5,000/-

THE IMPACT OF INSTITUTIONAL FACTORS AND LIBERALIZATION POLICIES ON PRIVATE INVESTMENT IN KENYA (1965-2007)

BY

KARUMBA MARY MUTHONI

C50/10047/2007

A RESEARCH PAPER SUBMITTED TO THE SCHOOL OF HUMANITIES AND SOCIAL SCIENCES IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR AWARD OF MASTER OF ARTS (ECONOMICS) DEGREE OF KENYATTA UNIVERSITY

OCTOBER, 2009

DECLARATION

This research paper is my original work and has not been presented for a degree award in any University.

Signature .... Date 15-12-2009

MARY MUTHONI KARUMBA (B.A. ECONOMICS)

C50/10047/2007

This research paper is submitted with our approval as supervisors:

Signature...Date 15.12.2009

DR. CHARLES OMBUKI
LECTURER
DEPARTMENT OF ECONOMICS
KENYATTA UNIVERSITY

Signature...Date 15-12-09

DR. JACOB O. ODUOR
LECTURER
DEPARTMENT OF ECONOMICS
KENYATTA UNIVERSITY

DEDICATION

To my dear Son George-Stanely and unborn Baby

ACKNOWLEGEMENTS

I am sincerely grateful to my supervisors Dr. Jacob Oduor and Dr. Charles Ombuki for their efforts and guidance throughout this study.

I also thank all my instructors at Kenyatta University School of Economics for their moral and academic encouragement throughout my study for Masters Degree.

I cannot forget the overwhelming support I have received from my dear friend and mentor Henry throughout my studies.

Finally, sincere thanks to my parents George and Lydia for their financial and moral support in my studies.

Any errors in this paper remain my responsibility.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

OPERATIONAL DEFINITION OF TERMS

Liberalization - measures put in place to remove restrictive trade practices like removal of: price controls, tariffs and other trade barriers.

Institutional factors- refers to events culminating to improvement or worsening of the business environment

Private Investment -refers to acquisition of physical capital assets by private individuals

ABBREVIATION

ADF	- Augmented Dickey Fuller
EAC	- East African Community
FEVD	-Forecast Error Variance Decomposition
GDP	-Gross Domestic Product
IMF	-International Monetary Fund
IRA	-Impulse Response Analysis
KIA	- Kenya Investment Authority
KIPPRA	-Kenya Institute of Public Policy Research and Analysis
KRA	-Kenya Revenue Authority
OECD	-Organization for Economic Cooperation and Development
PP	- Philips Perron
SVAR	-Structural Vector Autoregression
VAR	-Vector Autoregression
VECM	-Vector Error Correction Model

ABSTRACT

Private investment is an important strategy of achieving economic growth, through its ability to stimulate economic activity by expanding the capacity for production of goods and services, and creation of employment opportunities. To increase private investment, bi-lateral organizations have emphasized the need to liberate the economy in most developing countries. However, even with liberalization policies, the trend in private investment in these developing Countries, Kenya included has not been very encouraging as had been envisaged.

Given the poor performance of private investment in Kenya, it is questionable whether liberalization policies advocated by the IMF have had any significant effects. It could be the case that proper institutional base was not laid down for the liberalization policies to have any meaningful results.

Using Structural Vector Autoregression (SVAR) and data from 1965 -2007, this study analyzed the extent to which institutional factors impacted on private investment in Kenya and attempts to filter out the relative impact of liberalization measures against institutional factors in increasing private investment flows in Kenya.

This study found out that tax administration had a negative impact on private investment and that Investment promotion impacted negatively on private investment in Kenya. The impact of shocks due to tax administration were found to be dominant compared to those of liberalization policies, while the impact of investment promotion shocks was lesser, compared to that of liberalization of the Kenyan Economy. This study concluded that among the institutional factors that were considered for analysis, tax administration was of a greater importance to private investors and should have been put in place and properly enhanced before liberalization of the economy, if the latter was to achieve its objective of enhancing economic growth through increased private investment.

