) note that the ability of the financial sector to link ultimate lenders and borrowers is the "root institution in the savings-investment process". If the banking sector is not able to carry out this aspect, it means the ability of the foreigners accessing capital locally hinders their ability to have an influence on economic activity thus reducing their effect on economic output. Therefore any changes in policy that encourage foreign investors to borrow locally but do not encourage the development of the financial sector will not yield the desired positive effect on GDP.

Of great importance is the ability of the financial sector to influence the savings rate. It is important for the financial sector to be able to encourage domestic savings to be able to

encourage domestic investment. If the financial sector is unable to meet the needs of savers and the desires if borrowers, indirectly this will negatively influence the ability of the financial sector to attract foreign investment.

The ability to be able to carry out this aspect of intermediation is affected by various factors such as information asymmetry, moral hazard and adverse selection. These factors arise because of an imperfect markets and therefore the ability of the financial sector to be able to counter these factors also helps in the process of efficiency within the economy. The measure used to measure the ability of intermediation is the claims by local banks on the private sector. This is the variable that will be included in the model to represent financial development.

The next aspect of the financial sector development is financial depth which represents the banking sector's ability to be functional. If the banking sector is deemed to have a low velocity rate, the effect of money supply will be a hindrance to the ability of the banks to meet the money demand. This means the inability of banks to meet the demand for money limits the ability of foreigners to invest locally as they may not easily access the necessary local funds to inject into projects and investments. The inability to access large quantities of capital without increasing limits the investment interests that may arise from foreign investors. The financial depth of the banking sector can be used as measure for financial development but will not be included in the model as it will result in multi co linearity within the model.

The liquidity of the capital markets is another aspect that is of importance in relation to financial development. The ability of foreigners to be able to enter into the capital market and be able to exit without experiencing losses is vital in attracting foreign capital flows. The capital market is a major market in bringing in foreign capital. The ability of foreigners to buy shares and bonds is vital in the influencing the changes in capital flows and impact on the effect of policy changes. This is another proxy for financial development but will not be included in the model because of the problem of multi co linearity.

The model will also incorporate the import gap. The import gap compliments the savings gap. With the two gap model, the trade balance plays a major complimentary role together with the savings gap in determining the level of economic development. Cochrane (1972)notes that structural economist highlight that there are two possible constraints to economic growth, namely the domestic savings and trade gap. The model will use the trade balance to be able to account for the economy's import gap.

Also the model will incorporate the ability of the human capital within the economy to increase production. The ability to increase production directly influences the performance of the economy. The expectation is that changes in the capital account policy influence levels of technology within the economy. The economy should be able to fully utilise the new technology and therefore the ability of the human capital to use the new innovations is vital. The model will measure this aspect of productivity.

The model will be as follows:

$$Y = \alpha_0 + \alpha_1\ FDI_T\ + \alpha_2 P.I_T\ + \alpha_3 CLAIMS_T + \alpha_4 PRODUCTIVITY_T + \alpha_5 TRADE_T + \mu_T \quad \text{.....4.4}$$

4.3 Methodology

The main goal of the study is to analyse the performance of the South African economy that is focusing on output in relation to the change in the policy of restricting capital flows. To be able to deduce the effect capital account liberalisation may have had on the relationship between capital flows and economic growth within the South African context it is of importance to first establish a relationship. The relationship will be based on how the two variables interact with each other and their long run link. The relationship that will be established will be based on the period 1975 to 1994, which can be viewed as the normal expected relationship under a controlled environment. Then the study will then add onto the model period sixteen more years under which the economy operated under a liberalised environment and establish a new relationship. The goal will be to analyse the two relationships so as to be able to observe any changes that may have occurred to the second relationship and these will be attributed to the effect of liberalisation. Both qualitative and quantitative analysis will be done.

The relationship between capital account liberalisation and economic growth is one that can be analysed from various points of view. One approach is the one that uses indices to measure the change in policy from capital account restriction to capital account liberalisation. There are a number of index measures that have been used by past studies and these include the IMF measure known as the exchange arrangements and exchange restrictions, the Quinn measure and the share measure. Studies such as Kraay (1998) , Arteta *et al* (2001) and Rodrik (1998) have used the measures in their studies. The shortcoming of these measures is their inability to accurately represent the state of the economy at all times. The measures will represent either extreme of a continuum that is either the economy is fully open of under restrictions. The measures do not cover intermediate situations between the two extremes.

To be reflective of the actual state of the economy the study uses the actual flows of capital. The study will use the actual flows in terms of portfolio capital and foreign direct investment. The actual flows are better able to represent the effect the change in policy had on the economy. Various studies such as Aker & Aker (2009), Hermes & Lensink (2003) and Durham (2004) used the flows of capital to analyse the effect of capital account liberalisation.

Most studies have focused on using cross sectional samples to analyse the relationship between capital account liberalisation and economic growth. Examples of such studies include those done by such as Klein & Olivei, (2008), Bailliu (2000) and Durham (2004). Cross sectional studies have the limitation of generalizing. Aziakpono (2003:07) quoting Bloch and Tang (2003), highlights some of the problems that cross sectional data creates when analyzing the relationship between capital account liberalisation and economic growth.

The studies do not differentiate when the countries within the sample opened up their capital accounts. This means countries that have had longer periods of open capital accounts are treated the same way as countries that have recently opened up their capital accounts. The assumption is that there are no lag periods in relation to how each country will react to capital account liberalisation.

The other shortcoming of cross sectional data is the inadequate accounting for the country specific factors, which may result in a generalized view with at lower significance levels as compared to time series analysis of each individual country. These studies were not able to study the individual behaviours of individual economies and thus couldn't comment on specific countries. Each country has specific factors that affect its economy and these may have a significant influence on the relationship between capital account liberalisation and financial sector development.

Cross sectional studies also have the disadvantage of not being able to adequately provide the appropriate measure of influence each country may have on the final results. These approaches often give all countries, either small or large, an equal weighting since they are assumed to be homogeneous; and the coefficients represent only an average relationship, which may or may not apply to individual countries in the sample

4.3.1 QUALITATIVE ANALYSIS

The shape of the distribution is of importance when analysing data, because regression involving variables with considerable difference in shape tend to be a lot more difficult to carry out and explain. The shape is of importance because if a dependent variable has dominant features that are not explained by the independent variables in a model, it will make the analysis less credible. The Jarque-Bera skewness test is used to test the shape of the distribution.

The Jarque- Bera test uses the coefficient of skeweness and the coefficient of kurtosis. The coefficient of skeweness is a third centred moment. It measures if the distribution is symmetric, while the coefficient of kurtosis is a fourth centred moment and measures the heaviness of the tails of the distribution.

In economics it is more common to find data that is skewed. With skewed data the distribution is not balanced as the distribution does not have a clear centre. The mean and the median help define the balance of the distribution.

The use of the descriptive averages, namely the mean, mode and median will be used. When using these averages the following questions are of importance

1. Are the data unimodal or multi-modal?
2. Are the data symmetrically distributed or skewed?
3. If unimodal and symmetric is it bell shaped?
4. Does the distribution have a main body with fat or thin tails?

Multimodal data means the mean and median are not of great value because the shape of the distribution has to be bell shaped and therefore symmetry will play a bigger role. To make the data provide better analysis the data should be split and made unimodal. This will mean restructuring the data to be a series of data sets that represent individual structural breaks. The mean is most useful if the data is unimodal and symmetric.

The Qualitative analysis will also involve trend analysis. The analysis aims at trying to determine any trends that may exist between capital flows and economic growth. Capital flows will be split into net foreign direct investment and net portfolio investment while economic growth will be represented by the GDP growth rate. The analysis will be done under two periods, the period under capital controls and the period under capital liberalisation. Of importance will be the magnitude of the rates of change in capital flows, GDP and GDP per capita.

The comparison of the first (1^{st}) differences will provide a picture on whether the larger the changes in capital flows lead to a larger changes in GDP. The first differences will be used to analyse the rates of change in absolute terms over the long run

A scatter diagram will provide a visual explanation of the type of relationship that exists between changes in capital flows and changes in economic output. To be able to have better insight into the patterns the graphical illustrations are important. The first graphical illustration is the scatter diagram, which will plot the changes in capital flows against changes in economic growth. The plotting of these variables will produce a visual picture of the patterns that is created. The scatter plots will cover the period before 1994 and the period after 1994. Both diagrams will provide a picture on the behaviour of the two variables. The scatter will not infer any link but just how the variables behaved in relation to each other under both periods.

The variables

Net foreign direct investment (FDI) is the variable that accounts for the movement of capital into the home economy from non-residents and out of the home economy to foreign economies. Such investments are done through mergers and acquisitions or joint ventures and are made by the private non banking sector. The variable will be expressed in its monetary form.

Portfolio investment (P_I) can be loosely said to be the opposite of foreign direct investment. Portfolio investment refers to the capital that is invested into the domestic economy by foreign investors for the purpose of deriving quick sources of income. Investments in the stock market that are done without the goal of having control fall under the portfolio investment and are made by the private non banking sector. The variable is expressed in monetary terms.

Gross Domestic Product growth rate is the percentage change in GDP for consecutive time periods. The change can be positive or negative. It is the measure that is used to determine whether an economy is growing positively or negatively.

4.3.2 QUANTITATIVE ANALYSIS

Under quantitative analysis the study has opted to test the available data against a determined model, so as to obtain the behaviour of the data. The idea is to explore the available data against a given template, which is the model. The focus of the study is on analysing the data obtained so as to be able to determine if there is a long run relation between economic growth and capital flows and how this relationship was influenced by a policy change that affected capital flows into the economy. If there is a need the study will also use the results obtained to determine if there are shortcomings in the model and improve on the model.

The quantitative analysis will utilise econometric estimation. The study will begin by using a structural model modified from the theoretical framework discussed under empirical analysis. The structural model factors in various theories to help create the endogenous model. The econometric estimation techniques used will assess the extent to which capital account liberalisation had on GDP within the South African economy.

The structural endogenous model is based on economic theory. The model should be able to characterize and explain the changes in the real data, explore the data providing meaningful analysis and detecting the sensitivity of the data. For a model to be deemed as adequate it should be able to explain the relationship between variables and the error term should not account for any significant explanations that the model failed to account for.

In general there is a lot of variation in data. The variation in data makes the link between variables to be imperfect. To be able to overcome the imperfect nature of the relationship between variables it is important to account for the erratic variations. This is done through regression analysis which uses the error term to help capture these variations. The capture of the variations then makes its simpler to determine the behaviour of the data.

The starting point will be the regression of economic growth against capital flows and country specific conditions. The regression is done to evaluate and describe the relationship between a given dependant variable against a host of other variables. The goal of the regression is to establish if there is a quantitative relationship between variables that is changes to GDP which can be attributed to changes in the openness of the capital account. The regression analysis will predict the direction and the amount of change. The regression will also help determine how the dependant variable is expected to react at any point in time to the other variables.

Regression analysis focuses on the various averages of the dependent variable given different values of the independent variables. The estimators used have to be unbiased so as to be able to provide estimates that have meaningful economic interpretation. Unbiased estimators have distributions that are the same as the population mean and therefore are better able to reliable and valid estimates. The unbiased estimates have smallest variance and are referred to as maximum likelihood estimators.

The aspect of importance with the regression is the correlation that may exist between the variables. Correlation is a measure of the linear relationship between the variables being assessed. The model is linear and therefore it can be assessed to what degree the variables relate to each other in terms of movement.

4.3.3 OLS FRAMEWORK MODEL

$GROWTH = \propto + \beta FPI_t + \gamma[CONDITIONINGSET]_t + \varepsilon_t$ 4.5

Where GROWTH represents the real per capita GDP growth,

FPI represents net private capital inflows into the country;

CONDITIONING SET represents a vector of conditioning variables that are country specific.

The Empirical model (for the period 1975:01-1994:01)

$Y = \beta_0 + \beta_1\ FDI_T\ + \beta_2 P.I + \beta_3 CLAIMS_T + \ + \beta_4 PRODUCTIVITY_T + \beta_5\, TRADE_T + \varepsilon_T$ 4.6

The empirical model (for the period 1994:02-2010:02)

$Y = \alpha_0 + \alpha_1\ FDI_T\ + \alpha_2 P.I_T + \alpha_3 CLAIMS_T + \ + \alpha_4 PRODUCTIVITY + \alpha_5\, TRADE_T + \mu_T$ 4.7

The study uses a model similar to the one used by Tswamuno, Pardee, & Phanindra, (2007). There is a variable used to represent capital flows and there are variables that represent the country specific variables are classified as financial development, trade and Government expenditure. The study will utilise labour productivity in place of Government expenditure

Labour productivity is a vital aspect when referring to growth models. Labour is a component of capital and is used in both neo classical model and endogenous growth models. The importance of labour is the productivity of the labour force. This is an aspect that will influence the final output of an economy. Therefore to incorporate this aspect within the economy it will also be used in the model.

The variables used to represent foreign direct investment (FDI) are net Direct Investment (DI) for the period after 1994 and long term capital movements (LCM) for the period from 1975 to 1994. Both these variables measure FDI with LCM used under the BOPm4 framework which was in place prior to 1993 and the DI was used in the BOPm5 framework which came into effect after 1993.

Net portfolio investment (P_I) is made directly by foreign investors into South Africa. The figures will be from the private non banking sector. The PI is represented by Portfolio investment after 1994 and short term capital movements for the period 1975 to 1994. The portfolio investment is the measure used in BOPm5 while short term capital movements are used in the BOPm4 framework.

The other variable for financial development is CLAIMS, and these are claims by local banks on the private sectors like loans and are a measure of bank sector intermediation. Bank sector intermediation is a measure that basically aims to analyse the ability of the bank to link ultimate savers with ultimate borrowers. The study will use the ratio of the amount of credit the banking sector offers to the private sector in relation to the gross domestic production. This ratio will show the significance of the banking sector's activities in contributing to gross domestic product.

A variable that can be also used to proxy financial development in place of claims is financial depth. Financial depth is used to help determine the level of development of the financial sector. The financial sector is the main channel through which surplus units and deficit units are brought together. The development of the financial sector is vital and hence the assessment of its development is vital in determining the relationship that exists between capital flows and GDP. The most common measure of financial depth is the ratio, money supply to GDP.

The ratio shows the funds that are available within the economy in relation to economic output. Caballero & Krishnamurthy (2004) note that the lack of adequate fiscal discipline within an economy will negatively affect the Financial depth of the financial sector. Increasing public debt leads to an increase in demand for funds, which if not matched by a similar increase in the supply of funds will lead to an increase in the liquidity premium as the government crowds out the private sector. The crowding out of the private sector also reduces the confidence of investors.

The other control variable is trade openness (TRADE), which reflects the level of exports and imports within the country, as this variable represents the level of which a country will permit trade. The proxy of the trade openness is the sum of export and import divided by GDP. This is also referred to as trade intensity index.

The last variable EDUCATION is a proxy for the development of human capital. Human capital should improve in its ability to utilise the new technologies. The expectation is that expenditure on education should increase with improvements in productivity and thus human capital development should increase. This variable will also be in monetary terms.

ε_T and μ_T represent the error terms of the equations 3 and equation 4 respectively.

4.3.4 Vector Autoregressive model

The shortcoming with OLS is that if the variables in the structural model are not stationary at levels then the results obtained from the structural model will be spurious. Economic theory has noted that financially inclined variable tend to be non-stationary. This means they have the presence of a unit root. Therefore running the OLS on the structural model will produce results that are not valid.

The shortcoming of running the OLS on the structural model is that it is not able to establish the relationship that exists between individual variables in the model. The structural models utilise exogenous and endogenous variables. It is possible that individual variables can be influenced and can influence each other. According to Verbeek (2004) quoting Sims (1980) a VAR model is better because it does not utilise the distinction of being endogenous or exogenous as a measure of classifying variables, making it possible establish likely relationships between individual variables in the model.

One way of overcoming this shortcoming imposed by a structural model is to use a Vector Autoregressive model (VAR). The VAR according to Asteriou & Hall (2007:279) is a model that has a system of equation that is used to explain the relation between a set of variables and does not differentiate between exogenous and endogenous variables. All the variables are treated as endogenous. This means that a variable can be used as explanatory variable in one equation and then used as an explained variable in other equation.

Since all the variables are endogenous and when formulating the equations the right hand side contains all the predetermined values, it makes the application of OLS on each equation possible and will provide valid results.

The VAR model is good when it comes to analysing the dynamic behaviour of economic variables. The VAR model will provide a good description on data which can be used for policy analysis. The VAR model is used to determine if there are any interrelationships among variables in a system.

The study will use a standard for VAR model. The standard form VAR model contains only the variable to be determined on the left hand side and the predetermined variables on the right hand side. This eliminates the need for any restrictions as there is no feedback between the variables. This is highlighted by Brooks (2008;292). The structural form of the VAR model will need restrictions to eliminate any feed back because the predetermined variables are found both in the left hand and right hand sides of the equations. Therefore when running OLS there will be feedback and the restrictions limit the feedback.

The standard form VAR model

The standard from VAR model is a representation of the equations that can be estimated using the OLS individually. The standard from VAR model is derived from the primitive VAR model (4.8).

$Ay_t = \beta_0 + \beta_1 y_{t-p} + \mu_t$ 4.8

Where A is a matrix of variable coefficients

Y_t is 5 x1 matrix of the variables (GDP, fpi, claims, trade balance, productivity)

B_0 is a matrix of constants

B_1 5 x 5 matrix of the coefficients

μ_t white noise error term

The primitive model is derived from the matrix of the system of equations. To make the primitive model become a standard model, the equation has to be multiplied by the co-variance matrix of A. The co-variance matrix of A is written as A^{-1}. By multiplying the primitive form model by A^{-1} the equation ensures that the model becomes a standard VAR model (4.9).

$Y_t = \alpha_0 + \alpha_1 y_{t-p} + \varepsilon_t$.....4.9

Where α_0 *is a matrix of constants*

α_1 *is matrix of coeficents*

ε_t *is the vector of white noise error terms*

One problem that arises with the VAR model is that they are a-theoretical in nature. According to Gujarati (2004:853) the VAR model "uses less prior information." This means the interpretation of the output is not based on any past views. This problem has made the interpretation of VAR models difficult.

Another problem that arises from the VAR is that it is possible for lagged variables to have different signs across its lags. Since the VAR is a-theoretical it makes it difficult to analyse the effect of the change in signs within a particular system.

To overcome these problems the study will have to utilise measures that will aid in the interpretation of the output. The study will have to use the F-test, impulse response and variance decomposition to counter the problem of interpretation.

4.3.5 Impulse Response

The impulse response according Brooks (2008; 299) is to assess the impact of shocks to each variable. The impulse response measures the response of the dependent variable to the shock on the error term while the other variables are kept constant. The impulse response will provide an analysis of how a variable reacts to the shocks. The reaction of the dependent variable is outlined each time a shock is applied to an error term in an equation over the under consideration. The shock is applied to the standard form equation's error term of the equation. The standard form VAR error term is composed of the vector of structural residual terms.

4.3.6 Variance Decomposition

According to Brooks (2008) variance decomposition focuses on what proportion of movement associated with shock can be attributed to the shock emanating from the dependent variable its self and what portion of the movement is attributed to shock emanating from the other variables.

4.4 Model estimation and Data Analysis

4.4.1Stationary test

Time series data is an observation of a variable's historical process over a time period. With time series there is inherent momentum over time and is usually exhibited in trends and cycles. To be able to analyse the available data which is in time series and come up with valid results there is need to assess whether the data is stationary or not.

With time series data it is important for the data to be stationary as stationarity affects the behaviour of time series data. According to Brooks (2008) time series Data is stationary when the mean of the data is constant, as well as the variance and the covariance, which means regardless of which time period is considered it expected that the data will not deviate from their means, variance and covariance values, thus making the analysis of the data credible.

If the path of a variable will vary with time the variable is considered as being non stationary. This is so because the mean and variance of the distribution of the variable are not consistent but will depend on the time factor the observation occurred.

Non stationary data is expected to produce spurious results. Spurious regression results are considered invalid, and have no statistical meaning. Spurious results include spurious correlation which occurs when two variables are causally unrelated but according to the results there is correlation.

The study will test whether the variables are stationary using the Dickey-Fuller test. The Philips Peron test will be used to check the results from the dick-fuller test. The expectation is a weak form of stationary process is the most common even though the best would be a strongly stationary process. The study will test each variable in the model individually to determine if it is stationary or not.

Dickey Fuller test (DF)

According to Brooks (2008) Dickey and Fuller in 1979, come up with a process to formally test from non-stationarity in a time series variable. The Dickey Fuller test, tests for the presence of a unit root to determine whether a variable is stationary or non-stationary.

The presence of a unit root means the variable is non-stationary. The Dickey Fuller test (DF) uses hypothesis testing to determine if a variable is stationary or not. The Dickey Fuller test uses the following equation to test for a unit root

$Y_t = \theta y_{t-1} + \mu_t$ 4.10

if $\theta = 1$ then there is a presence of a unit root. The hypothesis is H_0 : series contains unit root. This means the series is non- stationary. The alternative is H_1 : series is stationary. Alternatively the equation can be expressed by subtracting y_{t-1}

$\Delta y_t = \psi y_{t-1} + \mu_t$ 4.11

Where $\theta - 1 = \psi$, therefore if there is a unit root then $\psi = 0$.

The Dickey Fuller test is a t-test type of procedure. This brings about some short comings. The t-statistic under the Dickey Fuller according to Books (2008; 328) does not follow the normal t-statistic distribution and that the DF critical values tend to be more negative than standard normal critical values. This is because of the instability linked with the unit root test. According to the DF test, if the test statistic is more negative than the DF critical value then the null hypothesis which states that there is a unit root, is rejected in favour of the alternative hypothesis.

Another point of note is that the DF test is limited when there is autocorrelation in the dependent variable. The DF is effective when the error term is white noise and the error terms are not auto correlated. Whether dependent variable is auto correlated it is likely the error terms are also auto correlated. This makes the test to be unreliable. Therefore to overcome this situation the Phillips- Peron test (PP) is used. The PP is used for robust checks and its results take precedence over the DF in cases of contradiction between the two tests.

Phillips-Peron test (PP)

The Phillip-Peron test is used to overcome the short coming of the DF and also act as a measure to test the validity of the DF test. The expectation is that the output should be similar, unless there is autocorrelation, which the Phillips Peron takes into consideration.

Verbeek (2004:273) notes that Phillips and Peron in 1988 came up with a process that improves on the ability of the DF test. The Phillips- Peron test will by design adjust for any autocorrelation in the error terms. The Phillips-Peron test uses the same equations as the DF test but makes adjustments to the DF statistics to make the process take into consideration the autocorrelation of error terms.

The output from the Phillips Peron is generally said to be the same as the Augmented Dickey Fuller test (ADF). They are similar as they both take into consideration the possibility of autocorrelation in the error terms although the ADF uses different equations to the DF and Phillips-Peron test.

Ordinary least squares (OLS)

The study will use OLS as an estimation technique. OLS is viewed as being simple and the best estimator. OLS will minimise the summed squared residuals thus will bring the estimated values as close as possible to the true values. The residual is the difference between the estimated dependent variables and the actual value of the variable that is the population value. Most studies previously used Generalized Method of Moments (GMM) because GMM is a better estimation technique when dealing with cross sectional data, but because the study is using time series data for one country namely South Africa, OLS is adequate as an estimation technique and is simpler.

The estimated regression equations will provide values for the coefficients of the independent variables. Each coefficient represents the amount of change in the dependent variable per unit change in the particular independent variable holding all other independent variables constant.

OLS will be used to determine the correlation between the dependant variable and the independent variables before 1995, which is the value of the coefficient of FPI, β_1. Correlation shows the linear association of two variables. The value of β_1 can also be used to interpret the elasticity of capital flows in relation to economic growth if the model introduces logs. Then the value of the coefficient for capital flows for the period including capital account liberalisation will be measured by α_1 and it will also indicate the correlation and measure the elasticity of the capital flows and economic growth.

Of importance with the OLS are the *t*-values, the probability of the individual variables and the goodness of fit of the model. The *t*-value will have to be in absolute terms greater than the value of two for the variable to be significant. The probability values will have to indicate that the level of significance should be better than or equal to 10%. The goodness of fit of the model will be represented by R squared. The level of r squared should be significantly high so as to be able to attribute the behaviour of the dependant variable to the independent variables used.

4.4.2 Johansen Approach

To be able to analyse the possibility of a long run relationship between capital flows and GDP there is need to analyse the error correction term. The error correction term is used when testing variables for co integration. Brooks (2008;336) notes that co integration occurs when a given set of variables have a linear relationship and are stationary. The linear relationship and the conditions that the variables be stationary imply that the variables will move together over the long term, even though this may not be the case in the short run.

Since capital flows and GDP are expected to move together over the long run, the expectation is that there should be an equilibrating level that exists. This means the variables tend towards a given level over the long run. This means in the short run, there can be disequilibrium but then the variables will move back towards the equilibrating level.

The study will use the Johansen approach. The Johansen approach is based on the vector autoregressive model and assumes all the variables are endogenous.

The study seeks to establish whether there is a long term causal relationship between, capital account capital flows as the independent variable and economic growth the explained variable by testing for cointegration. Cointegration allows the study to determine whether the variables in the model have a linear relationship which can provide a valid economic basis for their relationship over the long run. Differencing the model would make the variables stationary but is only be able to explain the relationship in the short run. A collection of the short run behaviour is what creates the long run behaviour. The Johansen approach will be used to test for cointegration.

The Johansen approach is suitable when testing for the long run relationship of a model that consists of more than two variables. According to Asteriou & Hall (2007) the Engle-Granger approach is more appropriate when there is one single co integrating relationship which is determined by the expression (n – 1), where n is the number of variables in the model, while the Johansen approach can obtain m more than one single co integrating relationship.

Under the Johansen approach there are two tests that can be used to determine the number of co integrating vectors, the Trace test and the maximal Eigen value test. Both of these tests are valid and support each other.

The trace test is a joint test, with the null hypothesis stating that the number of co integrating vectors present is less than or equal to the rank of the model being estimated and the alternate hypothesis being that the co integrating vectors are more that the rank. If the trace test statistic is greater than the critical value at a particular level of significance we fail to accept the null hypothesis and if the trace test statistic is smaller than the critical value we accept or fail to reject the null hypothesis.

The Johansen lag criteria

It is vital to have the best possible lag length when running the co integration tests. With the long run relationship the influence each variable in having an impact on the economy will vary. Therefore the lag will have to be considered to have the best possible analysis. Under the Johansen approach the lags will be determined by E-views.

Equilibrium Correction Model (ECM)

If the variables are co integrated then to be able to further analyse how the relationship in the long run is corrected, the error correction or equilibrium correction models can be used.

When two variables are non- stationary, finding first differences will make it difficult to analyse the relationship over the long run. Brooks (2008:338)notes that first differences will not have a long run solution. This is because first differences make it impossible to find a future without knowing the previous value of the explanatory variable. This means

for any value for the explanatory variable there will not be a unique long run value for that value.

The equilibrium error correction model is able to utilise the capital flows and GDP variables both at levels and as first differenced values.

$$\Delta y_t = \beta_1 \Delta x_t + \beta_2 (y_{t-1} - \phi x_{t-1}) + \mu_t \quad \text{4.12}$$

Where $(y_{t-1} - \phi x_{t-1})$ = the error correction term.

Brooks (2008) notes that as even though the variables maybe integrated of order one as long as the error term has a co integrating coefficient of ϕ, it will be stationary. The model can be adapted to include more than two variables as follows;

$$\Delta y_t = \beta_1 \Delta x_t + \beta_2 \Delta wt + \beta_3 (y_{t-1} - \phi_1 x_{t-1} - \phi_2 w_{t-1}) + \mu_t \quad \text{4.13}$$

According to the Equilibrium error correction model (4.12), the dependent variable (y) is expected to change from one period, which is t-1 to the next period which is t because of changes in the explanatory variable x. Also in the process the change is expected to correct any disequilibrium that existed in the previous period.

Φ maps out the long run relationship between the dependent and explanatory variables, while β_1 describes the shirt run relationship between the changes in x and the changes in y. β_2 explains the speed of adjustment back to equilibrium. This means that it will measure the proportion of the previous period's equilibrium error that is corrected in the next period.

The error correction term should be significant if there is a long run relationship. Co integration is an alternative approach to analysing the long run relationship between an explanatory variable and the explained variable. The long run relationship indicates that in the long run there is a causal link between the two variables. It is important to note that it is possible to have causality in the long run but not in the short run.

The shortcoming of the error correction term analysis is that it is not able to tell which independent variable has a link to the explained variable in the long run if there is a multivariate link. Therefore co integration tests are a better option is such cases.

4.5 Generalized autoregressive Conditional Heteroscedastic model (GARCH)

The study seeks to also establish if the change in policy helped increased the volatility of economic output. The stability of GDP is vital within an economy. Volatility can be used as a measure of risk and thus the study will seek to establish how under which policy was the economy deemed riskier. If economic output is seen as being very volatile, it is said to be riskier to invest in such an economy as compared to one where the level of economic output has a steady path it follows.

To support the quantitative analysis on volatility which uses the standard deviation measure which is based on historical volatility the study will also have to utilse a GARCH model to analyse variance.

The GARCH model is a variation of the ARCH model that according to Enders (2004) becomes a model that is able to trace the autoregressive moving average process of the times series. In addition to the autoregressive tracing of the conditional variance under the autoregressive process, the GARCH is able to also trace the ARMA process.

The GARCH model was developed by Taylor and Bollerslev (1986). Gujarati (2004;862) highlights that the GARCH (1,1) model, with one lag for the squared error term and one of the conditional variance of the error term is as follows

$$\Theta^2_t = \alpha_0 + \alpha_1 \mu^2_{t-1} + \emptyset \Theta^2_{t-1} \quad \text{.....4.14}$$

Where Θ^2 is conditional variance of error term

μ is the error term.

α_1 is the ARCH parameter

$\emptyset$ is the GARCH parameter

But can be changed to a GARCH (p,q) model, with q lags of the squared error term and p lags of the conditional variance which is a follows

$$\Theta^2_t = \alpha_0 + \sum_{i=1}^{q} \alpha_1 \mu^2_{t-1} + \sum_{i=1}^{p} \emptyset \Theta^2_{t-1} \quad \text{.....4.15}$$

According to the model (4.14), the conditional variance of the error term at a particular time is determined by the value of the error term in the prior period that has been squared and the conditional variance of the error term in its prior period.

The GARCH model is no longer linear and uses the conditional variance. OLS will not be used because OLS uses the values of the conditional mean and not the conditional variance values, thus in this case will not be the best method to apply, hence the study will apply maximum likelihood.

When the variance of the error terms especially after an auto regression is heteroskedastic in nature, GARCH can be used to analyse the error term's variance. When the variance of the error terms is heteroskedastic it means that over time the variance is not constant. The model will provide a volatility measure which like the standard deviation can be used to asses risk.

The GARCH model contains an ARCH parameter and a GARCH parameter. The arch error structure term according to Asteriou & Hall (2007) explain the effect of a shock on the variance. The larger the arch error term, the longer the times series is expected to have deviated from the expected mean.

One important property of the arch error term is that it is expected to be non-negative, and is restricted to be between zero and one. The closer the arch parameter is to zero the less responsive the GARCH is to new information thus less volatile, while the larger the ARCH parameter the more responsive the GARCH parameter is to new information resulting in higher volatility.

The maximum likelihood method can be applied to both linear and non-linear functions. The maximum likelihood method picks up the most appropriate values that maximise the function. The GARCH model utilises the maximum likelihood method of estimation.

Limitations of GARCH

The GARCH model requires that all the parameters be positive. A negative parameter could result in a negative conditional variance which would not make any economic sense. Therefore GARCH output with negative parameters is invalid.

The second limitation of GARCH model is that it considers the effect of a negative shock to be the same in magnitude as the effect of a positive shock. This is not always true for economic relationships. This could make the GARCH model less accurate.

To overcome these short comings the study will utilise the EGARCH model if the GARCH model provides negatives parameters.

4.6 EGARCH

The exponential GARCH (EGARCH) is an improvement on the GARCH model so as to be able to utilise negative parameters and also differentiate between the effect of a negative shock and a positive shock on a variable.

The model was developed by Nelson (1991) according to Asteriou & Hall (2007:268). The EGARCH model is able to utilise negative parameters and still provide a positive conditional variance. By utilising the natural log function, the model is converted to an exponential model which results in the conditional variance being positive.

The EGARCH model also includes a parameter to measure the effect of a shock. The inclusion of this parameter makes the EGARCH able to differentiate the effect of a positive shock and the effect of a negative shock on the dependent variable. Therefore the EGARCH is able to capture the asymmetries within the model.

Predictive failure test

It is also important to determine the stability of the model. The test is used when one period under consideration is small in economic and statistical terms. The stability of the model under that period helps validate the results to be obtained. If the model is stable it means that over time the variables behave in a constant manner. Under the predictive test the test statistic is greater than the critical value from the f- distribution then the study will fail to accept the null hypothesis. The null hypothesis says that the model is stable over time.

The expectations

When looking forward at the results the expectations are that the effect capital flows on positive economic growth should be far less significant in the period from 1975 to 1994 than in the period 1994 to 2010. The capital controls are expected to limit the effect of capital flows on GDP in that period. The growth of the economy is largely based on other factors other than capital flows.

This view can be taken further in light of economic theory and the study expects that the capital flows may have even had a negative effect on economic growth. Economic theory points out that capital controls will increase cost of capital and increase inefficiencies in terms of resource allocation thus slowing down economic performance and output.

In the post independence era, the expectation is that capital flows will play a significant role in terms of economic growth. They will be influential in aiding economic growth as they are expected to play a significant role. The significance of the capital flows will be more pronounced in the period after independence. There should be a positive relationship with GDP especially if there is a positive relationship between the other individual variables and GDP.

Data sources

The study focuses on two distinct time periods, the first is the controlled period which is under capital controls 1975 Q1-1994Q1 and the second which is the 1994Q2-2010Q2 under which liberalisation has occurred. The studies will utilise quarterly data to analyse the relationship between capital flows and economic growth. The first period ends in the first quarter of 1994 and the second period starts from the second quarter of 1994.

The data is sourced from the South African Reserve Bank (SARB). The data for the variables (capital flows, private sector claims, human productivity, and trade balance) were all obtained from the online statistical query under the SARB website.

The main problem encountered with the data is that the International Monetary fund (IMF) changed its classification of the balance of payment framework. Prior to 1994 the

IMF utilised the bopm4 framework which was then changed in 1993 to bopm5 frame work. This means that the period prior to 1994 will utilise the old frame for classifying foreign direct investment and portfolio investment and the period after 1994 the study will use the new frame for classifying foreign direct investment and portfolio investment.

According to walters (1999) under the bopm4 frame work the capital transfer account was referred to as the capital account and consisted of long term capital movements and short term capital movement. While under the bopm5 frame work the capital transfer account is referred to as the financial account and consist of direct investment and portfolio investment. See appendix A

The study will then use the E-views 7 software to carry out the computations of the estimation techniques. The software is user friendly and well developed to run all the estimation techniques used in the study. The output given out by E-views is easy to follow and analyse.

CHAPTER FIVE
Results and data analysis

5.1 QUALITATIVE ANALYSIS

5.1.1 STATISTICAL ANALYSIS

Table5. 1 Statistical data (1975-1994)

	Fdi	gdp	pi
Mean	-88.45455	975549.6	-597.6753
Median	-24.00000	1000452.	-285.0000
Maximum	928.0000	1093677.	3335.000
Minimum	-1734.000	788359.0	-5289.000
Std. Dev.	524.4902	95374.65	1350.436
Skewness	-0.749003	-0.573987	-1.135426
Kurtosis	3.970064	1.992341	6.090585
Jarque-Bera	10.21869	7.485744	47.18973
Probability	0.006040	0.023686	0.000000
Sum	-6811.000	75117316	-46021.00
Sum Sq. Dev.	20906841	6.91E+11	1.39E+08
Observations	77	77	77

Looking at the statistical data for the variables GDP, FDI and PI, for the period 1975 Q1 to 1994 Q1, the study focused on skweness, kurtosis.

The Skewness value is a third moment measure of central tendency. If the value is zero then the distribution of the data is normal. Therefore the close to zero the skweness

value is the closer to symmetry is the shape of the data distribution. The variable FDI has a skewness value of -0.75, while that of GDP is -0.57 and that of PI is -1.1. All three variables are negatively skewed, thus most of the data is to the right of the mean, with GDP having the closest to a symmetric distribution followed by FDI. Being all skewed to the left, means most of the values of the set are on the right side of the distribution.

A look at the kurtosis measure, which is regarded as a fourth centred measure, estimates the thickness of the tails of the distributions. . A value of three is regarded as the value for a normally distributed variable. The higher the value of kurtosis estimate, the thicker the tails of the distribution and the smaller the value of kurtosis relative to three, the thinner the tails.

FDI has the closest to a normally distributed tail for its distribution as the value is closest to three. GDP has the thinnest tail while PI has the thickest tail.

Table5. 2 Statistical data (1994-2010)

	Gdp	fdi	pi
Mean	1431872.	3881.846	5331.954
Median	1382572.	772.0000	3705.000
Maximum	1825023.	93351.00	49815.00
Minimum	1092477.	-39077.00	-111675.0
Std. Dev.	238126.6	15545.22	22175.85
Skewness	0.375360	3.194952	-2.486200
Kurtosis	1.738884	19.76584	14.46013
Jarque-Bera	5.833735	871.8779	422.6608
Probability	0.054103	0.000000	0.000000
Sum	93071676	252320.0	346577.0
Sum Sq. Dev.	3.63E+12	1.55E+10	3.15E+10

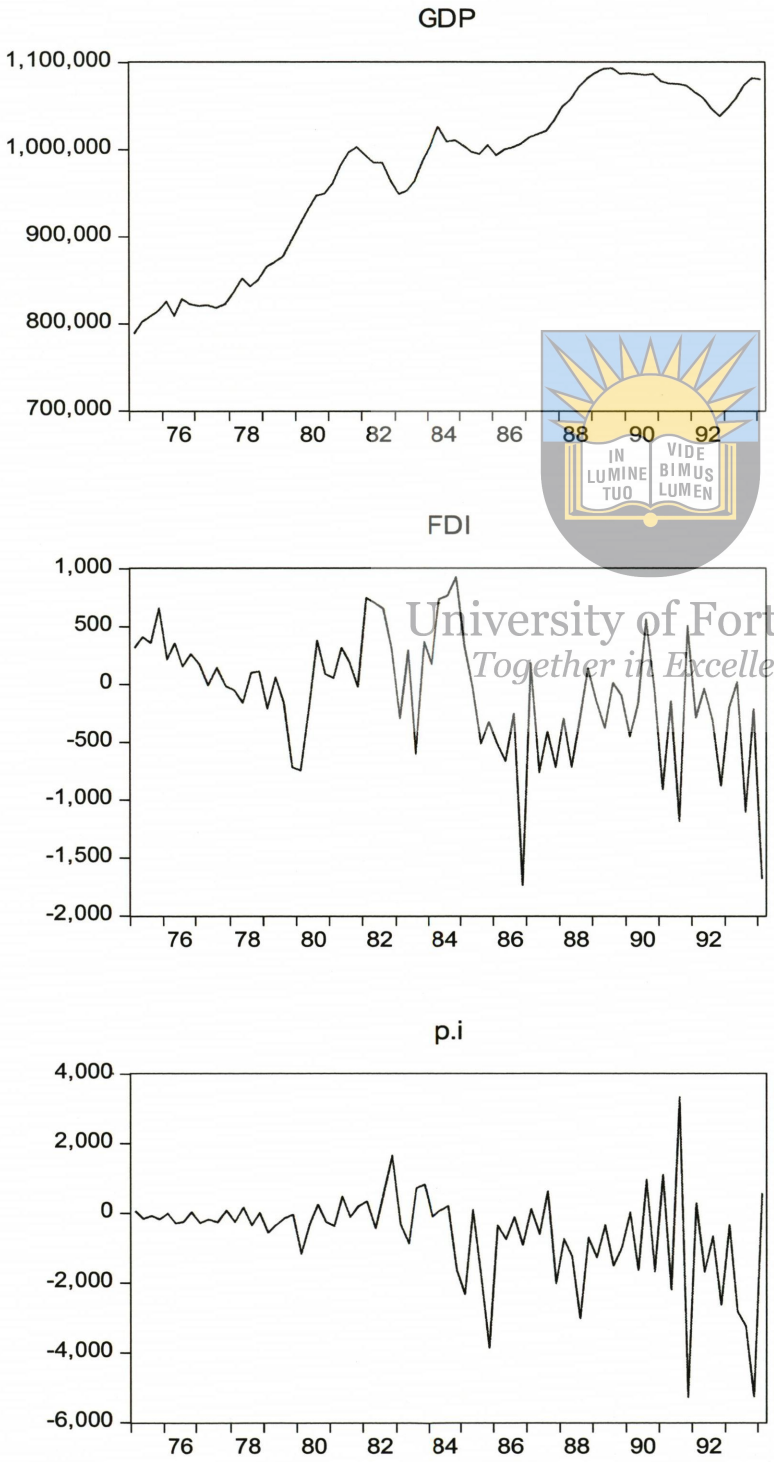
Observations	65	65	65

The output from Table5.2 is for the data ranging from 1994 Q2 to 2010 Q2. The skewness values show that GDP has a value of 0.38, while FDI has a value of 3.19 and PI has a value of -2.49. The value for GDP is the closest to a symmetric distribution even though the distribution is slight skewed to the right. PI has a negative skewness value which means most of the data is to the right of the distribution unlike FDI and GDP.

A look at the kurtosis value the GDP has a value less than three, while FDI and PI have values greater than three. FDI and PI have values of 19.8 and 14.5 respectively. This means they have thick tails that are thicker than a normally distributed data set.

5.1.2 Line graphs

figure 5. 1 Line graphs period (1975-1994)



A look at the line graphs of GDP, FDI and PI for the period 1975 to 1994 in figure 5.1 show that GDP has a general upward trend. A look at the graph for GDP shows that from 1975 to about 1979 the growth rate was slower than for the period 1980 to about 1982. From about 1980 GDP increased at an increasing rate. After which GDP increased at a slower rate again. The period 1975 to 1979 has more dips than the period 1980 to around 1982. The first significant depression came after 1982 and continued till about 1984. The dip was followed by a quick rate recovery but it stagnated after 1985 and the growth rate was very slow and GDP peaked around 1990 and slowly declined slightly after that.

Of importance is the gradient of the line which indicates that over the approximately twenty year period GDP increase by approximately 300 billion Rand. This would give an average rate of about 15 billion Rand year.