CHAPTER ONE

INTRODUCTION

1.1 The importance of private investment

Investment is an essential component of aggregate demand. It stimulates economic activity and long term economic growth by expanding the capacity for production of goods and services. Increased productive capacity calls for more workers, thus creating employment opportunities. The latter provides income which is later spent on goods and services. This increases consumption of goods and services in an economy, which enhances the welfare of consumers if all other factors in the economy remain constant. To create and sustain economic growth, developing countries need to maintain investment at a sizeable proportion of Gross Domestic Product (GDP). Gillis *et. al* (1987) proposed that this proportion should not be any less that 15 per cent and countries should target and sustain investment level of at least 25 per cent of their GDP.

The view that capital formation is imperative to growth "Capital Fundamentalism" was advanced by Youopoulous and Nuget (1976), which inspired many countries to draw development plans that reflected investment as a key strategy of achieving development targets.

The importance of public and private investment in Kenya was highlighted in Sessional paper No. 1 of 1965, as being strategic in creating and maintaining productive capacity for economic growth and development (Republic of Kenya, 1965). However, the government seemed to have been concerned with domestic ownership of private investment given that foreigners possessed much of private capital assets after independence. This was due to the desire by the government to 'Kenyanise' or 'Africanise' the economy; and consequently minimize the political influence of former colonialists and foreigners on internal economic matters (Ochieng', 1992). Faced with the need to increase output, employment generation, general development of the emerging Kenyan economy and the prevailing inadequate domestic resources (low savings), domestication of investment was no longer important and instead, foreign direct investment was identified as a major source of capital accumulation (Republic of Kenya, 1965; Ochieng' 1992).

From late 1980s up to the present, private investment has been emphasized as a key strategy for economic growth and poverty reduction because of the inefficiency that has been associated with public investment in major sectors of economies of developing and least developed countries. For instance, the IMF initiated the Africa Enterprise Fund; the United States initiated the Africa Growth Fund and the Africa Development Bank also started similar ventures to boost private investment to 25 per cent of GDP in African countries (Faruqee and Husain, 1994).

1.2 Institutional Factors and Private Investment

Institutional factors refer to business environmental aspects which impact on the cost of investment, cost of operations and decision on what type of investment to undertake (Ngugi and Nyang'oro, 2005). According to Djankov et al (2003), institutional and comparative economics recognize that institutional factors have significant impacts on economic performance. Moreover, the pure competitive model is not a useful way to think about capitalist economies because political and economic institutional factors play a critical role in determining economic performance (Djankov, Glaeser, La Porta, Lopez-de-Silanes, and Shleifer, 2003). Such institutional factors include; politics-related factors (government stability, democracy, ethnic tensions); governance and public accountability; infrastructure; crime and theft; insecurity brought about by internal and external aggression; property rights enforcement; bureaucracy, access to market and taxation issues. According to KIPRRA/World Bank (2004), investors in Kenya rated corruption, cost of finance, crime rates, theft and disorder, tax issues, anti-competitive practices and economic regulatory policy uncertainty as major business concerns.

1.3 Liberalization policies and private investment

To increase private investments, bi-lateral donor organizations have emphasized the need to liberalize the economy. Liberalization policies are designed to get rid of uncompetitive market behavior most of which falls under protectionist policies and government involvement in business activities. This uncompetitive market behavior creates a hostile business environment to private investors through increased cost of business and uncertainty of the policies that government will put in place to position itself or a preferred section of private actors on top of private competitors (OECD, 2006)

Thus through economic liberalization, competition and efficiency is engendered, and private investors (both domestic and foreign) are left free to make business decisions based on existing market conditions, without the fear that some of their competitors have undue advantage over themselves in form of information, subsidies or such other advantages that may accrue or be availed to one section of market players.

The effects of the world crises in the 1970s began spilling in the Kenyan economy in the early 1980s in the form of balance of payment problems. The government turned to the IMF for loans to adjust these problems. The advances were made on condition that the government would implement structural adjustment programmes whose core attention was liberalization of key economic sectors (Trade and finance) and privatization policies to increase the role of private sector in the economy. However, even with liberalization policies, the trend in private investment has not been very encouraging as had been envisaged.

1.4 Liberalization Policies in Kenya

Kenya, like many of her developing counterparts maintained a low interest rate often adjusting for inflation rates to maintain positive real rates. The main objective of this policy was to keep the cost of funds low with an aim of promoting development through increased investment. Interest rates remained under government administration by fixing minimum savings rates for all deposit-taking institutions and maximum lending rates for commercial banks, Non-bank Financial Institutions and building societies (Ngugi and Kabubo, 1998).