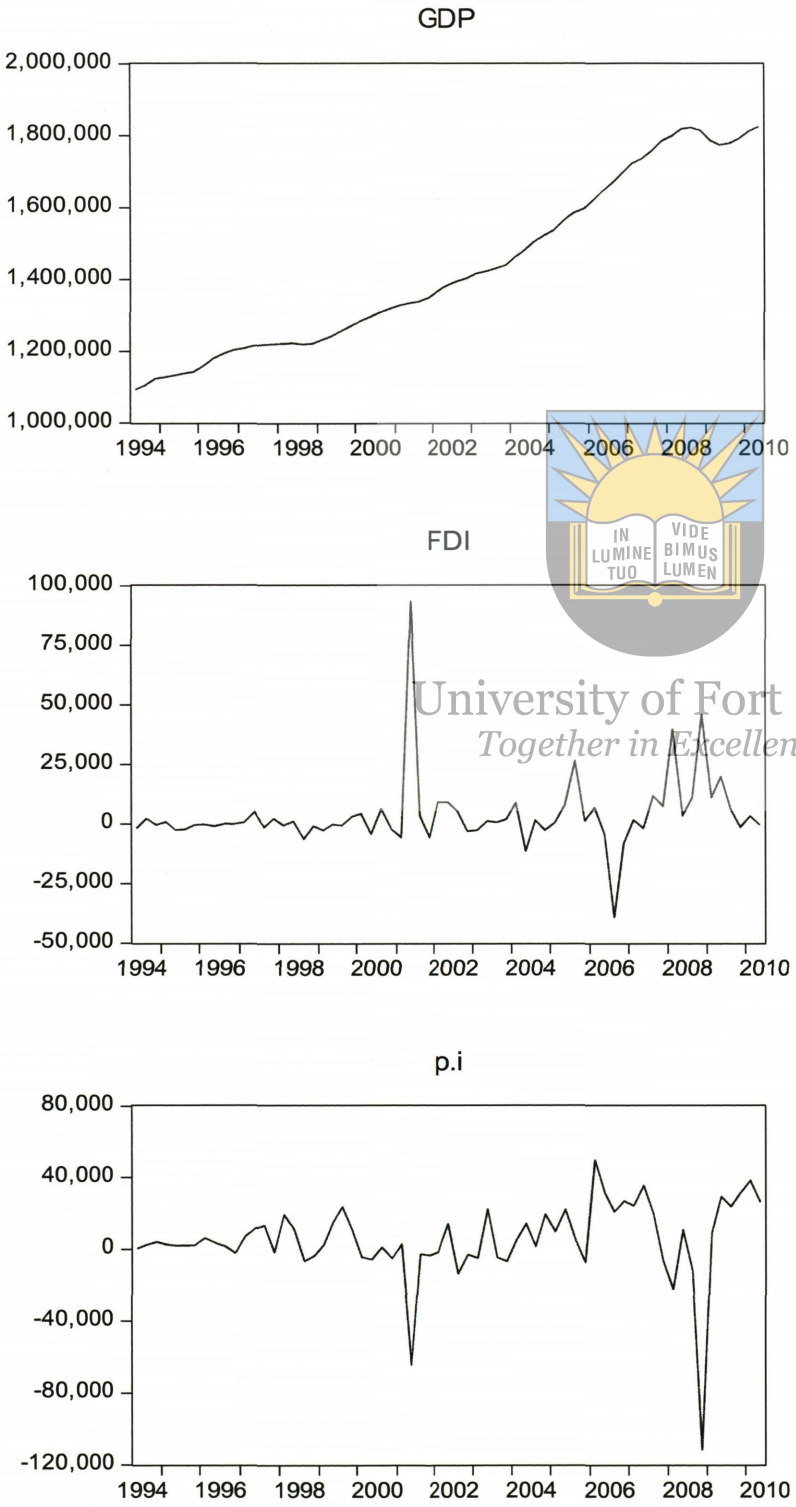
The line graph for FDI shows that from a declining trend which later becomes stagnant. From around 1975 to around 1979 the trend was a decline in FDI, with a larger than normal drop around 1979. For the period 1980 to 1984 the FDI mean level increased slightly compares to the period 1975 to 1979 and the trend was steady but the volatility increased and was persistent compared to the previous period of 1975 to 1979. From 1984 there was a huge drop which then stagnated at a mean level that was lower than the period 1975 to 1979. The period after 1984 to 1994 showed bigger spikes which indicate increased volatility. The spikes are sharper showing a reduction in persistency.

A look at the FDI graph, the variable peaked at almost one billion Rand and also had a low value of minus one and a half billion Rand. The fluctuations ranged between these two values.

The variable PI seems to hover around a constant mean. The period 1975 to 1979 shows low levels of volatility. This trend changes after 1979 as the spikes get bigger. Volatility increased even though the general trend remained constant. After 1985 the

levels of volatility were more pronounced and bigger and occurred more frequently. This indicates that any shock had a less persistent effect.

figure 5. 2 Line graphs (1994 – 2010)



Looking at the line graph for GDP for the period 1994 to 2010 from figure 5.2, the graph though bearing similar upward growth trend as the graph for the period 1975 to 1994 is very different. The graph has a steady growth rate which is smooth. Dips are small and have a generally small gradient which indicates that though they persist for a longer time they do nose dive.

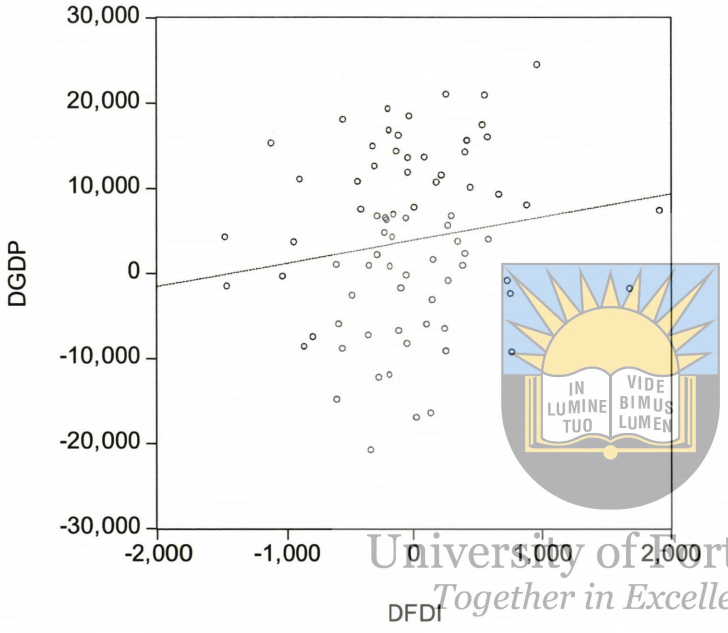
The level of GDP under the 16 year period increased from just above R1000 000 000 000 to approximately R1800 000 000 000. This gave the period under consideration an average rate of change of 50 billion Rand.

A look at the FDI graph shows that it hovers around a more or less constant mean. The spikes from 1994 are not pronounced and become significant with a once off huge spike in 2000. After the year 2000, the trend becomes more volatile as compared to the period prior to 2000. Compare to the graph for the period 1975 to 1994, the graph for 1994 to 2000 is far less volatile and has smaller spikes that are thicker indicating greater persistence after a shock.

Also the PI graph when compared to the graph of the period from 1975 to 1994 the graph is far less volatile, with smaller and thicker spikes. One main difference is that the PI graph for the period after 1994 is less sensitive to good news as the spikes are smaller than the graph for the period 1975 to 1994. A similarity is that they are both sensitive to bad shocks as indicated by the huge downward spikes.

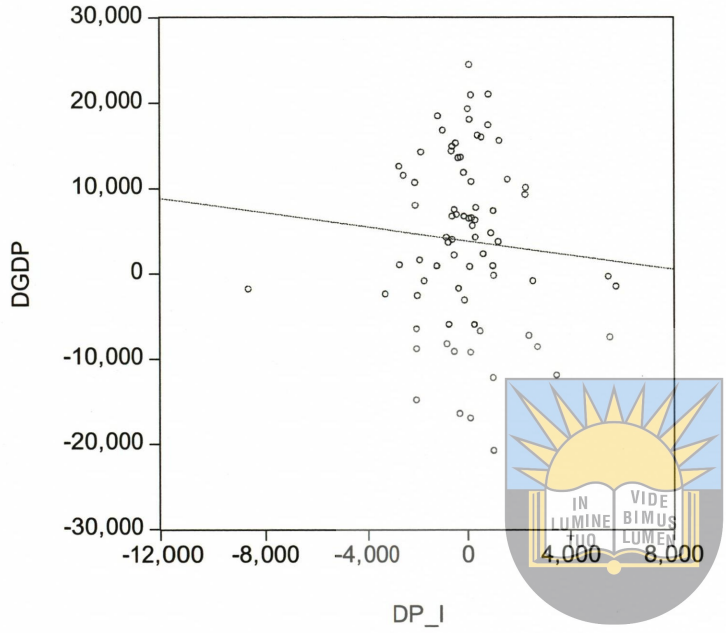
5.1.3 Scatter plots

figure 5 .3 Scatter plot (1975 – 1994)



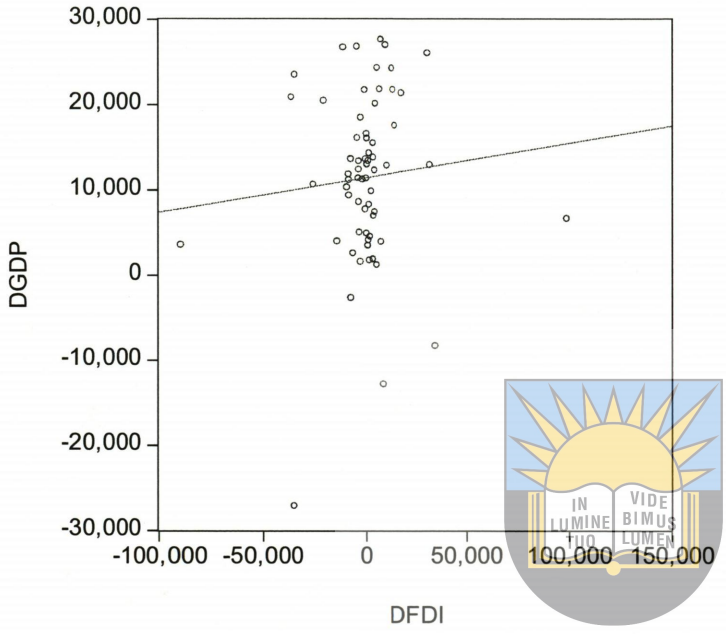
Using the differenced times series for GDP (DGDP) and FDI (DFDI) a scatter plot was drawn. The differenced time series data is used so as to compare the changes in each period and try to determine if the changes have a distinct pattern. According to the scatter plot fig there is a positive relationship that is evident. The regression line shows that the general trend is that a positive increase in DFDI leads to a positive increase in DGDP. Also of note is that the intercept is below the zero mark.

figure 5 .4 Scatter plot (1975 – 1994)



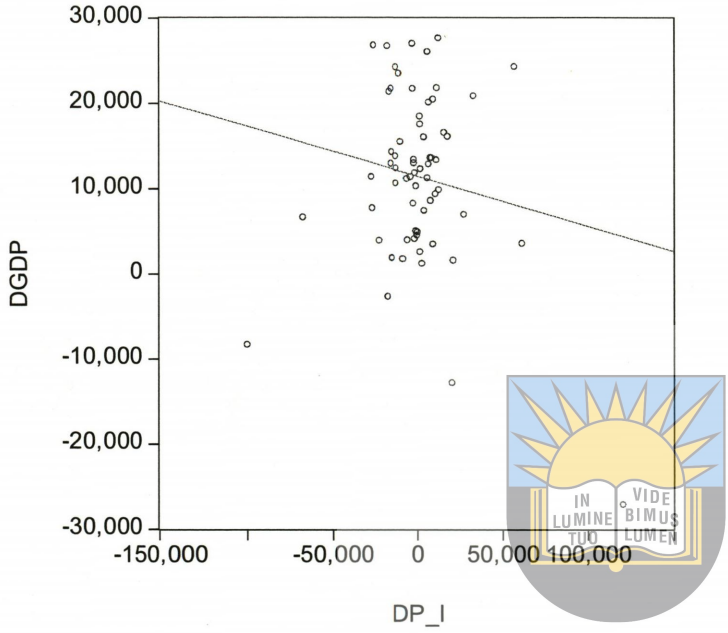
A similar analysis is done for the variables P_I and GDP. The differenced time series for each variable is analysed in connection to the other. The changes in GDP and P_I generally have a negative correlation. This means as DP_I increases generally economic output would decline. This is expected as P_I is influenced by the rate of return and thus a higher rate of return could be linked to higher interest rate levels than the rest of the world market. Higher interest rate levels are associated with high inflation levels which generally tend to slow economic growth.

figure 5 .5 Scatter plot (1994 – 2010)



Similarly for the period after 1994 the relationship between DFDI and DGDP is exhibiting a positive correlation. The gradient of the regression line is similar to that of figure 5.3. The analysis is that the change in capital flow regulations did not significantly influence the rate of change between DGDP and DFDI. The most significant change is that the intercept is now positive which means there were longer period of positive change in DGDP and more occurrences of positive changes in DGDP as compared to negative changes in DGDP after an increase in DFDI.

figure 5 .6 Scatter plot (1994 – 2010)



A look at the relationship between DGDP and DP_I also shows a similar trend to the relationship under capital controls. There is a negative correlation between the differenced times series of both variables. The main difference is that the regression line is a more steeper under capital account liberalisation than under capital controls. This means there is a bigger fall in DGDP after an increase in DP_I. This means DGDP is more volatile under capital account liberalisation.

5.2 QUANTITATIVE ANALYSIS (1975 Q1 TO 1994 Q1)

5.2.1 Stationary tests

The study carried out stationary tests for all the variables in the model. To be able to run OLS on the structural model it is a prerequisite that all the variables in the model are stationary at levels. If the variables are not stationary at levels then the study will use the VAR model.

The VAR model is able to analyse all the variables together by utilising the differenced non-stationary variables. Once the non-stationary variables have been differenced the VAR is able to provide an analysis of the relationship that exists within the variables.

Table5. 3-Stationarity output for the period (1975-1994)

	DF statistic	DF statistic	PP statistic	PP statistic
VARIABLE	Levels	1st Difference	Levels	1st Difference
GDP	0.396	-5.041**	-1.717	-6.080**
FDI	-2.443*	-16.955**	-6.003**	
PI	-0.457	-4.150**	-9.521**	
CLA	0.6184	-6.555**	-7.082	-3.499*
TRA	-2.109*	-13.539**	-4.080**	
PRO	-1.581	-2.541*	-2.543	-10.156**

DF critical values – 1% (-2.6) **
5% (-1.9)*
10% (-1.6)

PP critical values- 1% (-3.5) **
5% (-2.9)*
10% (-2.6)

** Stationary at 1%

* Stationary at 5%

Unit root test for GDP using DF test

From the output from E-views 7 the variable GDP has a t-statistic of 0.396350 while the critical values at 1%,5% and 10% are -2.596160,-1.945199 and -1.613948 respectively. According to the Dickey Fuller test the DF t-statistic should be greater than the critical values to be able not to reject the null hypothesis, which states that there is a unit root in the data series of the variable. The presence of a unit root means the series is non-stationary.

Since the DF t-statistic is bigger than the critical values at all levels then the series is not stationary, therefore there is need to test the stationary after differencing to determine if the series is stationary at first differences. If the series is stationary at first differences then the series is integrated of order one, I(1).

The output from E-views 7 at first (1^{st}) difference shows that GDP is stationary since the DF t-statistic is smaller in comparison to the critical values at all levels. The series becomes stationary after differencing. The series is 1^{st} difference stationary. A stochastic non-stationary series is the one that requires differencing. The variable is integrated of order one I(1).

Unit root test for GDP using PP test

The output from E-views 7 shows that under the PP test the variable GDP does have a unit root at levels as the t-statistic is larger than the critical values. The study further analysed the differenced data.

The differenced data is stationary at all three levels of significance. The t-statistic of -6.080352 is smaller than the critical values at all levels. Therefore the study concludes that the variable has a unit root therefore is integrated of order one.

Unit root test for FDI using DF test

According to the output, the variable FDI is non-stationary at 1% level as -2.443435 the DF t- statistic is larger than -2.596160 the critical value at 1%. The output also shows that FDI is stationary at 5% and 10% levels as the DF t-statistic is smaller than the critical values. Economically, the level of significance of 1% is the best level to consider as it allows for the lowest probability of an error in the results.

After differencing, the FDI series is now stationary at all levels. The t-statistic of -16.95452 is smaller than the critical values at 1%, 5% and 10%. FDI is I(1) at 1% percent level of significance.

Unit root test for FDI using PP test

The PP test indicates that the times series data for GDP does not contain a unit root at levels, therefore is stationary. The t-statistic is -6.003560 which is smaller than the critical values.

Unit root test for PI using DF test

The output from E-views shows that at all three levels of significance given the PI series is non-stationary. The DF t-statistic is at -0.457069 is bigger than all the critical values at 1%, 5% and 10% levels of significance. An analysis of the unit root test is done on the differenced to test for the level of integration.

The differenced series is now stationary at all three levels of significance. The DF t-statistic of -4.149978 is smaller than all the critical values at the three levels of significance given in the table. Thus the PI time series has one unit root and therefore integrated of order one.

Unit root test for Portfolio investment using PP test

According to the output from E-views the variable portfolio investment is stationary at all levels. The PP statistic is smaller than all the critical values used.

Unit root test for claim using DF test

The series data for claims is non-stationary at levels. The DF t-statistic is 0.618455 which is bigger than the critical values at 1%, 5% and 10% levels of significance. Therefore according to the DF t-statistic the null hypothesis holds at levels. To check if there is one unit root the series is also tested under 1st differences.

The differenced data has a t-statistic of -6.555 which is more negative than any of the critical values thus the null hypothesis is rejected and the series is now considered stationary.

Unit root test for claims using PP test

According to the Phillips-Peron test, the time series for claims is non-stationary at levels of 1%, 5% and 10%. This is a confirmation to the output from the DF test. The t-statistic is 7.081788 which is larger than the critical values at all three levels of significance. The differenced data series was also run under the Phillips-Peron test.

After differencing the times series data under the PP test has a t-statistic of -3.499452 which is marginally larger than the critical value at 1% but smaller than the critical values at 5% and 10%. At 5% significance level the variable is considered stationary.

Unit root test for labour productivity using DF test

The data series for labour productivity according to the DF test at levels is non-stationary at all levels of significance. The DF t-statistic for the data series is -1.581187 which is larger than the critical values at 1%, 5% and 10%. The 5% level of significance is a good measure for any errors but the best available level is 1%. Therefore the study ran the differenced series under Dickey-fuller to determine if it is stationary at 1%.

After 1st differences the series is still not stationary at 1% percent indicating there is more than one unit root at 1% level of significance, but is now stationary at both 5% and 10% levels of significance.

Unit root test for labour productivity using PP

According to the outcome on E-views the t-statistic for PP is larger than the critical values at 1%, 5% and 10%. This means at levels the time series data in non-stationary. To check if there is only one unit root the PP test is done on the differenced data.

According to the output from e-views the differenced PP test shows that the data is stationary at all three levels of significance. The t-statistic is -10.15576 is smaller than the critical values at all three levels of significance. PP test therefore indicates that the data is stationary at 1st differences.

The DF indicated that at 1st differences the data is only stationary at 5% and 10% while the PP test indicates that the data is stationary at all levels after differencing once. Therefore because the PP test takes precedence, its output will be the one that is used.

Unit root test for trade balance using DF test

Similarly the series data for trade balance is non-stationary at 1% but is according to the DF test is stationary at 5% and 10% levels. The DF t-statistic at levels of -2.109060 is more negative than the critical values at 5% and 10%, indicating that at these levels of significance the series will not have a unit root. The differenced series of data produced an even better outcome.

The 1st differenced series is stationary at all three levels of significance given by the DF test. The DF t-statistic is -13.53855 and smaller than the critical values at all three levels.

Unit root test for trade balance using PP test

According to the Phillips-Peron test the Phillips-Peron test statistic (pp t-statistic) should be smaller than the critical values to be able to conclude that a series is stationary. Thus according to the output from E-views using Mackinnon (1996) p-values, the trade balance data is stationary at levels. The Phillips-Peron test is used for robust checks in the study and its outcomes will take precedence over the DF test.

5.2.2 The Vector Auto Regression estimation (VAR)

The stationary test done on each variable shows that not all the variables are stationary at levels. The variables that are stationary are FDI, P_I AND TRA. Therefore because not all variables are stationary running the structural model under OLS will not give the best estimates.

To be able to analyse the relationship among variables, the study will have to estimate a system of equations involving all the endogenous variables. This means that the equation of each variable is analysed individually. This is done under VAR estimation.

The output of the VAR estimate is in appendix C. The output is not credible as the estimation uses the variables at levels. Some of the variables are non-stationary thus the output is not helpful in assessing the long run relationship of the variables.

Having established the system of equations under the VAR, the study will then use the Johnson method to determine the long run relationship. Therefore to analyse the long run relationship the study test for co integration using the Johansen method.

Table5. 4-The lag selection criteria

VAR Lag Order Selection Criteria

Endogenous variables: GDP FDI P_I CLA PRO TRA

Exogenous variables: C

Date: 06/16/11 Time: 16:06

Sample: 1975Q1 1994Q1

Included observations: 71

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-3739.254	NA	2.65e+38	105.5001	105.6913	105.5761
1	-3264.997	854.9989	1.16e+33	93.15483	94.49332*	93.68711*
2	-3224.929	65.46187	1.05e+33*	93.04026	95.52602	94.02877
3	-3193.944	45.38744	1.28e+33	93.18151	96.81455	94.62626
4	-3161.976	41.42238	1.60e+33	93.29511	98.07542	95.19609
5	-3120.772	46.42749	1.67e+33	93.14851	99.07609	95.50572
6	-3064.112	54.26614*	1.26e+33	92.56653*	99.64139	95.37998

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

There is need for determining the optimum lag length so as to make the results credible. The study will use the Schwarz Information Criterion which is regarded as the best measure for choosing the lag length. The output shows that according to Schwarz information criterion the lag length that is appropriate is one, for the study to be able to test for a possible the long run relationship between GDP and each independent variable.