However, in 1980s the pressure created by the 1970s oil crises made real interest rates negative and this created the need for the government to review interest rate policy under structural adjustment policies prescribed by the IMF and World Bank in mid 1991. This was expected to encourage savings through banks and forestall uneconomic use of savings by speculators.

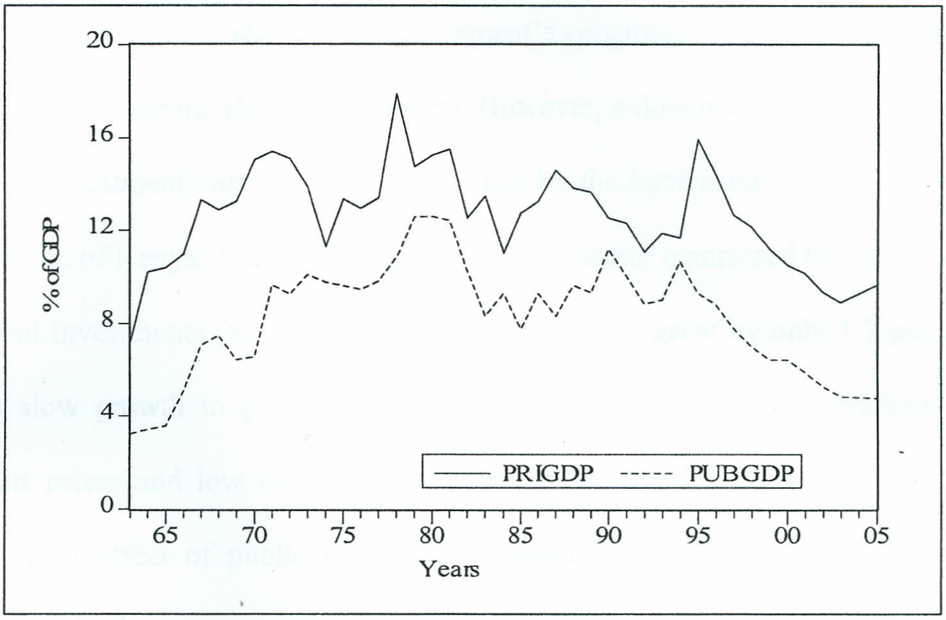
According to Ngugi and Kabubo (1998) the review of interest rates aimed at: allowing greater competition among banks and non-bank Financial Institutions (NBFIs) to foster efficiency in allocation of financial resources; harmonizing competition among banks and NBFIs by removal of the differentials that existed for maximum lending rates; and keeping interest rates positive thus encouraging savings.

Liberalization of interest rates was accompanied by removal of price controls and exchange rate liberalization. In the early years of independence, the Kenya Shilling value remained relatively stable against that of major industrial countries because of the exclusive use of foreign exchange controls (Republic of Kenya, 1994). However, due to deteriorating terms of trade and inflation in developing countries, Kenya introduced marginal adjustments to exchange rate through the 'crawling peg' mechanism in the mid 1980s. After these efforts, the Shilling became grossly over-valued and this presented a serious barrier to international trade and foreign direct investment flows. Under the auspices of structural adjustment and liberalization, the World Bank and IMF prescribed exchange rate adjustments which were gradually implemented in Kenya through: inter-bank trade in foreign currencies, retention accounts and foreign exchange bearer certificates (Republic of Kenya, 1994). This was followed closely by liberalization of prices of most items in the same year.

1.5 Public and Private Investment trends in Kenya.

Kenya managed to achieve a relatively high rate of capital formation in the decade after independence (see figure 1 below) in spite of the external shocks in the economy that were experienced in the 1970s.

Fig. 1: Public Investment as a percentage of GDP and Private Investment as a percentage of GDP in Kenya



Annual rate of investment averaged 24.1 per cent between the years 1970-1979, while GDP growth rate averaged 5 per cent. This was also accompanied by relatively good performance in GDP raising questions on whether investment stimulated growth in GDP through value addition, or GDP growth stimulated investment (Republic of Kenya, 1980).

Investment in Kenya took a downward turn in early 1980s with a sharp decline in real value of fixed investment in 1983, with the private sector declining more than the public sector (Republic of Kenya, 1980). This phenomenon was attributed to: absence of buoyant domestic demand, shortage of credit to the private sector, increased difficulties of the government raising adequate revenue to finance its own capital formation and the effect of import controls.