To test that there is a long run relationship between variables using the OLS they should be integrated of order zero I(0). According to the unit root test done on each variable, the variable are not all integrated of order zero, therefore are non-stationary at levels.

The variables in the study are integrated of order one I(1). This means to be able to determine if there is a long run relationship between variables the OLS will not suffice as the results will be spurious.

Economic theory suggests that if variables are integrated of order one and there is a linear relationship between them it is possible to ascertain whether there is a long run relationship between the variables.

If the combination of the variable s' error terms results in a combination that is integrated of order zero then the variables have along run relationship. One technique that is used to test non-stationary variables for co integration is the Johansen technique.

5.2.3 Johansen cointegration test and Vector Error correction model

The output from the Johansen estimation shows the results of the Trace statistic and the Maximum Eigenvale test indicate that there are three co-integrating equations at 5%.

Table5. 5 Cointegration using the Johansen approach

Date: 06/16/11 Time: 16:07

Sample (adjusted): 1975Q3 1994Q1

Included observations: 75 after adjustments

Trend assumption: Linear deterministic trend

Series: GDP FDI P_I CLA PRO TRA

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.525797	159.1466	95.75366	0.0000
At most 1 *	0.470258	103.1875	69.81889	0.0000
At most 2 *	0.339355	55.53507	47.85613	0.0081
At most 3	0.194576	24.44469	29.79707	0.1823
At most 4	0.084461	8.215740	15.49471	0.4426
At most 5	0.021076	1.597580	3.841466	0.2062

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**

None *	0.525797	55.95904	40.07757	0.0004
At most 1 *	0.470258	47.65245	33.87687	0.0006
At most 2 *	0.339355	31.09038	27.58434	0.0170
At most 3	0.194576	16.22895	21.13162	0.2118
At most 4	0.084461	6.618160	14.26460	0.5352
At most 5	0.021076	1.597580	3.841466	0.2062

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table5. 6 The Vector-Error Correction Model (VECM)

Vector Error Correction Estimates

Date: 06/16/11 Time: 16:10

Sample (adjusted): 1975Q3 1994Q1

Included observations: 75 after adjustments

Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
GDP(-1)	1.000000
FDI(-1)	132.3483
	(25.6859)
	[5.15256]
P_I(-1)	-12.12324
	(10.6945)
	[-1.13359]
CLA(-1)	-0.062611

	(0.19587)
	[-0.31966]
PRO(-1)	-13789.88
	(2170.41)
	[-6.35359]
TRA(-1)	5.921976
	(2.69890)
	[2.19422]
C	20376.90

The normalised equation for the GDP shows that three variables are significant, namely FDI (-1), PRO (-1) and TRA (-1). Under the normalised equation FDI and TRA are expected to have a positive relationship with GDP. This is in accordance with economic expectations. The expectation is that as FDI changes from one period to the next, GDP is also expected to change in the same direction although not at the same rate.

PRO is indicated having a negative relationship with GDP. This means that as GDP increases productivity decreases and the reverse is true. This result is not in line with the general economic thought which is that there should be a positive relationship. This could be as a result of misspecification within the model.

Under the normalised equation, P_I is not significant in this relationship with GDP over the long run. The t-statistic is significantly below the value of 2. Therefore the expectation is that short term capital flows will not significantly impact the long run relationship of GDP.

Table5. 7 The long run relationship (the cointegrating equation)

Error Correction:	D(GDP)	D(FDI)	D(P_I)	D(CLA)	D(PRO)	D(TRA)
CointEq1	-0.048894	-0.002813	-5.21E-05	0.017614	1.95E-06	-0.009698
	(0.01893)	(0.00091)	(0.00269)	(0.00282)	(3.3E-06)	(0.00768)
	[-2.58312]	[-3.08428]	[-0.01933]	[6.24674]	[0.58402]	[-1.26222]

The above output is extracted from the output on vector error correction estimation. The output is computed using E-views 7 for the data from the year 1975 to first quarter of 1994. Having determined that there are co-integrating vectors in the in the model among the variables under consideration, the next step is to analyse the error correction term. The output shows the error correction term, the standard error in round brackets and also the t-statistic in square brackets.

The error correction term is used to analyse the long run relationship between variables. The error correction term is expected to be zero if the variables under consideration are in equilibrium over a given time period. When there is disequilibrium the error term is non-zero.

The error correction term is expected to be negative. This is to show that over the period under consideration the variables are expected to tend back to their equilibrium level after a shock to the relationship.

The size of the error correction term will indicate the speed with which the relationship between variables tends back to equilibrium. This is referred to as the speed of adjustment. The speed of adjustment is in relation to the time period under consideration.

From the output there is a long run relationship between GDP, FDI, PI, and trade balance that adjusts towards its equilibrium over the period of one lag. This is shown by the negative error correction terms. The variables with positive error correction terms could indicate there adjustment between GDP and CLA and also the relationship between GDP and PRO takes longer to adjust and need a longer lag.

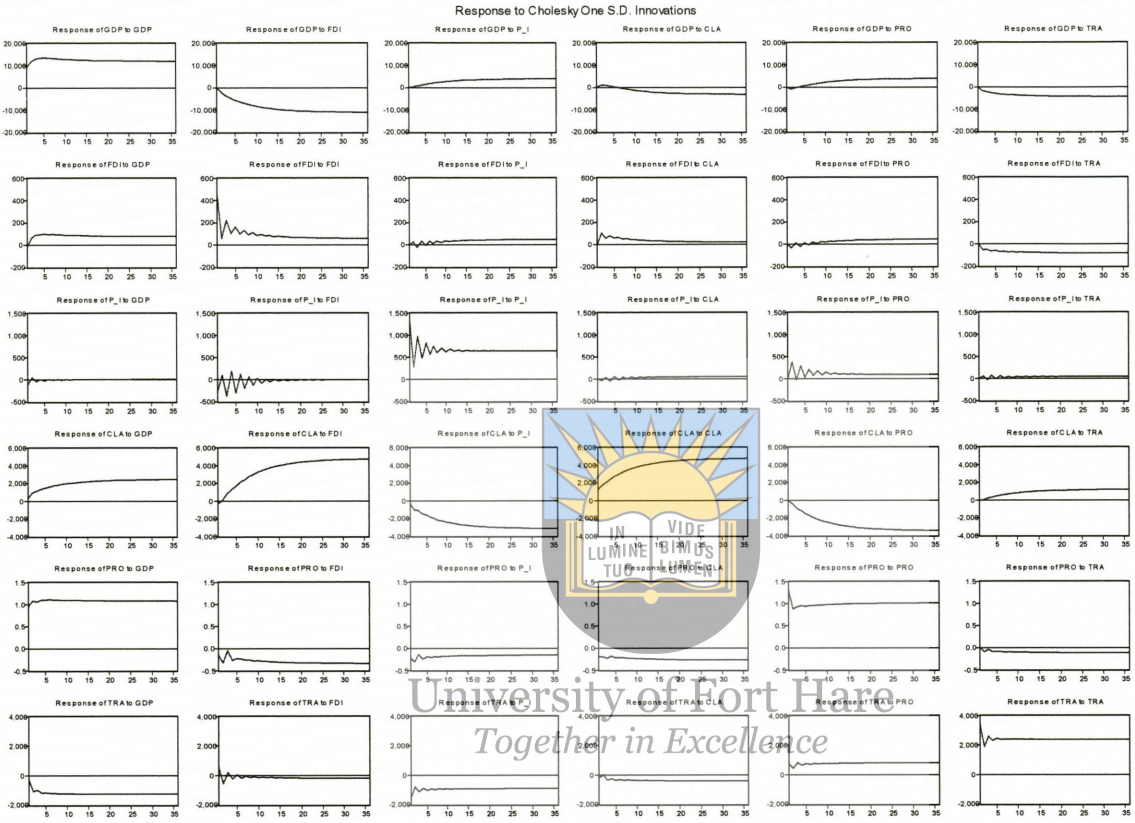
If affected by a shock the long run relationship between FDI and economic growth is expected to tend back to equilibrium at rate of 0.28% under the period of one lag, while the adjustment of PI is significantly slower at about 0.00521%, while the error adjustment of trade balance is approximately almost a per cent with an approximate rate of 0.9698%.

The t-statistics indicate that PI is highly insignificant, with a value of -0.019, while FDI is significant with a t-statistic of 3.084 and the trade balance is close to being significant with a t-statistic of -1.26.

5.2.4 Impulse response

The impulse response shows the effect of a shock from an independent variable in a model holding the other independent variables constant onto the dependent variable. The output follows the possible trend after a shock on the dependent variable which in this case is GDP. The impulse response is one standard deviation under the Cholesky.

figure 5 .7 Impulse response (1975 to 1994)

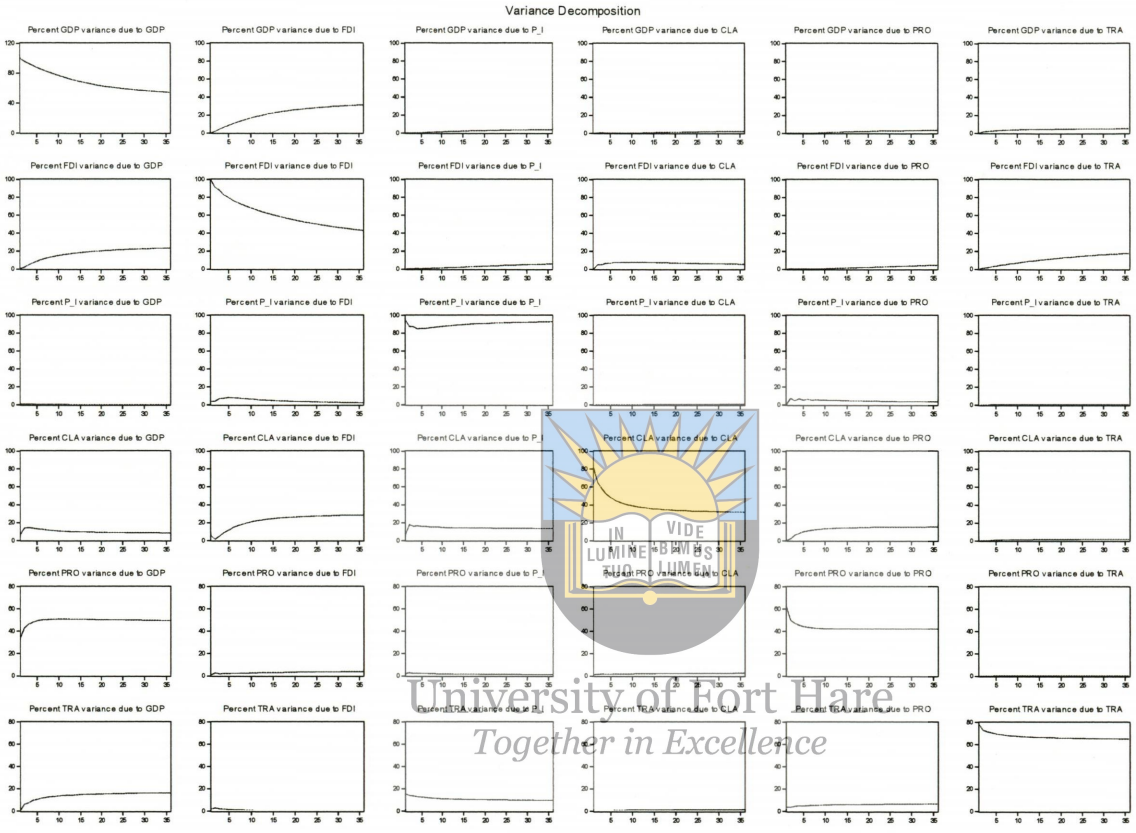


A shock from GDP is expected to have a positive effect which will gradually die out, while a shock from FDI is expected to have a negative effect which persists then die down. A shock from P_I has a smaller effect which is positive and quickly dies down.

5.2.5 Variance decomposition

The variance decomposition measure the proportion of the off the effect of a shock on the dependent variable which is attributed to each independent variable (Brooks, 2008)

figure 5 .8 Variance decomposition (1975 to 1994)



FDI has a significant proportion which increases with time but will gradually die down, while P_I has a small proportion which is close to being insignificant and quickly dies down.

5.2.6 GARCH

To determine if there is heteroscedasticity in the model of GDP, the model has to be tested for the ARCH effect. The presence of the ARCH effect shows that the residuals of the model don not have a constant variance.

To be able to test for the ARCH effect the model is first estimated using OLS. The output is then tested for ARCH effects using the ARCH test. The correlogram of

squared residual is also used to confirm the results of the ARCH test. The output of the correlogram of squared residuals is in the appendix.

Table5. 8-The ARCH test (1975 to 1994)

Heteroskedasticity Test: ARCH

F-statistic	2.872729	Prob. F(1,73)	0.0944
Obs*R-squared	2.839685	Prob. Chi-Square(1)	0.0920

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 09/27/11 Time: 07:19
Sample (adjusted): 1975Q3 1994Q1
Included observations: 75 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.26E+08	2.48E+08	3.735145	0.0004
RESID^2(-1)	0.203355	0.119980	1.694913	0.0944

R-squared	0.037862	Mean dependent var	1.15E+09
Adjusted R-squared	0.024683	S.D. dependent var	1.85E+09
S.E. of regression	1.83E+09	Akaike info criterion	45.5209
Sum squared resid	2.45E+20	Schwarz criterion	45.5827
Log likelihood	-1705.037	Hannan-Quinn	45.5456

		criter.	7
			1.99756
F-statistic	2.872729	Durbin-Watson stat	5
Prob(F-statistic)	0.094354		

From the output of the ARCH test for the data from 1975 Q1 TO 1994 Q1, there null hypothesis is that there is homoscedasticity. The output shows that the p value is 0.092 which is bigger than the significance level 5%, therefore accordingly the study is not able to reject the null hypothesis and concludes that there is little evidence of the ARCH effect.

Therefore according to the output the times series residuals have a constant variance. This means regardless of the shock the variance will be more or less the same.

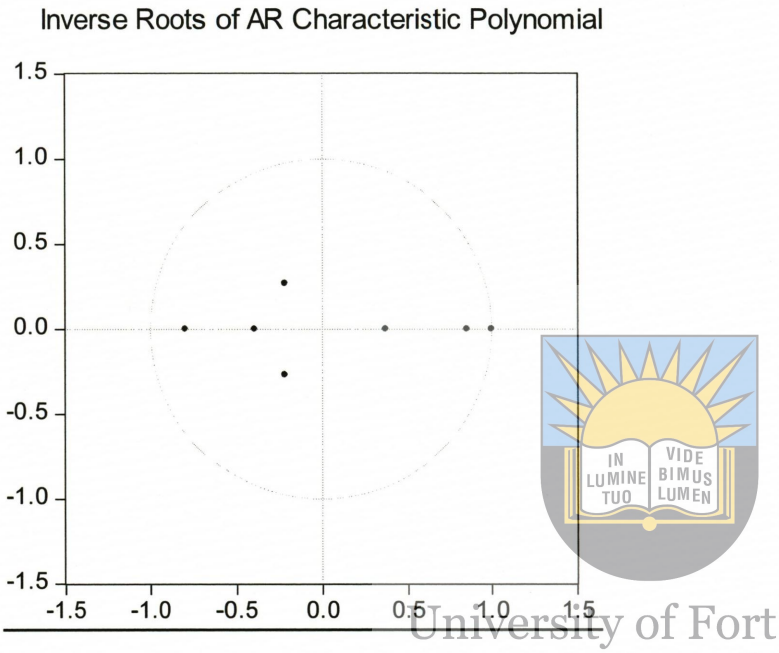
5.2.7Diagnostic tests

One of the diagnostic tests used is the AR roots test. The AR roots test aims to test the stability of the VECM model that has been used by the study. The stability of the VECM model refers to its stationary. The autoregressive model has to meet given specifications. If the AR root test shows that the VECM is not stable then the results can be questioned in terms of them being valid. The specification of the VECM model should provide valid estimates.

For a VECM model to be considered stable the roots should all fall inside the circle and should be less than one in nominal terms. If the modular of the roots of the VECM are less than one, then the expectation is that the expected mean should be constant and not time variant. This means the model is stationary.

The output shows that the VECM model specified is stationary as all the roots are within the circle and have a nominal value of less than one. There the model is stable and the estimates are valid.

figure 5 .9 Inverse Roots of AR Characteristic polynomial



Residual Diagnostic test.

Table5. 9 VEC Residual Normality Tests

Component	Jarque-Bera	df	Prob.
1	4.128487	2	0.1269
2	1.259922	2	0.5326
3	0.407817	2	0.8155
4	7.340251	2	0.0255
5	0.517703	2	0.7719
6	1.036816	2	0.5955
Joint	14.69099	12	0.2588

The output for the normality test is shown above. The null hypothesis is rejected based on the probability of the joint Jarque-Bera statistic. The Jarque-Bera statistic is compared with the given observed value under the null hypothesis. If the probability of the Jarque-Bera statistic is smaller than any significance level the null hypothesis is rejected and the conclusion is that the residuals are not multivariate normally distributed.

The probability value of the Jarque-Bera is 0.2588, which means that which means that at all the relevant significance levels we cannot reject the null and therefore the residuals are multivariate normally distributed.

5.3 QUANTITATIVE ANALYSIS (1994 Q2 TO 2010 Q2)

5.3.1 Stationary tests

Table5. 10 Output for unit root test (1994 Q2-2010 Q2)

	DF statistic	DF statistic	PP statistic	PP statistic
VARIABLE	Levels	1st difference	Levels	1st difference
GDP	0.806	-3.313**	0.356	-3.414*
FDI	-7.019**	-10.002	-7.278**	-21.147
PI	-5.982**	-9.604	-5.9527**	-20.615
CLA	0.621	-2.986**	1.529	-2.890**
TRA	-.5848**	-12.244	-1.381	-12.080**
PRO	0.805	-5.035**	-1.043	-5.523**

DF critical values – 1% (-2.6) **
5% (-1.9)*
10% (-1.6)

PP critical values – 1% (-3.5) **
5% (-2.9)*
10% (-2.6)

** Stationary at 1%

* Stationary at 5%

Test for claims using Dickey Fuller

The output from E-views 7 shows that the DF t-statistic is 0.620865 which is greater than the critical values at 1%, 5%, and 10% levels of significance. The time series has a unit root as the output indicates that the study should not reject the null hypothesis, which states that there is a unit root. To make the series stationary, the variable is differenced once and then tested for a unit root.

The times series for claims is now considered stationary as the DF t-statistic is smaller than the critical values. The times series is of order one, indicating that it has one unit root in the data at levels.

Unit root test for claims using Phillips-Peron

The Phillips Peron also shows that at levels the times series is also not stationary. The t-statistic is greater than the critical values. The study then tests the claims time series after differencing to determine if it is stationary.

The output shows that differenced claims is stationary only at 5%, which is a weaker level compared to the level of 1%, thus there is greater possibility of an error in terms of the power of the test. This indicates that the times series could have more than one unit root.

Unit root test for FDI using Dickey Fuller

The output for the test for a unit root on FDI shows that the times series is stationary at levels. The t-statistic is less than the critical values at the relevant levels of significance. There is no need to test the differenced data as the times series is stationary at 1%.

Unit root test for FDI using Phillips-Peron

The Phillips Peron test confirms the results obtained from the DF unit root test that the time series (FDI) is stationary at levels. The t-statistic is smaller than the critical values at 1%, 5% and 10% levels of significance.

Unit root test for GDP using Dickey Fuller

The unit root test on GDP shows that at levels the times series is not stationary. The output shows that the DF t-statistic is greater than the critical values at the relevant levels of significance. The time series (GDP) has at least one unit root therefore the null

hypothesis is not rejected. The differenced times series is then tested to determine if it is stationary.

The differenced time series is stationary at all the relevant levels of significance. The t-statistic is smaller than the critical values, thus the null hypothesis is rejected and the time series is considered not to contain a unit root. The GDP variable is I(1).

Unit root test for GDP using Phillips-Peron

The Phillips Peron test is providing a t-statistic that is greater than the critical values when the times series GDP is at levels. This indicates that the time series has a unit root.

The differenced GDP variable is considered stationary at 5% but not at 1%. Therefore at 5% the time series which contains one unit root which after differencing is then made stationary.

Unit root test for PI using Dickey Fuller

The PI time series after testing for a unit root is provides the above output. The output shows that the times series is stationary at levels. The DF t-statistic is smaller than the critical values at all levels of significance. The t-statistic of -5.981523 is smaller than any of the critical values. This means the study can reject the null hypothesis and conclude that the times series is stationary thus I(0).

Unit root test for PI using Phillips-Peron

The Phillips Peron test also confirms the results from the Dickey Fuller test. The output indicates that the times series (PI) is stationary at levels and thus I(0). The t-statistic of -5.952721 is smaller than any of the given critical values and thus the null hypothesis is rejected and the times series is considered stationary at levels.

Unit root test for PRO using Dickey Fuller

Productivity is considered to be not stationary at levels. The output indicates that the DF t-statistic is greater than the critical values. Therefore the null hypothesis holds and is not rejected. This means that the times series contains at least one unit root.

The differenced times series is also tested to determine if the time series (PRO) has a single unit root. After differencing the times series is stationary. The t-statistic is -5.034629 which is smaller than the critical values and is considered stationary at 1%. The times series is integrated of order one.

Unit root test for PRO using Phillips-Peron

The Phillips Peron test shows that the variable PRO is not stationary at levels. The t-statistic is bigger than the critical values provided by E-views7. The null hypothesis is thus not rejected, indicating that there is a unit root in the time series.

The differenced data provided the following results for the variable PRO. The output indicates that after differencing the time series is now stationary. The t-statistic is now smaller than the critical values and the variable PRO is stationary at 1%.

Unit root test for TRA using Dickey Fuller

The variable TRA is not stationary at levels. The critical values are all smaller than the t-statistic at the relevant levels of significance. The null hypothesis indicates that there is a unit root and the output indicates that the null hypothesis cannot be rejected.