Public investment led to an increase in total investment in 1984 by 7 per cent above the 1983 level, due to the Government's construction of petroleum storage facilities and various electricity projects. However, a downward trend persisted in private investment, but was more than offset by the increasing public investment (Republic of Kenya, 1985). Although the private sector comprised the larger share of total investments (60 per cent) from 1985-1990, it grew by only 1.7 per cent. This slow growth in private investment was attributed to the prevailing high import prices and low coffee export earnings (Republic of Kenya, 1990). The theoretical effect of public investment crowding out private investment could explain this phenomenon.

The problem of declining private capital formation and its adverse effects on the economy were highlighted as the most unfavourable feature of the Kenya's economy by the government in the Economic Survey of 1991 (Republic of Kenya, 1991). In particular low investment was notable in machinery and transport equipment (imported goods) during the financial year 1990/1991. This was attributed to high import prices and low coffee export prices, while the decline in construction sector was attributed to high mortgage rates and increase in the domestic price of building materials. Notably, it is during this period that the country experienced political tensions because of the clamour for multiparty democracy which led to ethnic tensions and tribal clashes in the Rift Valley region of Kenya. These culminated into change of political system from one party to multiparty democracy.

Positive benefits of liberalization began to leak into the economy in the 1995-1996 periods, perhaps as a result of the private sector adjusting itself to survive competition from the global trade. These adjustments could have been in the form of investment in more efficient capital equipment, given that there was an improvement in private investment the same periods. Political disturbances in 1997; decline in donor funding and reduced credit from financial institutions eroded the little progress made earlier resulting in a slow rate of both public and private investment of 2 per cent in 1998, compared to 2.7 per cent reported earlier for 1997 (Republic of Kenya, 1998). This trend of low private investment was maintained up to the year 2003, when increasing trends emerged once again. This is the period when elections brought a change of political administration from KANU party to NARC, the latter of whom was a coalition of parties that won elections on the platform of recovering the ailing economy and promise for new constitution.

Private investment was identified as one of the growth components in the Economic Recovery Strategy and various measures like introduction of Kenya Investment Authority (KIA) to provide a one-stop-shop for investor services were set up with an aim of encouraging private investment (Republic of Kenya, 2004). The system of national statistics however stopped accounting for private investment separately from public investment, instead choosing to account for Gross fixed capital formation. The Economic Recovery strategy failed to achieve its target of 23 per cent growth in Gross capital formation, instead achieving 19.7 per cent (Republic of Kenya, 2009).

Given the poor performance of private investment, it is questionable whether liberalization policies advocated by the IMF have had any significant effects. It could be the case that proper institutional base was not laid down for the liberalization policies to have any meaningful results.

1.6 Statement of the problem

Private investment has been recognized as one of the pillars for achieving sustainable economic growth. The international donor organizations (IMF and World Bank) have stressed on the need to achieve higher economic growth through increased private investments. One of the emphases of these organizations is that liberalization of key sectors is important to increase private investments. Most developing countries have in the past implemented these liberalization policies without much thought on the requisite institutional basis necessary for such liberalization policies to have an impact on private investments and hence economic growth. In the process, most countries have instituted liberalization policies without instituting institutional reforms necessary to support the liberalization policies with the result that the policies have failed to achieve the intended growth objectives (White and Leavy, 2000). Kenya for instance has undertaken several liberalization measures including the liberalization of exchange rates, trade, interest rates among others. This was expected to increase the momentum of private investment flow. Contrary to this expectation, private investment has recorded periods of decline during and after the liberalization of key economic sectors (see figure 1).

This study analyses the extent to which institutional factors contributed to the declining trend of private investments in Kenya and attempts to filter out the relative importance of liberalization measures against institutional factors in increasing private investment flows in Kenya.

1.7 Research Questions

i. To what extent did institutional factors influence private investment before and after liberalization of the Kenyan economy?

ii. What is the relative impact of institutional factors and liberalization measures on private investment in Kenya?

iii. What policy recommendations can be drawn from (i) and (ii)?

1.8 Objectives of the study

i. To establish the extent to which institutional factors influenced private investment before and after liberalization of the Kenyan economy.

ii. To assess the relative impact of institutional factors and liberalization policies on private investment in Kenya.

iii. To give policy recommendations in light of (i) and (ii).

1.9 Significance of the study

Although many studies have been carried out on determinants of private investment in Kenya, none so far has investigated the relative impacts of institutional factors and liberalization polices on private investment. Moreover, the World Bank and IMF maintain that liberalization is an adequate strategy for growth, the latter of which has not had major achievement in Kenya as evidenced by the declining trends of private investment before and after liberalization measures were implemented in Kenya. This study contributes to the existing debate on liberalization measures and their effectiveness in Kenya. Further, the study informs policy making by shedding light on the importance of institutional factors as a basis for enhancing private investment. Lastly, the study has useful information which can guide decision making by existing and prospective private investors.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This section reviews the theoretical and empirical literature existing on investment. The theoretical literature reviews the investment theories dating back to Clark's theory of investment; Irving Fisher's theory; Keynesian marginal efficiency of investment theory, classical view of investment (Samuelson); neo-classical view on investment (Flexible accelerator theory), neo-liberalist view as well as other theories advanced on investment. The section on empirical literature reviews previous work done on private investment to gain other scholars' view on the subject.

2.1 Theoretical Literature

2.1.1 Keynes Marginal Efficiency of Investment Theory

In General Theory, Keynes (1936) proposed an investment function

$$I = I_0 + I(r)$$

Where I is total investment; I_0 is initial investment and I(r) is additional investment. He further proposed that firms rank various investment projects depending on their internal rate of return (IRR) or Marginal Efficiency of Capital (MEI). Thus given a rate of interest, and investor would choose a project whose rate of return exceeds the rate of interest. With infinite number of projects, firms would invest until their marginal efficiency of investment was equal to the rate of interest i.e. $MEI = r$

Keynes defined MEI as the rate of discount which would make the present value of the series of annuities given by returns expected from a capital asset during its useful life just equal to its replacement cost.

Given $A_1, A_2, A_3, \ldots A_n$ as the expected stream of returns from a particular investment project; at a given rate of interest r, the present value of these return

$$= \sum_{t=0}^{\infty} A_t (1+r)^t$$

If C is the cost of undertaking the project or the replacement cost of the asset, then Keynes proposed that the Internal Rate of Return (IRR) or Marginal Efficiency of Investment (MEI) would be the discount rate r* where

$$\sum_{t=0}^{\infty} A_t / (1+r^*)^t = C.$$

The limitation of Keynes MEI theory is that it fails to consider other factors apart from rate of returns and interest rate on financing, which affect investment decision. In addition, given the wide variety of the nature of investment projects in an economy, Keynes theory is limited and therefore not amenable for a wider macroeconomic analysis.

2.1.2 The Neo-classical (Flexible Accelerator) Model

In deriving the relationship between investment demand and output, two steps are involved as Branson (2005): first is the determination of the desired capital stock and secondly, translating the movements in desired or equilibrium capital stock into a flow of net realized investment i.e. to show how movements in capital investment are related to changes in equilibrium capital stock.

The neo-classical model operates under the following assumptions: the firm is competitive in both product and input market; assumption of certainty of the future; the firm has a given production function and depreciation is assumed to be constant.

In determining the desired stock of capital stock by a firm, we consider a firm's present value maximization problem. Assuming that the firm is forward looking and its current decision to invest will influence its future opportunities, investment becomes the link between the present and future growth of a firm.

However, where as the neo-classical model proposed that the real interest rate (user cost of capital) was negatively related to investment, neo-liberalist emphasized that financial deepening and interest rates were positive determinants of investment. Mackinnon and Shaw (1973) hypothesized that high interest rates would encourage investment through the 'conduit effect'. High interest rates encourage savings with financial intermediaries which would in turn improve the availability of investible funds, which can then be lent to investors. Financial liberalization of developing countries' economies would do away with financial repression, increase savings and investible funds which can then stimulate economic activity (Mackinnon and Shaw, 1973).

2.1.3 The q Investment Model

This theory postulates that the demand for capital varies directly with the ratio of the market value of the capital assets to their replacement value. Given that V_t is the market value of the capital assets and $P^I{}_t K_t$ is the replacement value of the assets where P^I is the price of capital assets or investment goods K at a time t; the ratio

$q_t = V_t / P^I K_t$ is derived form a mathematical process of a firm's optimization problem, whereby a firm seeks chooses inputs to maximize the discounted sum of expected cash flows. The optimization process will not be illustrated here since it is not necessary for the current study.