When the time series has been differenced the variable has become stationary. This indicates that there was one unit root. Therefore the time series is integrated of order one. The differenced t-statistic is smaller than the critical values.

Unit root test for TRA using Phillips-Peron

The Phillips- Peron test also indicates that the times series TRA is not stationary at levels. The t-statistic of -1.380502 is greater than the critical values at 1%, 5% and 10.

This means that the null hypothesis that says there is a unit root cannot be rejected. This means the times series can be tested after differencing.

After differencing the differenced t-statistic is now -12.08048, this is smaller than the critical values provided by E-views7. This means now the null hypothesis does not hold and is not accepted and this means the times series is now stationary. Therefore the times series has one unit root and is integrated of order one.

5.3.2 The Vector Auto Regression estimation (VAR)

To be able to analyse the relationship among variables, the study will have to estimate a system of equations involving all the endogenous variables. This means that the equation of each variable is analysed individually. This is done under VAR estimation.

The output of the VAR estimate is in appendix C. The output is not credible as the estimation uses the variables at levels. Some of the variables are non-stationary thus the output is not helpful in assessing the long run relationship of the variables.

Having established the system of equations under the VAR, the study will then use the Johnson method to determine the long run relationship. Therefore to analyse the long run relationship the study test for co integration using the Johansen method.

Lag selection criteria

Table5. 11 VAR Lag order selection

VAR Lag Order Selection
Criteria
Endogenous variables: GDP FDI P_I CLA
PRO TRA
Exogenous variables: C
Date: 06/16/11 Time: 15:43
Sample: 1994Q2 2010Q2
Included observations: 60

Lag	LogL	LR	FPE	AIC	SC	HQ

0	-3787.190	NA	3.29e+47	126.4397	126.6491	126.5216
1	-3378.623	721.8024	1.34e+42	114.0208	115.4868*	114.5942*
2	-3333.325	70.96577*	1.02e+42*	113.7108*	116.4335	114.7758
3	-3302.976	41.47684	1.35e+42	113.8992	117.8785	115.4557
4	-3273.026	34.94244	1.99e+42	114.1009	119.3367	116.1489
5	-3233.141	38.55491	2.45e+42	113.9714	120.4638	116.5109

* indicates lag order selected by the criterion

There is need for determining the optimum lag length so as to make the results credible. The study will use the Schwarz Information Criterion which is regarded as the best measure for choosing the lag length. The output shows that according to Schwarz information criterion the lag length that is appropriate is one, for the study to be able to test for a possible the long run relationship between GDP and each independent variable.

5.3.3 Johansen Cointegration test and the Vector Error Correction Model

Table5. 12 Cointegration using the Johansen method

Date: 06/16/11 Time: 15:44
Sample (adjusted): 1994Q4 2010Q2
Included observations: 63 after adjustments
Trend assumption: Linear deterministic trend
Series: GDP FDI P_I CLA PRO TRA
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized		
d	Trace	0.05

No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.578066	153.7597	95.75366	0.0000
At most 1 *	0.536628	99.39653	69.81889	0.0000
At most 2 *	0.339721	50.93539	47.85613	0.0250
At most 3	0.235249	24.78450	29.79707	0.1693
At most 4	0.116394	7.887583	15.49471	0.4775
At most 5	0.001455	0.091738	3.841466	0.7620

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.578066	54.36316	40.07757	0.0007
At most 1 *	0.536628	48.46113	33.87687	0.0005
At most 2	0.339721	26.15089	27.58434	0.0754
At most 3	0.235249	16.89692	21.13162	0.1769
At most 4	0.116394	7.795846	14.26460	0.3998
At most 5	0.001455	0.091738	3.841466	0.7620

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

Table5. 13 VECM

1	CointegratingLog				
Equation(s):		likelihood	-3548.173		

Normalized cointegrating coefficients (standard error in parentheses)

GDP	FDI	P_I	CLA	PRO	TRA
1.000000	25.15116	17.57894	0.087982	-19234.80	3.154974
	(3.29059)	(2.44730)	(0.22508)	(5508.63)	(1.53169)

According to the normalised equation, the FDI, P_I, PRO and TRA are significant in the model. To get the t-statistic the coefficients are divided by the standard error term for each. FDI, P_I and TRA are expected to have a positive relationship with GDP.

Edwards (2001) drew a conclusion based on estimation focusing on data for the 1980s that found that the relationship between capital flows and economic growth is positive if the economy has experienced a given level of development

An increase in FDI, P_I AND TRA is expected to result in an increase in GDP. This is in line with economic expectations. PRO has a negative coefficient which indicate that there is a negative relationship between PRO and GDP. A drop in PRO will have a positive impact on GDP growth. This relationship does not have an economic backing. The general view is that the relationship is positively correlated.

CLA which represent the financial sector development is insignificant even though it has a positive coefficient. CLA is considered insignificant in the model as shown by the results. The t-statistic is far below the value of 2.

Arteta *et al* (2001) in their study made an interesting observation saying that financial depth does not play a role in aiding the economy to benefit from capital account liberalisation

The Arteta et.al (2001) note that capital account liberalisation will aid economic growth provided the macro economic imbalances are removed and is the sequencing of trade and financial liberalisation are done in the right order.

Bekaert *et al* (2001) The study finds that most countries had higher economic growth rates five years after liberalisation than the five years prior to liberalisation. The study says that approximately 40% of the increase in economic growth is attributed to liberalisation

Table5. 14 Long run relationship (cointegrating equation)

Error Correction:	D(GDP)	D(FDI)	D(P_I)	D(CLA)	D(PRO)	D(TRA)
CointEq1	0.004585	-0.038877	-0.008644	0.007046	2.91E-06	-0.001496
	(0.00382)	(0.00963)	(0.01396)	(0.01055)	(1.2E-06)	(0.00957)
	[1.20040]	[-4.03634]	[-0.61908]	[0.66814]	[2.45062]	[-0.15633]

The error correction term is expected to be negative. This is to show that over the period under consideration the variables are expected to tend back to their equilibrium level after a shock to the relationship.

The size of the error correction term will indicate the speed with which the relationship between variables tends back to equilibrium. This is referred to as the speed of adjustment. The speed of adjustment is in relation to the time period under consideration.

Looking at the output for the data from 1994 to 2010, the variables FDI, P_I and TRA have negative coefficients. This means that these variables are expected to tend back to their long run equilibrium if there is a shock.

Only FDI of the variables that adjust within the given lag period to their long run equilibrium is significant. Therefore the result shows that there is a long run relationship between FDI and GDP. The expectation is that FDI corrects any disequilibrium at a rate of 3.89% towards equilibrium within the given time period.

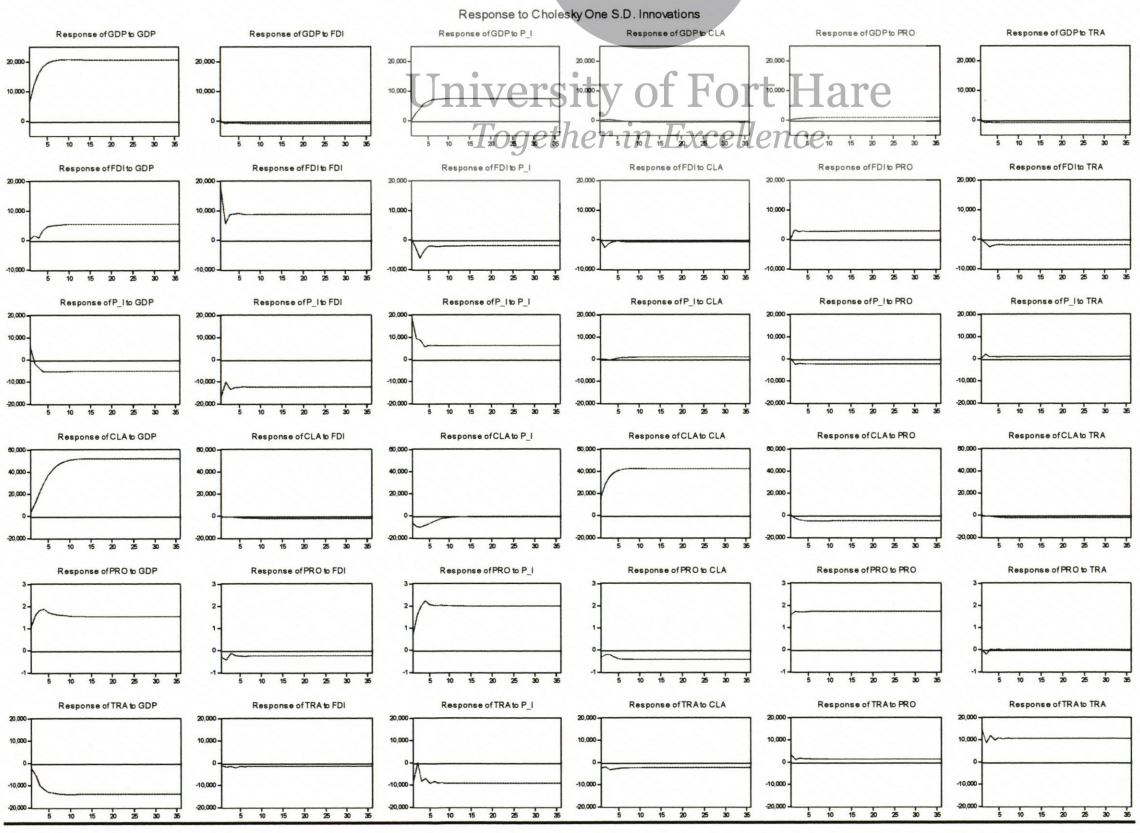
Another variable that is significant is PRO. PRO has a positive error correction term which could be an indication that it takes longer to adjust back to equilibrium.

P_I is insignificant together with CLA and TRA. This means that within the long run these variables do not have much of impact on GDP.

Of importance is that the coefficient for GDP is positive which means GDP takes longer to adjust back to equilibrium. A longer time frame is need for GDP adjust back to equilibrium. Therefore there disequilibrium is more persistent that had the coefficient been negative.

5.3.4 impulse response

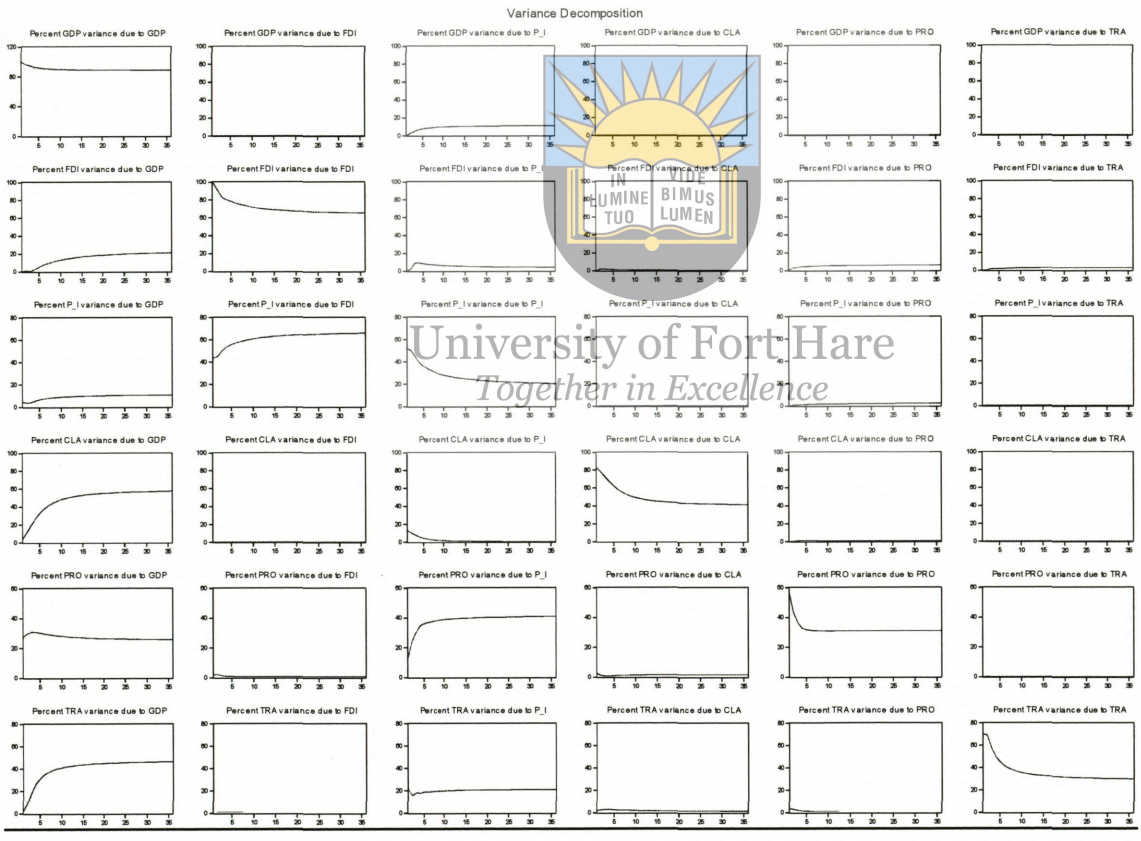
figure 5 .10 Impulse response (1994 to 2010)



After capital account liberalisation the effect of a shock from FDI results in a negative effect on GDP but the shock quickly dies down. The effect of a shock on P_I on the other hand shows that GDP reacts more to it than a shock from FDI. There is a positive relationship between the shock from P_I and GDP.

5.3.5 Variance decomposition

figure 5 .11 Variance decomposition (1994 to 2010)



The variance decomposition shows that P_I results in the largest proportional effect on GDP. Even though the effect quickly dies down it is has the greatest impact when a shock occures on GDP.

5.3.6 GARCH

Table5. 15 The ARCH test. (1994-2010)

Heteroskedasticity Test: ARCH

F-statistic	12.35449	Prob. F(1,61)	0.0008
Obs*R-squared	10.61057	Prob. Chi-Square(1)	0.0011

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 09/27/11 Time: 07:30
Sample (adjusted): 1994Q4 2010Q2
Included observations: 63 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.21E+08	99688793	3.220557	0.0021
RESID^2(-1)	0.407729	0.116000	3.514896	0.0008

R-squared	0.168422	Mean dependent var	5.45E+08
Adjusted R-squared	0.154789	S.D. dependent var	6.62E+08
S.E. of regression	6.09E+08	Akaike info criterion	43.3236
Sum squared resid	2.26E+19	Schwarz criterion	43.3917
Log likelihood	-1362.696	Hannan-Quinn	43.3504

		criter.	4
			1.91911
F-statistic	12.35449	Durbin-Watson stat	6
Prob(F-statistic)	0.000836		

The output indicates that the data from 1994 Q2 to 2010 Q2 has an ARCH effect. The p value is 0.0011 which is less than the significant level of 5%. Therefore the null hypothesis is rejected and the study concludes that there is an ARCH effect.

Having determined that there is an ARCH effect, the next step is to determine the conditional variance by estimating the model using GARCH.

Table5. 16 GARCH output

Dependent Variable: GDP
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 06/16/11 Time: 15:53
Sample: 1994Q2 2010Q2
Included observations: 65
Failure to improve Likelihood after 46 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(7) + C(8)*RESID(-1)^2 + C(9)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	536296.9	28564.43	18.77499	0.0000
FDI	-0.093464	0.233111	-0.400943	0.6885
P_I	-0.029776	0.241193	-0.123452	0.9017
CLA	0.206829	0.017114	12.08522	0.0000
PRO	6620.091	347.9835	19.02415	0.0000
TRA	-0.231497	0.114988	-2.013230	0.0441

	Variance Equation			
C	2.63E+08	1.78E+08	1.476418	0.1398
RESID(-1)^2	0.611538	0.339405	1.801798	0.0716
GARCH(-1)	-0.276659	0.440498	-0.628058	0.5300

The study utilised the GARCH at various lags and found that the parameters where negative.

The output above is from the GARCH (1,1) model. The results are not valid as the GARCH parameter is negative, therefore the study will then utilise the EGARCH model.

Table5. 17 EGARCH output

Dependent Variable: GDP
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 09/28/11 Time: 06:23
Sample (adjusted): 1994Q3 2010Q2
Included observations: 64 after adjustments
Convergence achieved after 99 iterations
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(7) + C(8)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(9)
*ABS(RESID(-2)/@SQRT(GARCH(-2))) + C(10)*RESID(-1)
/@SQRT(GARCH(-1)) + C(11)*LOG(GARCH(-1)) + C(12)*LOG(GARCH(
-2))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	504559.3	15148.65	33.30721	0.0000

FDI(-1)	0.137586	0.198379	0.693552	0.4880
P_I(-1)	0.431608	0.110573	3.903365	0.0001
CLA(-1)	0.173992	0.011539	15.07855	0.0000
PRO(-1)	7226.849	205.6698	35.13811	0.0000
TRA(-1)	-0.301524	0.076185	-3.957761	0.0001
	Variance Equation			
C(7)	25.36728	6.120546	4.144611	0.0000
C(8)	1.592355	0.818504	1.945445	0.0517
C(9)	1.429968	0.653868	2.186936	0.0287
C(10)	-0.560123	0.302026	-1.854551	0.0637
C(11)	0.145683	0.272420	0.534773	0.5928
C(12)	-0.537432	0.164713	-3.262846	0.0011

With the EGARCH output the variable that is of importance to the study is the one that measures the level of asymmetry, which is C (10). The presence of the ARCH effect indicates that variance is not consistent and thus the variable C (10) will indicate under which type of shock the variable GDP reacts more to between a negative shock and a positive shock.

The variable C(10) is negative which is an indication that the GDP in the model is more reactive to the negative shocks that it would be to positive shocks. GDP is expected to fall significantly because of negative shocks. This means that the possibility of an increase in a crisis is more pronounced in the model under the period 1994 to 2010.

The combination of the other variables that is C (8), C (9), C (11) and C (12) indicate an increment in the persistence of a shock. C (8) and C (9) focus on the effect of past shocks while the past value of the variance is captured by C(11) and C(12). The parameters C(8) and C(9) are significant and substantive. Therefore the study expects the shock to persist for longer which will lead to longer periods of recession and thus a depression after a negative shock.

This is in line with the views of (Henry, 2003), who said It is possible the sudden and huge increase in capital inflows and outflows coupled with the possibility of external shocks after capital account liberalisation can lead to a situation whereby the local currency loses its ability to be a medium of exchange and a store of value.

Ishii & Habermeier (2002) noted that of 24 economies that experienced a financial crisis had liberalized their capital account at most 5 years before the crisis.

Aker and Aker (2009), in a study found that liberalisation can lead to financial crises as free capital movements are noted to have a huge influence on macroeconomic variables.

Reinhart & Kaminsky (1999) Using a combination of developed and developing countries totalling 20, the study found that the link between banking crises and a currency crisis increased after financial liberalisation

Detragiache & Demirgüç-Kunt (1998) The study found that in the event of capital account liberalisation banks are more exposed to external forces and shocks. This exposure increases the chances of a banking crisis occurring if there is financial liberalisation.

The value of the variable measuring the asymmetry in the period 1975 to 1994 is largely insignificant and positive. This is shown in the output in the appendix.

5.3.7 Diagnostic tests

The VECM model is tested to check if its stationary. A stable VECM model validates the estimates used by estimating the model. The roots have a modulus that is less than one and to see if they lie within the circle. This means the VECM model is stable.

figure 5 .12 Inverse Roots AR Characteristic polynomial

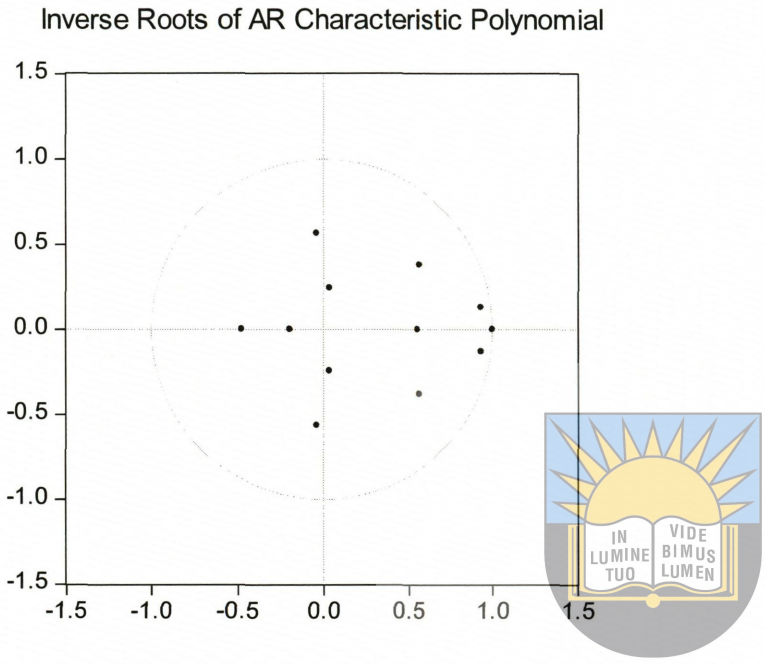


Table5. 18 Residual normality test

Component	Jarque-Bera	df	Prob.
1	1.447191	2	0.4850
2	776.0273	2	0.0000
3	91.10772	2	0.0000
4	24.01303	2	0.0000
5	0.643850	2	0.7248
6	14.72658	2	0.0006
Joint	907.9657	12	0.0000

The output for the normality test is shown above. The null hypothesis is rejected based on the probability of the joint Jarque-Bera statistic. The Jarque-Bera statistic is compared with the given observed value under the null hypothesis. If the probability of the Jarque-Bera statistic is smaller than any significance level the null hypothesis is rejected and the conclusion is that the residuals are not multivariate normally distributed.