The optimization model assumes that the firm is constrained by production, adjustment and accumulation technologies and the firm is a price taker in both input and output markets. The assumption of a forward looking firm necessitates introduction of an expectations operator in the optimization problem which is difficult to estimate calling for a mechanism of relating the unobservable to the observable. In this respect, the q theory which postulates that Average q is equal to the Marginal q comes in. However this can only happen under the following conditions: competitive product and factor markets; production and adjustment cost technologies are linear homogeneous; capital is homogeneous and investment decisions are largely separate from other real and financial decisions.

The resultant q ratio from the optimization process simply compares the return on capital with the return which is required by the investors to replace the existing capital equipment. If $q > 1$ investment should be undertaken and if it is below one, investment should not be done.

The strength of the q model is that as it relates capital to the stock market prices for the value of the firm, it solves the notorious problem of formulating expectations about future prices (Chirinko, 1993).

However, the model has serious limitations which make its adoption in this study difficult. Firstly the q model relies on use of advanced and robust capital markets to deal with the problem of expectations. Although Kenya and other developing countries have a capital market, they are under-developed and prices of stock are quite unstable and unpredictable. Such limitation cannot be wished away in any analysis since it is a fundamental assumption of the theory. Secondly, because Marginal q is not observable, one has to rely on the Average q under restrictive conditions which are unrealistic.

2.1.4 The Euler Equation Model

The Euler Equation model shares the same optimization framework as the Q-model of investment, only that it incorporates more explicitly the role of expectations and dynamics due to technology.

The estimable model is given as:

$$I_t / K_t = \rho I_{t+1} / K_{t+1} - (1/\alpha)(p'_t - \rho p'_{t+1}) + (1/\alpha)\lambda_t + \mu_t$$

Where $\mu_t = \tau_t + \varepsilon_t - \rho\varepsilon_{t+1}$

The error term μ_t is a combination of technology shocks τ_t and expectation errors $(\varepsilon's)$. Other versions of this model incorporate time-to-build lags and labour as a determinant of investment. This theory does not yield a new hypothesis for explaining the behavior of investment but presents an alternative way to the Q theory way of modeling expectations- there is no use relying on stock market valuations. However, the theory still does not solve the problem of relying on expectations and its application is cumbersome in developing countries like in the current study.

2.1.5 The Real Option Approach

On the onset it is important to note that the primary contribution of this theory is not necessarily to modeling determinants of investment, but the proposition that the timing of investment may be altered by uncertainty. The theory is developed by considering a firm's problem of deciding the optimal time to pay a sunk cost, in return for a project of a certain value.

According to Dixit and Pindyck (1994) uncertainty (risk) plays a key role in investment decisions because investment represents a sink cost that once invested, it cannot be used for a different activity without incurring prohibitive costs. Thus there is an incentive for an investor to delay investment decision until risk is resolved, as he will avoid costly mistakes. Thus irreversibility and delay according to this theory create option to invest.

The theory postulates that uncertainty and irreversibility jointly influence the minimum expected return required to trigger investment. However, the theory limits itself to application because it does not offer specific predictions on the level of investment, and therefore needs to develop structural links between marginal profitability of capital and the desired or primal capital stock just like in the neoclassical models (Hubbard, 1994). Moreover, uncertainty itself is a difficult aspect to measure and cannot stand alone, unless it is embedded in policies, prices, or costs. These variables can then be added onto a investment equation.

2.2 Empirical literature

In a study of the short-run, medium term and long-run determinants of private investment in Argentina for the period 1970-2000, Andre`s and Pablo (2004) used co integration technique and error correction method on a series of: Private investment; Gross Domestic Product, public investment, external debt, trade liberalization, real exchange rate, credit to the private sector, relative price of capital goods with respect to consumption goods and inflation rate.

The co integration equation revealed that coefficients of GDP, Trade liberalization, external debt level and domestic financing were significant. This implied that output perspectives, debt financing uncertainty and profitability due to trade liberalization guided the long run private investment decision in Argentina during the study period. The study found no evidence of government investment crowding out private investment in the long-run. An error correction model was used to check for the 'medium term' determinants of private investment and the results revealed that the coefficients of all the variables except trade liberalization and relative price of capital goods were significant, and that the elasticity of output was higher in the medium term than in the short-term. The crowding out effect prevailed in the medium term and was higher than in the short-term.