The probability value of the Jarque-Bera is 0.000, which means that which means that at all the relevant significance levels we can reject the null and therefore the residuals are not multivariate normally distributed.

5.4 Summary

The chapter sought to establish the type of relationship that existed between capital flows and economic growth under capital controls and also the relationship that exist under capital account liberalisation.

The study compared the trends between capital flows and economic growth under both periods and also sought to establish the long run relationship by testing for cointegration using the Johansen test. The VECM output established the long run equations and thus a comparison of the relationships is to be done.

The GARCH was able to ascertain the behaviour from a volatility point of view. The output explains how the relationship under each period behaved under different shocks.

CHAPTER SIX
CONCLUSION

6.1 Summary of study and conclusions

The objectives of the study were to analyse the trends of GDP, FDI and PI under capital controls and after liberalisation, to determine if there is a long run relationship between capital flows and economic and to analyse the relationship if present under the controlled period and liberalised period and then to determine if the volatility of GDP changed after liberalisation.

The trend graphs indicate that GDP under both capital controls and capital account liberalisation has an upward trend. Of importance is the rate of change which is under the period under capital controls was approximately 15 billion Rand while for the period after capital account liberalisation was approximately 50 billion rand, which is over three times the rate. This means that opening the capital account did increase the average growth rate of the South African economy.

According to Fischer (1997:3) capital account liberalisation is the trigger for the development of an economy that is why all developed economies have open capital accounts. This increase in rate of GDP increase could be associated with the opening up of the capital account and thus the better development of the economy leading to an increased GDP growth rate.

A look at FDI shows that the volume of FDI increased significantly after capital account liberalisation. The inflows increased from a peak of approximately one billion Rand to a peak of almost one hundred billion Rand after capital account liberalisation but also the minimum value increased from about one and a half billion Rand to close to twenty five billion Rand. This shows that there is an increase in the volatility levels after capital account liberalisation. The ease of capital movement meant that there should be increased level of volatility with regards to capital flows.

A look at P_I shows that the variable increased in volatility as there was an increase in inflows but also an even bigger increase in terms of outflows. The liberalisation of the

capital account made it easier for investors to withdraw their funds as when they desired. This made P_I very volatile.

The scatter plots indicate that there is a positive relationship between the change in FDI and the change in GDP in both periods. The regression line has a similar gradient under both periods. The main difference is that under capital account liberalisation the regression is has a positive intercept which could be an indication that there were longer period of economic growth and smaller negative differences.

The scatter plots also indicate there is a negative correlation between changes in P_I and changes in GDP. Of greater importance is the steeper gradient of the regression line which indicates that after liberalisation the change in P_I resulted in a bigger change in GDP than under capital controls. This means there was an increase in volatility in the change in GDP.

The next objective was to determine if there is a long run relationship between the dependent variable, GDP and the independent variables namely FDI, P_I, CLA, PRO and TRA. Under the controlled period, there is a long run relationship between the dependent and independent variables.

The trace test indicates three cointegrating equations but the relevant one is the one with GDP as the dependent variable. Under the normalised equation of the cointegrating equation that has GDP as the dependent variable FDI, PRO and TRA are significant under the period with capital controlsThe outcome shows that there is a positive relationship between FDI and GDP. The positive relationship indicates a positive correlation in the changes between FDI and GDP. GDP tracks the movement of FDI. This means an increase in FDI should lead to an increase in GDP holding all other things constant.

P_I is considered to be insignificant and therefore of no major impact on the long run relationship of GDP. Even though it is significant in the short run, over the long run it plays a less significant role.

For the liberalised period, the trace test indicates that there are also three cointegrating equations. Focusing on the GDP equation the normalised equation shows that FDI, P_I, PRO and TRA are significant.

This outcome is different from the results of the controlled period in that P_I is now significant. FDI, P_I and TRA all have positive coefficients which indicate a positive correlation between the dependent variable GDP against the independent variables.

Therefore in the short run liberalisation allowed both forms of capital flows to be influential in influencing economic growth. Therefore the opening up of capital accounts does in the short run aid economic growth.

Having analysed the normalised equation for the period from 1975 to 1994, the next step is to look at the cointegrating equation. From the cointegrating equation, GDP, FDI and CLA are significant. GDP and FDI are expected to adjust within the given period towards the equilibrium position each after a shock. CLA may take longer to adjust. GDP adjusts at rate of approximately 0.28%.

A look at the cointegrating equation for the period 1994 to 2010 shows that only FDI and PRO are now significant with GDP now adjusting at a faster rate. There has been an increase from 0.28% to 3.9%. GDP is expected to adjust more within the one lag as it moves towards equilibrium.

This means that after liberalisation in the long run economic output is more sensitive to changes and will fluctuate at faster rates than when there were capital controls. The effect of shocks from capital flows is sharper and has a greater impact on the trend of GDP.

The CLA variable is not significant after capital account liberalisation. This means that the results indicate that the importance of the financial sector, in terms of intermediation in the long run relationship with GDP is less pronounced. This is in line with the view that the South African economy has a low savings culture.

This means that according to the study the effect of financial intermediation is not as important in the relationship between capital flows and economic growth. Financial

intermediation does not a play a major role in the development of the economy after liberalisation.

Looking at the variance decomposition, it is important to note that before capital account liberalisation, FDI had the largest impact in terms of proportion on changes in GDP. This means that a change in FDI would have the biggest impact on GDP than a change in the other independent variables. After capital liberalisation this changed to a situation that saw FDI having a reduced impact in terms of proportion attributed to it for a change in GDP. Opening the capital account allowed P_I to have the greatest impact of all the independent variables on GDP. Changes in GDP where tracking changes in P_I. GDP become more sensitive to changes in P_I than to FDI. This means GDP become more volatile and this is confirmed by the EGARCH results.

Testing for the ARCH effect on the times series 1975 to 1994 found that there was a limited arch effect. This meant basically the conditional variance of the time series is more or less consistent. The times series from 1994 to 2010, exhibited the ARCH effect. This means the conditional variance is not constant. The EGARCH results show that GDP become more volatile and the negative C (10) parameter indicates GDP was sensitive to negative news. This means that negative news made GDP drop more than the effect of good news.

This is in line with the economic view that opening the capital account increases the risk of a financial crisis. A series of negative shocks will result in a depression. The positive coefficient of GDP under the cointegrating equation indicates that GDP needs a longer time to adjust back to equilibrium and thus this means the combination of persistent negative shocks and the slow adjustment of GDP back to equilibrium means that an economy is easily susceptible to a recession.

6.2 Policy implications

It has to be acknowledged that for the liberalisation to be effective there is the need for sound macroeconomic policies as highlighted by Fischer (1997). There is a need to properly manage the interest rate, the exchange rate and the performance of the economy as a whole so as to aid in the growth of the economy.

The exposure of the economy to external shock and its increased sensitivity to negative shocks means that there is need for strong and proper management of the economy. The uncurbed goal of developing the economy should not leave the economy at risk of falling into a recession. The actions taken to help develop and increase the economic output should not be done without proper supervision as a quick fix can lead to longer term disastrous consequences.

By opening up the economy, there is a greater need to maintain and implement sound macroeconomic policies. Sound policies will be able to shield the economy from adverse effects of a possible economic crisis.

In conclusion, the study does find that opening the capital account in the case of South Africa did increase capital flows and also increase the grow rate of economic production. The effect of intermediation was minimal as it became less pronounced after liberalisation.

Coupled with the increase in the economic growth rate the economy also became more susceptible to an economic crisis. This means that the benefit of opening the capital account can easily be nullified by a financial crisis. This is in line with the view takes by economist against the neo classical view. Economists against the neo classical view put forward the view that the short term capital flows are volatile and subject to abrupt changes and thus have negative effects on the economy. The argument goes on to pronounce that capital account liberalisation dependent short term inflows will result in the possibility of a financial crisis particularly in developing countries (Gray & Dilyard 2005).

6.3 Limitations of study

The model could not incorporate the other aspects of financial development hence the effect of the capital markets and the effect of financial depth were not incorporated. Therefore the full impact of the financial sector on the relationship is not conclusively ascertained.

The change of the BOP composition also influenced the output as the capital flows under each period were not fully consistent. The composition of capital flows differs slightly from BOP M4 TO BOP M5.

7 REFERENCE LIST

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8. APPENDICES

APPENDIX A

A note on the revision of the balance of payments accounting framework

A note on the revision of the balance of payments accounting framework

by S.S. Walters

Introduction

Since the publication of the fourth edition of the Balance of Payments Manual (BOPM4) of the International Monetary Fund (IMF) in 1977, the world economy has experienced substantial changes in the scope and complexity of international transactions. These changes resulted from the liberalisation of financial markets, the widespread abolition of capital controls, innovations in the creation of financial instruments and new approaches to the restructuring of external debt. In addition, international trade in services grew strongly. All these developments necessitated changes in the recording and the classification of such transactions within the structure of the balance of payments accounts. Furthermore, there was a need to integrate and harmonise balance of payments data with the revised System of National Accounts (SNA) and the IMF's statistical systems on money and banking and government finance.

The fifth edition of the IMF's Balance of Payments Manual (BOPM5) issued in September 1993 standardises the concepts, definitions and classifications of international transactions and helps to facilitate the collection, the organisation and comparability of balance of payments and international investment position statistics.

Major changes introduced by BOPM5

The scope and orientation of BOPM5 differ from previous editions in a number of areas. These changes include

- the provision of a conceptual framework to reconcile balance of payments flows (transactions) with stocks of financial assets and liabilities (the international investment position);
- the harmonisation of the balance of payments transaction flows with the rest of the world account in the SNA. Mainly for this reason, the BOPM5 differentiates between current and capital transfers;
- a clear distinction between international transactions in services and transactions in income;
- an expansion of the list of identifiable transactions in services to reflect their growing importance and their contributions to or linkages with other statistical systems; and
- an expansion of the coverage of financial flows and the restructuring of stocks.

Structure of the balance of payments

The structure of the balance of payments as presented in the BOPM5 is in line with the rest of the world account in the national accounts, and consists of the current account, the capital transfer account, the financial account and the international investment position. The

Table 1. The analytical presentation of the South African balance of payments

BOPM4	BOPM5
Current account	**Current account**
Merchandise exports	Merchandise exports
Net gold exports	Net gold exports
Service receipts	Service receipts
	Income receipts
Less: Merchandise imports	*Less:* Merchandise imports
Less: Payments for services	*Less:* Payments for services
	Less: Income payments
Transfers (net receipts+)	Current transfers (net receipts+)
Balance on current account	**Balance on current account**
	Capital transfer account (net receipts+)
Capital account	**Financial account**
Long-term capital movements	Direct investment
Public authorities	Liabilities
Public corporations	Assets
Monetary sector	Portfolio investment
Non-monetary private sector	Liabilities
Short-term capital movements	Assets
Public authorities	Other investment
Public corporations	Liabilities
Monetary sector	Assets
Non-monetary private sector	
	Unrecorded transactions
Change in net gold and other foreign reserves	**Change in net gold and other foreign reserves**
Change in liabilities related to reserves	Change in liabilities related to reserves
SDR allocations and valuation adjustments	SDR allocations and valuation adjustments
Change in gross gold and other foreign reserves	**Change in gross gold and other foreign reserves**
Memo item: Total capital movements not related to reserves	Memo item: Total capital transfer and financial account transactions including unrecorded transactions

Appendix B

Null Hypothesis: GDP has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		0.396350
Test critical values:	1% level	-2.596160
	5% level	-1.945199
	10% level	-1.613948

*MacKinnon (1996)

Null Hypothesis: D(GDP) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		-5.041491
Test critical values:	1% level	-2.596160
	5% level	-1.945199
	10% level	-1.613948

*MacKinnon (1996)

Null Hypothesis: GDP has a unit root

Exogenous: Constant

Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.716843	0.4188
Test critical values:	1% level	-3.519050	
	5% level	-2.900137	
	10% level	-2.587409	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(GDP) has a unit root

Exogenous: Constant

Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.080352	0.0000
Test critical values:	1% level	-3.520307	
	5% level	-2.900670	
	10% level	-2.587691	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: FDI has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		-2.443435
Test critical values:	1% level	-2.596160
	5% level	-1.945199
	10% level	-1.613948

*MacKinnon (1996)

Null Hypothesis: D(FDI) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		-16.95452
Test critical values:	1% level	-2.596160
	5% level	-1.945199
	10% level	-1.613948

*MacKinnon (1996)

Null Hypothesis: FDI has a unit root

Exogenous: Constant

Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.003560	0.0000
Test critical values:	1% level	-3.519050	
	5% level	-2.900137	
	10% level	-2.587409	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: P_I has a unit root

Exogenous: Constant

Lag Length: 3 (Automatic - based on SIC, maxlag=11)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		-0.457069
Test critical values:	1% level	-2.597025
	5% level	-1.945324
	10% level	-1.613876

*MacKinnon (1996)

Null Hypothesis: D(P_I) has a unit root

Exogenous: Constant

Lag Length: 3 (Automatic - based on SIC, maxlag=11)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		-4.149978
Test critical values:	1% level	-2.597476
	5% level	-1.945389
	10% level	-1.613838

*MacKinnon (1996)

Null Hypothesis: P_I has a unit root

Exogenous: Constant

Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-9.520735	0.0000
Test critical values:	1% level	-3.519050	
	5% level	-2.900137	
	10% level	-2.587409	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: CLA has a unit root

Exogenous: Constant

Lag Length: 4 (Automatic - based on SIC, maxlag=11)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		0.618455
Test critical values:	1% level	-2.597476
	5% level	-1.945389
	10% level	-1.613838

*MacKinnon (1996)

Null Hypothesis: D(CLA) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=11)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		-6.554688
Test critical values:	1% level	-3.675000
	5% level	-3.110000
	10% level	-2.815000

*Elliott-Rothenberg-Stock (1996, Table 1)

Null Hypothesis: CLA has a unit root

Exogenous: Constant

Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	7.081788	1.0000

Test critical values:	1% level	-3.519050
	5% level	-2.900137
	10% level	-2.587409

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(CLA) has a unit root

Exogenous: Constant

Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.499452	0.0106
Test critical values:	1% level	-3.520307	
	5% level	-2.900670	
	10% level	-2.587691	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: PRO has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=11)

	t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic	-1.581187

Test critical values:	1% level	-2.595745
	5% level	-1.945139
	10% level	-1.613983

*MacKinnon (1996)

Null Hypothesis: D(PRO) has a unit root

Exogenous: Constant

Lag Length: 2 (Automatic - based on SIC, maxlag=11)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		-2.540874
Test critical values:	1% level	-2.597025
	5% level	-1.945324
	10% level	-1.613876

*MacKinnon (1996)

Null Hypothesis: PRO has a unit root

Exogenous: Constant

Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.543328	0.1095
Test critical values:	1% level	-3.519050	

	5% level	-2.900137
	10% level	-2.587409

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(PRO) has a unit root

Exogenous: Constant

Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-10.15576	0.0001
Test critical values:	1% level	-3.520307	
	5% level	-2.900670	
	10% level	-2.587691	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: TRA has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		-2.109060
Test critical values:	1% level	-2.596160
	5% level	-1.945199

	10% level	-1.613948

*MacKinnon (1996)

Null Hypothesis: D(TRA) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		-13.53855
Test critical values:	1% level	-2.596160
	5% level	-1.945199
	10% level	-1.613948

*MacKinnon (1996)

Null Hypothesis: TRA has a unit root

Exogenous: Constant

Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.080134	0.0018
Test critical values:	1% level	-3.519050	
	5% level	-2.900137	
	10% level	-2.587409	

*MacKinnon (1996) one-sided p-values.

Period 1994 Q2 to 2010 Q2

Null Hypothesis: CLA has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=10)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		-0.620865
Test critical values:	1% level	-2.602185
	5% level	-1.946072
	10% level	-1.613448

*MacKinnon (1996)

Null Hypothesis: D(CLA) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		-2.986812
Test critical values:	1% level	-2.602185
	5% level	-1.946072

	10% level	-1.613448

*MacKinnon (1996)

Null Hypothesis: CLA has a unit root

Exogenous: Constant

Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		1.528703	0.9992
Test critical values:	1% level	-3.536587	
	5% level	-2.907660	
	10% level	-2.591396	

Null Hypothesis: D(CLA) has a unit root

Exogenous: Constant

Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.890120	0.0522
Test critical values:	1% level	-3.538362	
	5% level	-2.908420	
	10% level	-2.591799	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: FDI has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		-7.019310
Test critical values:	1% level	-2.601596
	5% level	-1.945987
	10% level	-1.613496

*MacKinnon (1996)

Null Hypothesis: D(FDI) has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=10)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		-10.00219
Test critical values:	1% level	-2.602794
	5% level	-1.946161
	10% level	-1.613398

*MacKinnon (1996)

Null Hypothesis: FDI has a unit root

Exogenous: Constant

Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.277831	0.0000
Test critical values:	1% level	-3.536587	
	5% level	-2.907660	
	10% level	-2.591396	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(FDI) has a unit root

Exogenous: Constant

Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-21.14720	0.0001
Test critical values:	1% level	-3.538362	
	5% level	-2.908420	
	10% level	-2.591799	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: GDP has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=10)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		0.806226
Test critical values:	1% level	-2.602185
	5% level	-1.946072
	10% level	-1.613448

*MacKinnon (1996)

Null Hypothesis: D(GDP) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		-3.313481
Test critical values:	1% level	-2.602185
	5% level	-1.946072
	10% level	-1.613448

*MacKinnon (1996)

Null Hypothesis: GDP has a unit root

Exogenous: Constant

Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.355510	0.9794
Test critical values:	1% level	-3.536587	
	5% level	-2.907660	
	10% level	-2.591396	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(GDP) has a unit root

Exogenous: Constant

Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.414073	0.0140
Test critical values:	1% level	-3.538362	
	5% level	-2.908420	
	10% level	-2.591799	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: P_I has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.981523	0.0000
Test critical values:	1% level	-3.536587	
	5% level	-2.907660	
	10% level	-2.591396	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(P_I) has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.604210	0.0000
Test critical values:	1% level	-3.540198	
	5% level	-2.909206	
	10% level	-2.592215	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: P_I has a unit root

Exogenous: Constant

Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.952721	0.0000
Test critical values:	1% level	-3.536587	
	5% level	-2.907660	
	10% level	-2.591396	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(P_I) has a unit root

Exogenous: Constant

Bandwidth: 14 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-20.61544	0.0001
Test critical values:	1% level	-3.538362	
	5% level	-2.908420	
	10% level	-2.591799	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: PRO has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=10)

	t-Statistic

Elliott-Rothenberg-Stock DF-GLS test statistic		0.804644
Test critical values:	1% level	-2.602185
	5% level	-1.946072
	10% level	-1.613448

*MacKinnon (1996)

Null Hypothesis: D(PRO) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=10)

	t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic	-5.034629
Test critical values: 1% level	-2.602185
5% level	-1.946072
10% level	-1.613448

*MacKinnon (1996)

Null Hypothesis: PRO has a unit root

Exogenous: Constant

Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-1.042559	0.7330

Test critical values:	1% level	-3.536587
	5% level	-2.907660
	10% level	-2.591396

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(PRO) has a unit root

Exogenous: Constant

Bandwidth: 11 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.523335	0.0000
Test critical values:	1% level	-3.538362	
	5% level	-2.908420	
	10% level	-2.591799	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: TRA has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=10)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		-0.584823
Test critical values:	1% level	-2.602185

	5% level	-1.946072
	10% level	-1.613448

*MacKinnon (1996)

Null Hypothesis: D(TRA) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		-12.24388
Test critical values:	1% level	-2.602185
	5% level	-1.946072
	10% level	-1.613448

*MacKinnon (1996)

Null Hypothesis: TRA has a unit root

Exogenous: Constant

Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.380502	0.5864
Test critical values:	1% level	-3.536587	
	5% level	-2.907660	

	10% level	-2.591396

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(TRA) has a unit root

Exogenous: Constant

Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-12.08048	0.0000
Test critical values:	1% level	-3.538362	
	5% level	-2.908420	
	10% level	-2.591799	

*MacKinnon (1996) one-sided p-values.