The short-term distributed lag model gave evidence for a partial adjustment with the first lag of the difference significant. Other determinants of private investment in the short-term were, output, public investment, exchange rate devaluation and inflation. The immediate impact of inflation was found to stimulate investment and this positive effect vanishes with time and becomes negative in the long-run. Trade liberalization was found to have an adverse effect on private investment in the short-run. However, high debt signaled good credit rating in the short-run, but in the long-term it generated uncertainty.

Ouattara (2004) modeled the long run determinants of private investment in Senegal over the period 1970-2000 using the Johansen Co integration techniques and bounds test approach. The study used series for: public investment, real GDP, credit to the private sector, foreign aid and terms of trade. The results indicated that public investment crowded out private investment in the long run. Contrary to expectations coefficient of credit to the private sector was found to have a negative sign implying that credit did not boost private investment in Senegal. This phenomenon could have been caused by absence of strong business institutions. Private investment responded positively to foreign aid flow suggesting that donor funding improved development of the private sector in Senegal.

King'ori (2005) used Johansen's Cointegration techniques and error correction model to establish the long run and short run determinants of private investment in Kenya with the estimated short run parsimonious private investment model having an adjusted R^2 of 59 per cent. The macroeconomic variables chosen for the study could only account for the variation in private investment 59 per cent of the time.

It was found out that in the long run, foreign exchange reserves, GDP growth rate, public investment; saving and interest rates had a positive impact on private investment. High interest rates in Kenya were found not deter private investment in the long run, contrary to theoretical expectations. Inflation, openness to trade, real foreign exchange rates and external debts were found to have a negative influence on private investment. Openness to trade was expected to increase private investment because of availability of new markets for private sector goods and services. The result could be attributed to the fact that Kenya is not competitive enough to do business for private investors (in terms of high operating costs), so private investors' returns were eroded by exposure to competition resulting from opening up trade with the rest of the world.

In the short-run, foreign aid, savings, real GDP growth rate and foreign exchange rates were found to have a positive impact on private investment. Inflation and interest rates defied theoretical expectations in the short run as they were found to have a positive influence on private investment, while openness to trade did not boost private investment in short-run. Just like in Senegal, the positive coefficient of donor aid implies that donor conditions of private sector development were observed in Kenya, at least in the short-run.

Although the savings rate is very low in Kenya to finance all investment requirements, the study found out that savings had a significant positive impact on private investment in both short run and long run period. This implied that investors in Kenya gained heavily from retained earnings during the period of the study. The stock of foreign exchange reserve was found to have a positive impact on private investment in short and long terms confirming that private investment relies heavily on importation of capital equipment (for which they pay using foreign currency). Inflation was however compliant to theoretical expectations in the long run as it were found to have a negative coefficient.

In a study of determinants and constraints of private investment in Kenya, Matwang'a, 2000 used regression analysis and co integration technique to establish the long-run and short-run private investment model. Lack of strong incentives and general information of existing opportunities in manufacturing, agriculture and service industries was attributed to the low private investors' interest in these sectors. Further, the estimated coefficients for savings, GDP growth and public investment concurred with theoretical expectation of their positive influence on private investment. Debt service ratio and inflationary uncertainty were found to influence private investment negatively. The partial adjustment parameter had a positive and a significant sign thus indicating divergence between the actual and desired levels of investment within a particular period. The study concluded that traditional models of investment are inappropriate for explaining the behavior of private investors in developing countries since they were developed to explain this behavior in developed countries. Most of these models do not capture circumstances like uncertainty, civil wars, debt overhang among others, which are peculiar to developing countries.

Kimani (2005) studied the relationship between budget deficit financing and private investment in Kenya using a VAR analysis and found out that domestic borrowing crowds out private investment in Kenya. These results contradict those of King'ori (2005) which found out that government investment instead crowds in private investment. This could imply that the government does not use the resources from domestic borrowing for investment in public utilities like infrastructure so that it does not compete for funds with the private sector, but the latter benefits largely from public investment in utilities.