Appendix C

Vector Autoregression Estimates

Date: 06/16/11 Time: 16:05

Sample (adjusted): 1975Q3 1994Q1

Included observations: 75 after adjustments

Standard errors in ( ) & t-statistics in [ ]

	GDP	FDI	P_I	CLA	PRO	TRA
GDP(-1)	1.186279	0.006986	-0.017139	0.065356	5.45E-05	-0.068406

	(0.14666)	(0.00674)	(0.01804)	(0.02170)	(2.6E-05)	(0.05448)
	[8.08850]	[1.03727]	[-0.94998]	[3.01130]	[2.09486]	[-1.25560]
GDP(-2)	-0.244438	-0.006165	0.028822	-0.049634	-4.83E-05	0.081366
	(0.14113)	(0.00648)	(0.01736)	(0.02089)	(2.5E-05)	(0.05243)
	[-1.73198]	[-0.95127]	[1.66015]	[-2.37652]	[-1.92863]	[1.55201]
FDI(-1)	-5.016527	-0.022107	0.313967	0.362397	-0.000685	-3.855716
	(2.90664)	(0.13348)	(0.35755)	(0.43013)	(0.00052)	(1.07972)
	[-1.72588]	[-0.16562]	[0.87811]	[0.84252]	[-1.32813]	[-3.57102]
FDI(-2)	-3.972473	0.198285	-0.604636	1.316413	0.000689	-1.126347
	(2.94929)	(0.13544)	(0.36280)	(0.43645)	(0.00052)	(1.09557)
	[-1.34692]	[1.46403]	[-1.66660]	[3.01621]	[1.31588]	[-1.02809]
P_I(-1)	0.231489	0.046542	-0.320583	-0.325528	-0.000261	-0.158419
	(1.15951)	(0.05325)	(0.14263)	(0.17159)	(0.00021)	(0.43072)
	[0.19964]	[0.87407]	[-2.24761]	[-1.89714]	[-1.26725]	[-0.36780]
P_I(-2)	1.162688	0.017390	0.070621	0.444419	-6.00E-06	-0.369587
	(1.24944)	(0.05738)	(0.15370)	(0.18490)	(0.00022)	(0.46413)
	[0.93057]	[0.30309]	[0.45949]	[2.40361]	[-0.02705]	[-0.79631]

CLA(-1)	0.364663	0.020755	-0.089619	1.233201	-3.93E-05	-0.456114
	(0.83641)	(0.03841)	(0.10289)	(0.12377)	(0.00015)	(0.31070)
	[0.43599]	[0.54037]	[-0.87104]	[9.96331]	[-0.26498]	[-1.46803]
CLA(-2)	-0.355382	-0.022199	0.068411	-0.227375	3.32E-05	0.464185
	(0.83142)	(0.03818)	(0.10227)	(0.12304)	(0.00015)	(0.30885)
	[-0.42744]	[-0.58141]	[0.66890]	[-1.84802]	[0.22492]	[1.50296]
PRO(-1)	-155.2124	-17.40193	154.0317	-214.3845	0.549065	-120.3798
	(897.108)	(41.1969)	(110.354)	(132.757)	(0.15916)	(333.247)
	[-0.17301]	[-0.42241]	[1.39579]	[-1.61486]	[3.44983]	[-0.36123]
PRO(-2)	859.9742	8.829698	-328.3799	52.85256	0.224115	-81.34348
	(894.988)	(41.0996)	(110.093)	(132.443)	(0.15878)	(332.459)
	[0.96088]	[0.21484]	[-2.98274]	[0.39906]	[1.41147]	[-0.24467]
TRA(-1)	-0.281342	-0.035587	-0.034359	0.028514	-5.27E-05	0.229491
	(0.38120)	(0.01751)	(0.04689)	(0.05641)	(6.8E-05)	(0.14161)
	[-0.73803]	[-2.03292]	[-0.73272]	[0.50545]	[-0.77940]	[1.62064]
TRA(-2)	0.542761	-0.021876	-0.046002	0.114947	9.87E-06	0.040721

	(0.37565)	(0.01725)	(0.04621)	(0.05559)	(6.7E-05)	(0.13954)
	[1.44486]	[-1.26815]	[-0.99552]	[2.06776]	[0.14804]	[0.29182]
C	6239.970	-65.66026	2564.526	-2169.431	10.83342	4262.302
	(26053.1)	(1196.41)	(3204.82)	(3855.42)	(4.62211)	(9677.90)
	[0.23951]	[-0.05488]	[0.80021]	[-0.56270]	[2.34383]	[0.44042]
R-squared	0.991605	0.460364	0.425041	0.999623	0.796677	0.595932
Adj. R-squared	0.989981	0.355918	0.313759	0.999550	0.757325	0.517725
Sum sq. resids	5.24E+09	11053870	79316317	1.15E+08	164.9814	7.23E+08
S.E. equation	9194.774	422.2419	1131.059	1360.673	1.631254	3415.564
F-statistic	610.3000	4.407685	3.819483	13695.87	20.24450	7.619945
Log likelihood	-783.7614	-552.7005	-626.6004	-640.4622	-135.9833	-709.4895
Akaike AIC	21.24697	15.08535	17.05601	17.42566	3.972889	19.26639
Schwarz SC	21.64867	15.48704	17.45771	17.82736	4.374587	19.66808
Mean dependent	980360.1	-100.4933	-612.3600	78547.79	72.91333	2555.413
S.D. dependent	91858.23	526.1272	1365.360	64136.48	3.311378	4918.300

Determinant resid covariance (dof adj.)	3.25E+32
Determinant resid covariance	1.04E+32
Log likelihood	-3402.981
Akaike information criterion	92.82615

Schwarz criterion 95.23634

Vector Autoregression Estimates

Date: 06/16/11 Time: 15:41

Sample (adjusted): 1994Q4 2010Q2

Included observations: 63 after adjustments

Standard errors in ( ) & t-statistics in [ ]

	GDP	FDI	P_I	CLA	PRO	TRA
GDP(-1)	1.456490	-0.115484	0.196062	0.262102	4.95E-05	-0.597032
	(0.15062)	(0.36459)	(0.49580)	(0.34697)	(4.6E-05)	(0.38617)
	[9.67011]	[-0.31675]	[0.39544]	[0.75540]	[1.07845]	[-1.54605]
GDP(-2)	-0.336005	-0.079329	0.200178	0.037260	-1.99E-05	0.450597
	(0.16475)	(0.39879)	(0.54232)	(0.37952)	(5.0E-05)	(0.42239)
	[-2.03951]	[-0.19892]	[0.36912]	[0.09818]	[-0.39579]	[1.06677]
FDI(-1)	-0.015841	-0.127290	0.166028	-0.058856	1.67E-05	0.207640
	(0.07241)	(0.17528)	(0.23837)	(0.16681)	(2.2E-05)	(0.18566)
	[-0.21876]	[-0.72620]	[0.69652]	[-0.35283]	[0.75624]	[1.11840]

FDI(-2)	0.018223	-0.246933	-0.106804	0.196020	2.60E-05	-0.103629
	(0.07078)	(0.17132)	(0.23298)	(0.16304)	(2.2E-05)	(0.18146)
	[0.25748]	[-1.44133]	[-0.45842]	[1.20225]	[1.20572]	[-0.57108]
P_I(-1)	0.095197	-0.080089	0.261850	0.099288	2.69E-05	0.289471
	(0.06060)	(0.14669)	(0.19948)	(0.13960)	(1.8E-05)	(0.15537)
	[1.57093]	[-0.54599]	[1.31267]	[0.71124]	[1.45508]	[1.86313]
P_I(-2)	0.037793	-0.227000	-0.101679	0.347775	4.96E-06	-0.218854
	(0.05812)	(0.14070)	(0.19133)	(0.13390)	(1.8E-05)	(0.14902)
	[0.65021]	[-1.61341]	[-0.53142]	[2.59733]	[0.28012]	[-1.46859]
CLA(-1)	-0.034605	-0.036258	0.161680	0.966215	2.78E-05	-0.242636
	(0.06159)	(0.14909)	(0.20274)	(0.14188)	(1.9E-05)	(0.15791)
	[-0.56186]	[-0.24320]	[0.79746]	[6.80995]	[1.47910]	[-1.53654]
CLA(-2)	0.006952	0.067893	-0.196603	-0.109184	-2.74E-05	0.248724
	(0.05499)	(0.13311)	(0.18102)	(0.12668)	(1.7E-05)	(0.14099)
	[0.12642]	[0.51004]	[-1.08608]	[-0.86188]	[-1.63178]	[1.76410]
PRO(-1)	170.5755	813.6685	-1378.442	-558.9139	0.916156	-104.6308
	(560.197)	(1356.02)	(1844.05)	(1290.50)	(0.17081)	(1436.28)

	[0.30449]	[0.60004]	[-0.74751]	[-0.43310]	[5.36372]	[-0.07285]
PRO(-2)	-771.5140	906.8513	-1997.652	370.8723	-0.268810	1269.263
	(580.893)	(1406.12)	(1912.18)	(1338.17)	(0.17712)	(1489.34)
	[-1.32815]	[0.64493]	[-1.04470]	[0.27715]	[-1.51770]	[0.85223]
TRA(-1)	-0.044028	-0.012099	0.271595	-0.332126	2.30E-06	0.415244
	(0.05245)	(0.12695)	(0.17264)	(0.12082)	(1.6E-05)	(0.13447)
	[-0.83948]	[-0.09530]	[1.57316]	[-2.74898]	[0.14383]	[3.08809]
TRA(-2)	0.093832	-0.092945	0.093187	-0.144163	4.09E-05	0.272810
	(0.05073)	(0.12281)	(0.16701)	(0.11687)	(1.5E-05)	(0.13008)
	[1.84947]	[-0.75683]	[0.55798]	[-1.23350]	[2.64225]	[2.09730]
C	-75658.28	71492.60	-160626.5	-280678.0	-3.885215	77014.35
	(32272.3)	(78118.6)	(106234.)	(74343.8)	(9.83993)	(82742.1)
	[-2.34437]	[0.91518]	[-1.51201]	[-3.77540]	[-0.39484]	[0.93078]
R-squared	0.999381	0.200417	0.274309	0.999452	0.988943	0.928461
Adj. R-squared	0.999232	0.008517	0.100143	0.999320	0.986289	0.911291
Sum sq. resids	2.11E+09	1.23E+10	2.28E+10	1.12E+10	195.7488	1.38E+10
S.E. equation	6489.359	15708.21	21361.64	14949.18	1.978630	16637.92

F-statistic	6723.629	1.044381	1.574986	7598.409	372.6684	54.07645
Log likelihood	-635.1220	-690.8153	-710.1823	-687.6950	-125.1046	-694.4378
Akaike AIC	20.57530	22.34334	22.95817	22.24429	4.384273	22.45834
Schwarz SC	21.01754	22.78558	23.40040	22.68652	4.826507	22.90058
Mean dependent	1442451.	3997.714	5454.683	899477.0	108.0254	-43486.10
S.D. dependent	234170.9	15775.53	22518.93	573446.0	16.89799	55861.96

Determinant resid covariance (dof adj.)	2.76E+41
Determinant resid covariance	6.90E+40
Log likelihood	-3498.475
Akaike information criterion	113.5389
Schwarz criterion	116.1923

APPENDIX D

1975 to 1994

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

GDP	FDI	P_I	CLA	PRO	TRA
1.77E-05	0.002340	-0.000214	-1.11E-06	-0.243770	0.000105
2.70E-05	-0.002280	-0.001600	-2.49E-05	-0.418855	-0.000384
-3.05E-06	0.001876	-0.000915	-1.47E-05	-0.045439	9.83E-05
-4.04E-06	0.001034	0.000454	8.73E-06	-0.090273	-0.000138
-1.11E-05	0.000605	-8.05E-05	2.02E-05	0.397227	-7.37E-05
-2.05E-05	-0.000426	-0.000205	3.43E-05	0.144559	-4.87E-05

Unrestricted Adjustment Coefficients (alpha):

D(GDP)	-2765.902	-725.6406	-567.3549	-1860.826	-1442.471	731.9180
D(FDI)	-159.1538	76.29198	-149.0215	11.34424	-40.59588	-34.83218
D(P_I)	-2.946146	429.3586	495.2134	-258.9471	25.63470	-43.47094
D(CLA)	996.4074	-101.3616	-318.5046	-241.3755	-16.12678	62.60695
D(PRO)	0.110390	0.150848	0.090031	0.175124	-0.340719	0.128085
D(TRA)	-548.6141	1142.635	-1021.934	710.4575	317.3690	240.5412

1 Cointegrating Equation(s): Log likelihood -3454.574

Normalized cointegrating coefficients (standard error in parentheses)

GDP	FDI	P_I	CLA	PRO	TRA
1.000000	132.3483	-12.12324	-0.062611	-13789.88	5.921976
	(25.6859)	(10.6945)	(0.19587)	(2170.41)	(2.69890)

Adjustment coefficients (standard error in parentheses)

D(GDP)	-0.048894
	(0.01893)
D(FDI)	-0.002813
	(0.00091)
D(P_I)	-5.21E-05
	(0.00269)
D(CLA)	0.017614
	(0.00282)
D(PRO)	1.95E-06
	(3.3E-06)
D(TRA)	-0.009698
	(0.00768)

2 Cointegrating Equation(s): Log likelihood -3430.748

Normalized cointegrating coefficients (standard error in parentheses)

GDP	FDI	P_I	CLA	PRO	TRA
1.000000	0.000000	-40.88508	-0.586913	-14838.59	-6.368718
		(6.21945)	(0.11596)	(1286.05)	(1.23303)
0.000000	1.000000	0.217319	0.003962	7.923878	0.092866
		(0.05999)	(0.00112)	(12.4049)	(0.01189)

Adjustment coefficients (standard error in parentheses)

D(GDP)	-0.068494	-4.816447
	(0.03445)	(3.48611)
D(FDI)	-0.000753	-0.546314
	(0.00164)	(0.16581)
D(P_I)	0.011545	-0.985917
	(0.00462)	(0.46757)
D(CLA)	0.014876	2.562301
	(0.00513)	(0.51953)
D(PRO)	6.03E-06	-8.57E-05
	(6.1E-06)	(0.00061)
D(TRA)	0.021164	-3.888966
	(0.01329)	(1.34473)

3 Cointegrating Equation(s): Log likelihood -3415.203

Normalized cointegrating coefficients (standard error in parentheses)

GDP	FDI	P_I	CLA	PRO	TRA
1.000000	0.000000	0.000000	0.089563	-11855.55	-3.674017
			(0.18849)	(2086.18)	(1.84891)
0.000000	1.000000	0.000000	0.000366	-7.932070	0.078543
			(0.00110)	(12.1616)	(0.01078)
0.000000	0.000000	1.000000	0.016546	72.96151	0.065909
			(0.00375)	(41.5253)	(0.03680)

Adjustment coefficients (standard error in parentheses)

D(GDP)	-0.066762	-5.880728	2.272658
	(0.03453)	(4.01143)	(1.97559)
D(FDI)	-0.000298	-0.825859	0.048375
	(0.00154)	(0.17847)	(0.08790)
D(P_I)	0.010033	-0.056963	-1.139277
	(0.00421)	(0.48862)	(0.24064)
D(CLA)	0.015848	1.964829	0.239982
	(0.00500)	(0.58088)	(0.28608)
D(PRO)	5.75E-06	8.32E-05	-0.000347
	(6.1E-06)	(0.00071)	(0.00035)
D(TRA)	0.024283	-5.805976	-0.775612
	(0.01272)	(1.47759)	(0.72770)

4 Cointegrating Equation(s): Log likelihood -3407.088

Normalized cointegrating coefficients (standard error in parentheses)

GDP	FDI	P_I	CLA	PRO	TRA
1.000000	0.000000	0.000000	0.000000	302.7184	16.03753
				(6544.23)	(5.22106)
0.000000	1.000000	0.000000	0.000000	41.72696	0.159052
				(28.7508)	(0.02294)
0.000000	0.000000	1.000000	0.000000	2319.067	3.707400
				(1133.94)	(0.90467)
0.000000	0.000000	0.000000	1.000000	-135750.8	-220.0855
				(68257.9)	(54.4570)

Adjustment coefficients (standard error in parentheses)

D(GDP)	-0.059248	-7.804750	1.428059	0.013232
	(0.03399)	(4.06387)	(1.98696)	(0.03144)
D(FDI)	-0.000344	-0.814129	0.053524	0.000571
	(0.00155)	(0.18499)	(0.09045)	(0.00143)
D(P_I)	0.011079	-0.324704	-1.256809	-0.020232
	(0.00411)	(0.49139)	(0.24026)	(0.00380)
D(CLA)	0.016823	1.715257	0.130426	0.004002
	(0.00495)	(0.59124)	(0.28908)	(0.00457)
D(PRO)	5.04E-06	0.000264	-0.000268	-3.67E-06
	(6.1E-06)	(0.00073)	(0.00036)	(5.6E-06)
D(TRA)	0.021415	-5.071391	-0.453147	-0.006582
	(0.01250)	(1.49425)	(0.73059)	(0.01156)

5 Cointegrating Equation(s): Log likelihood -3403.779

Normalized cointegrating coefficients (standard error in parentheses)

GDP	FDI	P_I	CLA	PRO	TRA
1.000000	0.000000	0.000000	0.000000	0.000000	15.60220
					(5.04708)
0.000000	1.000000	0.000000	0.000000	0.000000	0.099046
					(0.01113)
0.000000	0.000000	1.000000	0.000000	0.000000	0.372397
					(0.09060)
0.000000	0.000000	0.000000	1.000000	0.000000	-24.86506
					(6.22798)
0.000000	0.000000	0.000000	0.000000	1.000000	0.001438

					(0.00036)

Adjustment coefficients (standard error in parentheses)

D(GDP)	-0.043187	-8.676919	1.544202	-0.015840	598.9563
	(0.03539)	(4.05282)	(1.95998)	(0.03724)	(650.740)
D(FDI)	0.000108	-0.838675	0.056792	-0.000248	-3.536913
	(0.00163)	(0.18617)	(0.09003)	(0.00171)	(29.8917)
D(P_I)	0.010794	-0.309205	-1.258873	-0.019716	-168.0640
	(0.00434)	(0.49709)	(0.24040)	(0.00457)	(79.8144)
D(CLA)	0.017003	1.705506	0.131724	0.003677	-170.5823
	(0.00522)	(0.59823)	(0.28931)	(0.00550)	(96.0544)
D(PRO)	8.84E-06	5.82E-05	-0.000240	-1.05E-05	-0.245336
	(6.3E-06)	(0.00072)	(0.00035)	(6.6E-06)	(0.11544)
D(TRA)	0.017881	-4.879498	-0.478700	-0.000185	-236.4957
	(0.01314)	(1.50425)	(0.72747)	(0.01382)	(241.529)

1994 to 2010

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

GDP	FDI	P_I	CLA	PRO	TRA
4.40E-06	0.000111	7.74E-05	3.87E-07	-0.084665	1.39E-05
8.56E-06	-1.03E-06	3.51E-05	-9.03E-06	0.103086	-4.51E-05
-8.27E-06	-5.40E-05	3.75E-05	3.45E-06	0.033692	1.73E-05
5.65E-05	-1.70E-05	-1.30E-05	-1.22E-05	-0.317174	1.45E-05
1.09E-05	-1.87E-05	-2.24E-06	1.11E-07	-0.194396	-1.90E-05
1.41E-05	1.53E-06	-2.47E-07	-6.81E-06	-0.074738	-1.82E-05

Unrestricted Adjustment Coefficients (alpha):

D(GDP)	1041.614	717.2299	1486.611	2261.728	-367.5978	-122.1281
D(FDI)	-8832.350	1721.891	7767.482	-1996.202	481.8058	79.62717
D(P_I)	-1963.911	-9053.261	-7295.703	7492.407	-43.61924	-61.73717
D(CLA)	1600.752	11272.30	-781.2149	3118.064	949.8944	195.1431
D(PRO)	0.660812	-0.621129	0.275696	0.541532	0.369427	-0.021531
D(TRA)	-339.9776	3925.814	-2277.423	-3826.701	2241.976	-401.2087

1 Cointegrating Equation(s): Log likelihood -3548.173

Normalized cointegrating coefficients (standard error in parentheses)

GDP	FDI	P_I	CLA	PRO	TRA
1.000000	25.15116	17.57894	0.087982	-19234.80	3.154974
	(3.29059)	(2.44730)	(0.22508)	(5508.63)	(1.53169)

Adjustment coefficients (standard error in parentheses)

D(GDP)	0.004585
	(0.00382)
D(FDI)	-0.038877
	(0.00963)

D(P_I)	-0.008644
	(0.01396)
D(CLA)	0.007046
	(0.01055)
D(PRO)	2.91E-06
	(1.2E-06)
D(TRA)	-0.001496
	(0.00957)

2 Cointegrating Equation(s): Log likelihood -3523.943

Normalized cointegrating coefficients (standard error in parentheses)

GDP	FDI	P_I	CLA	PRO	TRA
1.000000	0.000000	4.158100	-1.048817	11890.86	-5.227957
		(1.11587)	(0.12526)	(3036.79)	(0.84830)
0.000000	1.000000	0.533607	0.045199	-1237.544	0.333302
		(0.09090)	(0.01020)	(247.389)	(0.06911)

Adjustment coefficients (standard error in parentheses)

D(GDP)	0.010726	0.114573
	(0.00830)	(0.09547)
D(FDI)	-0.024134	-0.979574
	(0.02095)	(0.24089)
D(P_I)	-0.086158	-0.208075
	(0.02819)	(0.32416)
D(CLA)	0.103559	0.165581
	(0.01783)	(0.20503)
D(PRO)	-2.41E-06	7.38E-05
	(2.5E-06)	(2.8E-05)
D(TRA)	0.032116	-0.041689
	(0.02031)	(0.23353)

3 Cointegrating Equation(s): Log likelihood -3510.867

Normalized cointegrating coefficients (standard error in parentheses)

GDP	FDI	P_I	CLA	PRO	TRA
1.000000	0.000000	0.000000	-0.933899	9199.374	-4.901888
			(0.11504)	(2803.00)	(0.78715)
0.000000	1.000000	0.000000	0.059946	-1582.941	0.375146
			(0.01378)	(335.870)	(0.09432)
0.000000	0.000000	1.000000	-0.027637	647.2874	-0.078418
			(0.01818)	(443.078)	(0.12443)

Adjustment coefficients (standard error in parentheses)

D(GDP)	-0.001575	0.034233	0.161465
	(0.01065)	(0.10332)	(0.07787)
D(FDI)	-0.088405	-1.399345	-0.331875
	(0.02421)	(0.23496)	(0.17708)
D(P_I)	-0.025790	0.186201	-0.742782
	(0.03501)	(0.33975)	(0.25606)
D(CLA)	0.110023	0.207799	0.489676
	(0.02347)	(0.22779)	(0.17167)
D(PRO)	-4.69E-06	5.89E-05	3.97E-05
	(3.2E-06)	(3.1E-05)	(2.4E-05)
D(TRA)	0.050960	0.081388	0.025921

	(0.02649)	(0.25710)	(0.19377)		

4 Cointegrating Equation(s): Log likelihood -3502.419

Normalized cointegrating coefficients (standard error in parentheses)

GDP	FDI	P_I	CLA	PRO	TRA
1.000000	0.000000	0.000000	0.000000	-10159.58	1.814230
				(734.896)	(0.24952)
0.000000	1.000000	0.000000	0.000000	-340.3075	-0.055955
				(189.525)	(0.06435)
0.000000	0.000000	1.000000	0.000000	74.39051	0.120335
				(248.734)	(0.08445)
0.000000	0.000000	0.000000	1.000000	-20729.17	7.191481
				(2120.21)	(0.71989)

Adjustment coefficients (standard error in parentheses)

D(GDP)	0.126230	-0.004315	0.132135	-0.028444
	(0.04525)	(0.09717)	(0.07325)	(0.01214)
D(FDI)	-0.201206	-1.365322	-0.305989	0.032124
	(0.10935)	(0.23482)	(0.17701)	(0.02934)
D(P_I)	0.397589	0.058501	-0.839942	-0.035339
	(0.14862)	(0.31915)	(0.24057)	(0.03987)
D(CLA)	0.286218	0.154655	0.449241	-0.141745
	(0.10428)	(0.22393)	(0.16880)	(0.02798)
D(PRO)	2.59E-05	4.97E-05	3.27E-05	2.29E-07
	(1.4E-05)	(3.0E-05)	(2.3E-05)	(3.8E-06)
D(TRA)	-0.165278	0.146610	0.075545	0.003107
	(0.11711)	(0.25149)	(0.18957)	(0.03142)

5 Cointegrating Equation(s): Log likelihood -3498.521

Normalized cointegrating coefficients (standard error in parentheses)

GDP	FDI	P_I	CLA	PRO	TRA
1.000000	0.000000	0.000000	0.000000	0.000000	6.522093
					(1.16699)
0.000000	1.000000	0.000000	0.000000	0.000000	0.101740
					(0.05329)
0.000000	0.000000	1.000000	0.000000	0.000000	0.085863
					(0.05758)
0.000000	0.000000	0.000000	1.000000	0.000000	16.79720
					(2.42254)
0.000000	0.000000	0.000000	0.000000	1.000000	0.000463
					(0.00011)

Adjustment coefficients (standard error in parentheses)

D(GDP)	0.122211	0.002569	0.132960	-0.028485	-610.0661
	(0.04596)	(0.09807)	(0.07312)	(0.01212)	(309.259)
D(FDI)	-0.195938	-1.374345	-0.307069	0.032177	1726.471
	(0.11122)	(0.23733)	(0.17696)	(0.02932)	(748.441)
D(P_I)	0.397112	0.059318	-0.839844	-0.035344	-3380.708
	(0.15124)	(0.32274)	(0.24064)	(0.03987)	(1017.80)
D(CLA)	0.296604	0.136866	0.447112	-0.141640	-173.4571
	(0.10585)	(0.22588)	(0.16842)	(0.02791)	(712.341)
D(PRO)	2.99E-05	4.27E-05	3.18E-05	2.70E-07	-0.354263
	(1.4E-05)	(3.0E-05)	(2.2E-05)	(3.7E-06)	(0.09428)

D(TRA)	-0.140764	0.104623	0.070518	0.003355	1134.647
	(0.11784)	(0.25146)	(0.18749)	(0.03107)	(793.016)

APPENDIX E

Vector Error Correction Estimates
Date: 06/16/11 Time: 16:10
Sample (adjusted): 1975Q3 1994Q1
Included observations: 75 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
GDP(-1)	1.000000
FDI(-1)	132.3483
	(25.6859)
	[5.15256]
P_I(-1)	-12.12324
	(10.6945)
	[-1.13359]
CLA(-1)	-0.062611
	(0.19587)
	[-0.31966]
PRO(-1)	-13789.88
	(2170.41)
	[-6.35359]
TRA(-1)	5.921976
	(2.69890)
	[2.19422]
C	20376.90

Error Correction:	D(GDP)	D(FDI)	D(P_I)	D(CLA)	D(PRO)	D(TRA)
CointEq1	-0.048894	-0.002813	-5.21E-05	0.017614	1.95E-06	-0.009698
	(0.01893)	(0.00091)	(0.00269)	(0.00282)	(3.3E-06)	(0.00768)
	[-2.58312]	[-3.08428]	[-0.01933]	[6.24674]	[0.58402]	[-1.26222]
D(GDP(-1))	0.290837	0.008207	-0.020750	0.057951	4.08E-05	-0.093851
	(0.13604)	(0.00656)	(0.01937)	(0.02027)	(2.4E-05)	(0.05522)
	[2.13781]	[1.25174]	[-1.07141]	[2.85950]	[1.70014]	[-1.69950]
D(FDI(-1))	2.605317	-0.407914	0.509081	-1.624053	-0.000841	-0.482080
	(2.52505)	(0.12169)	(0.35946)	(0.37615)	(0.00045)	(1.02497)
	[1.03179]	[-3.35217]	[1.41624]	[-4.31755]	[-1.88739]	[-0.47034]
D(P_I(-1))	-0.775540	-0.010438	-0.709585	-0.283751	-0.000129	-0.056390

	(0.65992)	(0.03180)	(0.09394)	(0.09831)	(0.00012)	(0.26788)
	[-1.17520]	[-0.32822]	[-7.55325]	[-2.88637]	[-1.10552]	[-0.21051]
D(CLA(-1))	0.674988	0.079067	0.025395	0.337336	-5.16E-05	0.103891
	(0.61111)	(0.02945)	(0.08700)	(0.09104)	(0.00011)	(0.24806)
	[1.10452]	[2.68472]	[0.29191]	[3.70551]	[-0.47802]	[0.41881]
D(PRO(-1))	-995.9622	-54.23225	289.1271	-72.40776	-0.272820	-120.3202
	(822.075)	(39.6171)	(117.028)	(122.463)	(0.14512)	(333.697)
	[-1.21152]	[-1.36891]	[2.47058]	[-0.59126]	[-1.87997]	[-0.36057]
D(TRA(-1))	-0.239819	0.001280	0.019011	-0.091878	-3.96E-05	-0.376001
	(0.30511)	(0.01470)	(0.04344)	(0.04545)	(5.4E-05)	(0.12385)
	[-0.78600]	[0.08708]	[0.43769]	[-2.02142]	[-0.73534]	[-3.03589]
C	832.3793	-276.0542	-60.09238	1684.514	0.054314	255.8864
	(2003.71)	(96.5623)	(285.243)	(298.489)	(0.35371)	(813.348)
	[0.41542]	[-2.85882]	[-0.21067]	[5.64348]	[0.15355]	[0.31461]
R-squared	0.248271	0.495441	0.610434	0.731696	0.128088	0.289675
Adj. R-squared	0.169732	0.442726	0.569733	0.703664	0.036992	0.215462
Sum sq. resids	5.76E+09	13380210	1.17E+08	1.28E+08	179.5333	9.49E+08
S.E. equation	9273.043	446.8832	1320.082	1381.383	1.636949	3764.116
F-statistic	3.161122	9.398458	14.99801	26.10241	1.406082	3.903297
Log likelihood	-787.3056	-559.8629	-641.0992	-644.5036	-139.1531	-719.6857
Akaike AIC	21.20815	15.14301	17.30931	17.40010	3.924083	19.40495
Schwarz SC	21.45535	15.39021	17.55651	17.64730	4.171282	19.65215
Mean dependent	3717.400	-27.88000	9.760000	2847.853	0.050667	97.57333
S.D. dependent	10176.84	598.6315	2012.480	2537.595	1.668093	4249.679

Determinant resid covariance (dof adj.)	8.07E+32
Determinant resid covariance	4.10E+32
Log likelihood	-3454.574
Akaike information criterion	93.56198
Schwarz criterion	95.23057

Vector Error Correction Estimates
Date: 06/16/11 Time: 15:46
Sample (adjusted): 1994Q4 2010Q2
Included observations: 63 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
GDP(-1)	1.000000
FDI(-1)	25.15116
	(3.29059)
	[7.64337]
P_I(-1)	17.57894
	(2.44730)

	[7.18299]
CLA(-1)	0.087982
	(0.22508)
	[0.39090]
PRO(-1)	-19234.80
	(5508.63)
	[-3.49176]
TRA(-1)	3.154974
	(1.53169)
	[2.05980]
C	494066.0

Error Correction:	D(GDP)	D(FDI)	D(P_I)	D(CLA)	D(PRO)	D(TRA)
CointEq1	0.004585	-0.038877	-0.008644	0.007046	2.91E-06	-0.001496
	(0.00382)	(0.00963)	(0.01396)	(0.01055)	(1.2E-06)	(0.00957)
	[1.20040]	[-4.03634]	[-0.61908]	[0.66814]	[2.45062]	[-0.15633]
D(GDP(-1))	0.629406	0.211360	-0.389283	0.947777	9.78E-06	-0.687423
	(0.13481)	(0.33996)	(0.49285)	(0.37222)	(4.2E-05)	(0.33787)
	[4.66886]	[0.62172]	[-0.78987]	[2.54631]	[0.23336]	[-2.03457]
D(FDI(-1))	-0.075961	0.016793	0.239116	-0.130476	-4.39E-05	0.217616
	(0.06910)	(0.17426)	(0.25263)	(0.19079)	(2.1E-05)	(0.17319)
	[-1.09926]	[0.09637]	[0.94652]	[-0.68386]	[-2.04265]	[1.25653]
D(P_I(-1))	0.010685	0.354285	-0.188479	-0.026522	-1.42E-05	0.288734
	(0.05565)	(0.14033)	(0.20344)	(0.15365)	(1.7E-05)	(0.13947)
	[0.19201]	[2.52459]	[-0.92644]	[-0.17261]	[-0.82185]	[2.07020]
D(CLA(-1))	0.007015	-0.123611	-0.013968	0.605859	6.73E-06	-0.039095
	(0.04182)	(0.10545)	(0.15288)	(0.11546)	(1.3E-05)	(0.10481)
	[0.16775]	[-1.17218]	[-0.09137]	[5.24736]	[0.51789]	[-0.37302]
D(PRO(-1))	420.8060	1456.263	-2012.332	-1340.684	0.169859	-468.4957
	(518.135)	(1306.62)	(1894.24)	(1430.60)	(0.16101)	(1298.60)
	[0.81215]	[1.11453]	[-1.06234]	[-0.93715]	[1.05493]	[-0.36077]
D(TRA(-1))	-0.078227	0.042512	0.171749	-0.069663	-2.31E-05	-0.409513
	(0.04824)	(0.12166)	(0.17637)	(0.13320)	(1.5E-05)	(0.12091)
	[-1.62152]	[0.34944]	[0.97379]	[-0.52299]	[-1.53886]	[-3.38689]
C	3492.941	-571.5710	7560.795	1238.908	0.476056	7257.569
	(1487.48)	(3751.10)	(5438.06)	(4107.03)	(0.46224)	(3728.06)
	[2.34822]	[-0.15237]	[1.39035]	[0.30166]	[1.02988]	[1.94674]
R-squared	0.578188	0.413020	0.246027	0.598987	0.248321	0.434337
Adj. R-squared	0.524503	0.338314	0.150067	0.547949	0.152653	0.362344
Sum sq. resids	2.61E+09	1.66E+10	3.49E+10	1.99E+10	251.9452	1.64E+10
S.E. equation	6887.342	17368.35	25179.29	19016.34	2.140285	17261.67
F-statistic	10.76997	5.528575	2.563850	11.73610	2.595645	6.033007
Log likelihood	-641.8741	-700.1469	-723.5433	-705.8578	-133.0545	-699.7587
Akaike AIC	20.63092	22.48085	23.22360	22.66215	4.477922	22.46853

Schwarz SC	20.90307	22.75300	23.49574	22.93430	4.750066	22.74068
Mean dependent	11432.67	-43.77778	376.3016	27663.67	0.968254	-1176.222
S.D. dependent	9987.979	21351.71	27311.85	28283.51	2.325096	21616.71

Determinant resid covariance (dof adj.)	7.55E+41
Determinant resid covariance	3.34E+41
Log likelihood	-3548.173
Akaike information criterion	114.3547
Schwarz criterion	116.1917

APPENDIX F

1975 to 1994

Variance Decomposition of GDP:

Period	S.E.	GDP	FDI	P_I	CLA	PRO	TRA
1	9273.043	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	15224.65	95.95084	1.924625	0.063107	0.448446	0.278975	1.334010
3	20483.14	93.16311	4.170551	0.175435	0.491007	0.171989	1.827910
4	25102.06	90.45565	6.394875	0.279257	0.413954	0.116754	2.339509
5	29203.95	87.99343	8.408478	0.460521	0.318786	0.117783	2.701003
6	32933.09	85.64416	10.28300	0.634879	0.250944	0.177729	3.009281
7	36398.86	83.31682	12.08329	0.839676	0.218685	0.273569	3.267957
8	39646.35	81.13057	13.71746	1.037468	0.221128	0.404957	3.488415
9	42737.77	79.00963	15.26562	1.242239	0.250615	0.551966	3.679929
10	45688.69	77.02916	16.67163	1.436612	0.302432	0.714268	3.845897
11	48531.16	75.14983	17.98276	1.627249	0.368930	0.879538	3.991694
12	51271.65	73.40421	19.17575	1.806103	0.446518	1.047789	4.119623
13	53927.38	71.76922	20.27856	1.976874	0.530151	1.212332	4.232866
14	56501.92	70.25544	21.28421	2.136059	0.617644	1.373460	4.333189
15	59005.26	68.84712	22.21037	2.285963	0.706079	1.527848	4.422622
16	61440.06	67.54481	23.05717	2.425270	0.794278	1.675963	4.502504
17	63812.64	66.33673	23.83650	2.555550	0.880690	1.816329	4.574201
18	66125.36	65.21934	24.55118	2.676505	0.964761	1.949491	4.638714
19	68382.61	64.18342	25.20962	2.789274	1.045748	2.074940	4.696999
20	70586.57	63.22412	25.81539	2.894012	1.123460	2.193232	4.749797
21	72740.56	62.33406	26.37462	2.991580	1.197605	2.304342	4.797792
22	74846.62	61.50834	26.89083	3.082309	1.268192	2.408797	4.841540
23	76907.39	60.74100	27.36862	3.166871	1.335174	2.506797	4.881538
24	78924.78	60.02757	27.81111	3.245640	1.398661	2.598821	4.918202
25	80900.99	59.36322	28.22184	3.319151	1.458728	2.685158	4.951904
26	82837.76	58.74405	28.60346	3.387766	1.515533	2.766231	4.982957
27	84737.00	58.16615	28.95874	3.451914	1.569208	2.842349	5.011641
28	86600.29	57.62619	29.28988	3.511922	1.619921	2.913881	5.038196
29	88429.27	57.12099	29.59908	3.568139	1.667827	2.981123	5.062836
30	90225.40	56.64777	29.88815	3.620849	1.713091	3.044392	5.085747

31	91990.12	56.20390	30.15885	3.670337	1.755865	3.103956	5.107093
32	93724.73	55.78708	30.41266	3.716846	1.796306	3.160087	5.127020
33	95430.52	55.39515	30.65100	3.760611	1.834556	3.213022	5.145656
34	97108.65	55.02619	30.87510	3.801837	1.870756	3.262991	5.163117
35	98760.27	54.67843	31.08611	3.840717	1.905035	3.310200	5.179505
36	100386.4	54.35027	31.28503	3.877425	1.937518	3.354845	5.194909

1994 to 2010

Variance Decomposition of GDP: Period	S.E.	GDP	FDI	P_N_I	CLA	PRO	TRA
1	6887.342	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	14367.21	96.43264	0.363487	2.723659	0.015791	0.051529	0.412889
3	21854.61	94.82417	0.238208	4.513616	0.022679	0.073969	0.327353
4	29162.04	92.93260	0.194789	6.483878	0.016327	0.084016	0.288391
5	35761.37	91.85009	0.176711	7.614996	0.011101	0.093140	0.253963
6	41704.29	91.10863	0.172625	8.366025	0.011337	0.101461	0.239919
7	47068.77	90.61130	0.169735	8.865047	0.014724	0.109173	0.230021
8	51972.77	90.22513	0.167676	9.248742	0.019230	0.115524	0.223694
9	56483.97	89.93035	0.165996	9.540254	0.024137	0.120779	0.218483
10	60667.67	89.69867	0.164925	9.767723	0.028906	0.125093	0.214685
11	64575.83	89.51688	0.164135	9.945340	0.033270	0.128688	0.211693
12	68254.38	89.37022	0.163530	10.08811	0.037099	0.131679	0.209368
13	71738.41	89.25040	0.163025	10.20452	0.040411	0.134185	0.207458
14	75056.09	89.15077	0.162611	10.30118	0.043259	0.136295	0.205885
15	78229.45	89.06702	0.162264	10.38236	0.045709	0.138089	0.204560
16	81276.45	88.99567	0.161970	10.45147	0.047824	0.139627	0.203437
17	84211.57	88.93423	0.161716	10.51097	0.049658	0.140958	0.202468
18	87046.71	88.88075	0.161495	10.56275	0.051259	0.142119	0.201626
19	89791.73	88.83379	0.161299	10.60822	0.052667	0.143140	0.200885
20	92454.89	88.79222	0.161127	10.64847	0.053913	0.144044	0.200230
21	95043.25	88.75515	0.160972	10.68436	0.055024	0.144850	0.199645
22	97562.84	88.72188	0.160834	10.71657	0.056020	0.145574	0.199120
23	100018.9	88.69186	0.160708	10.74564	0.056919	0.146227	0.198646
24	102416.1	88.66462	0.160595	10.77202	0.057734	0.146819	0.198216
25	104758.4	88.63980	0.160491	10.79605	0.058477	0.147359	0.197825
26	107049.5	88.61708	0.160396	10.81805	0.059156	0.147853	0.197466
27	109292.6	88.59621	0.160309	10.83826	0.059780	0.148307	0.197136
28	111490.5	88.57696	0.160229	10.85689	0.060355	0.148725	0.196833
29	113646.0	88.55917	0.160155	10.87413	0.060887	0.149112	0.196552
30	115761.3	88.54266	0.160086	10.89011	0.061380	0.149471	0.196291
31	117838.7	88.52731	0.160022	10.90497	0.061839	0.149804	0.196049
32	119880.0	88.51300	0.159962	10.91884	0.062267	0.150115	0.195823
33	121887.2	88.49962	0.159906	10.93179	0.062666	0.150406	0.195612
34	123861.9	88.48708	0.159854	10.94393	0.063041	0.150679	0.195414

35	125805.6	88.47532	0.159805	10.95532	0.063393	0.150935	0.195228
36	127719.7	88.46425	0.159758	10.96604	0.063723	0.151175	0.195053

APPENDIX G

VEC Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Date: 06/16/11 Time: 16:12
Sample: 1975Q1 1994Q1
Included observations: 75

Lags	LM-Stat	Prob
1	51.60679	0.0444
2	70.85686	0.0005
3	36.03088	0.4672
4	51.80717	0.0427
5	45.56817	0.1318
6	56.63720	0.0156
7	42.49972	0.2113
8	40.89197	0.2643
9	84.97237	0.0000
10	43.86641	0.1725
11	40.86971	0.2651
12	49.58720	0.0653

Probs from chi-square with 36 df.

residula normality

VEC Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Date: 06/16/11 Time: 16:13
Sample: 1975Q1 1994Q1
Included observations: 75

Component	Skewness	Chi-sq	df	Prob.
1	-0.529527	3.504989	1	0.0612
2	-0.207873	0.540139	1	0.4624
3	-0.107836	0.145357	1	0.7030
4	0.074392	0.069176	1	0.7925
5	-0.067091	0.056265	1	0.8125
6	0.049279	0.030355	1	0.8617
Joint		4.346282	6	0.6299

Component	Kurtosis	Chi-sq	df	Prob.
1	3.446676	0.623498	1	0.4298
2	3.479928	0.719783	1	0.3962
3	3.289805	0.262460	1	0.6084
4	4.525367	7.271074	1	0.0070
5	3.384266	0.461438	1	0.4970
6	3.567510	1.006460	1	0.3158
Joint		10.34471	6	0.1109

Component	Jarque-Bera	df	Prob.
1	4.128487	2	0.1269
2	1.259922	2	0.5326
3	0.407817	2	0.8155
4	7.340251	2	0.0255
5	0.517703	2	0.7719
6	1.036816	2	0.5955
Joint	14.69099	12	0.2588

VAR Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Date: 06/16/11 Time: 15:45
Sample: 1994Q2 2010Q2
Included observations: 63

Lags	LM-Stat	Prob
1	43.46129	0.1834
2	32.09073	0.6551
3	46.52938	0.1124
4	35.79060	0.4785
5	46.79558	0.1074
6	27.30696	0.8510

7	36.36516	0.4516
8	47.78975	0.0904
9	47.84522	0.0895
10	26.62275	0.8725
11	52.77540	0.0352
12	45.98437	0.1231

Probs from chi-square with 36 df.

residula normality

VAR Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Date: 06/16/11 Time: 15:45
Sample: 1994Q2 2010Q2
Included observations: 63

Component	Skewness	Chi-sq	df	Prob.
1	0.285492	0.855808	1	0.3549
2	3.158924	104.7774	1	0.0000
3	-1.057747	11.74771	1	0.0006
4	0.056894	0.033988	1	0.8537
5	0.045751	0.021978	1	0.8821
6	-0.781122	6.406589	1	0.0114
Joint		123.8435	6	0.0000

Component	Kurtosis	Chi-sq	df	Prob.
1	2.525354	0.591383	1	0.4419
2	18.99107	671.2499	1	0.0000
3	8.498398	79.36001	1	0.0000
4	6.022395	23.97904	1	0.0000
5	2.513273	0.621871	1	0.4304
6	4.780315	8.319993	1	0.0039
Joint		784.1222	6	0.0000

Component	Jarque-Bera	df	Prob.
1	1.447191	2	0.4850
2	776.0273	2	0.0000
3	91.10772	2	0.0000
4	24.01303	2	0.0000
5	0.643850	2	0.7248
6	14.72658	2	0.0006
Joint	907.9657	12	0.0000