Ghura and Goodwin (2000) studied the determinants of private investment in Asia, Latin America and Sub-Saharan Africa (SSA) with a panel data for the period 1975-1992. Among the factors that were found relevant in improving private investment were real GDP growth, increases in government investment, improvements in financial intermediation, reductions in credit to the government, declines in world interest rates and educational development. The negative effect of external debt was not confirmed by this study.

Le (2004) examined the political and economic determinants of private investment using panel data for 25 developing countries for the period 1975-1995. The study adopted the portfolio choice theory of asset allocation to derive a model for private investment equation model. The study utilized indices for: socio-political instability; regime change instability and policy uncertainty, while controlling for return differential. The results indicated that socio-political instability marked by non-violent uprisings promotes private investment while violent uprisings hinder private investment. Moreover, regime change instability characterized by constitutional government change promotes private investment while unconstitutional government change hinders investment (Le, 2004). However, the study admits that because developing countries in the sample had diverse political landscapes and economic volatilities, the results could be affected by unmeasured country characteristics.

In a study on determinants of Private investment behavior in Ghana, Asante (2000) used time series analysis and complemented it with a cross-sectional analysis and found that the two analyses supported each other. The study found out that macroeconomic instability mattered a lot in determining the direction of private investment and its coefficient took a negative sign and was significant at 1%. The cross-section survey supported this outcome with 45 per cent of the respondents attributing low performance of the private sector to macroeconomic uncertainty. The coefficient of real interest rate was found to have a positive sign, supporting the MaCkinnon and Shaw hypothesis but was at variance with the cross section analysis because 82 per cent of the respondents cited cost of capital as a major obstacle to investment. Trade regime had a negative coefficient implying that the over-controlled economy in Ghana depressed private investment.

Coefficient of political instability behaved as expected as the dummy for successful political coup took a positive sign and was significant. However, this disputed the cross-section analysis where only 22 per cent of the respondents termed political instability as a constraint to private investment. The study used lag of private investment to capture the confidence that investors had with the investment environment. The coefficient took a positive sign and was statistically significant at 1 per cent. The effect of taxation on private investment was found to be insignificant by the time series analysis, but the cross section analysis revealed that high taxation was a major constraint to private investment (54.5 percent of the respondents).

Another study by IFC, (1996) established that privatization increases the private investment levels. Based on pre and post privatization financial and operating performance of sixty one companies from eighteen countries in thirty two industries, the study found out that upon privatization, the firms increased the ratio of capital expenditures to sales from 11.7 per cent to 16 per cent.

In a study of trends in private investments in developing nations, IFC (1992) established a strong relationship between government adjustment efforts and private investment in developing nations. Such government adjustments sought to address macro-instabilities such as; reduction in public sector deficit, and country risk. However, the study noted that contrary to expectations, if the returns from investment projects are sufficiently high, as with the case of mining and oil sectors, high attendant country risks may not deter private investors.

Knack and Keefer (1995) used cross country tests to study the relationship between institutions and economic performance using International Country Risk Guide (ICRG) indicators (first published in 1982), Business Environmental risk Intelligence (BERI) indicators (first published in 1972) and Political Violence indicators. ICRG index comprised of: expropriation risk; rule of law – measuring whether there are established mechanisms of adjudicating disputes; corruption in government and repudiation of contracts by government. On the other hand, BERI index comprised of contract enforceability and infrastructure quality. The study used regressions to show that political indicators as measured by the Gastil's index of political freedoms and civil liberties were insufficient proxies with information that has nothing to do with incentives for investment and innovation. The study estimated two regression equations with Growth and Private Investment as dependent variables. The independent variables that entered both regressions were: ICRG index, BERI index, Political Violence indicator that replaced Gastil's political index in some trials. Further, other variables like education, initial income (proxy for capital stock) and government consumption were included on the right hand side to control for country specific characteristics. The private investment equation was given as:

$$PINV7085 = \alpha + \beta_1 GDP60 + \beta_2 SEC60 + \beta_3 PRIM60 + \beta_4 GOVCONS + \beta_5 REVCOUP + \beta_6 ASS + \beta_7 PPI60DEV + \beta_8 PPI60 + \varepsilon$$

where:

PINV7085 = real private investment, *GDP60* =initial income (1960), *SEC* = secondary school enrolment, *PRIM* = primary school enrolment, *GOVCONS* = government expenditure as a ratio of GDP, *REVCOUP* = the frequency of revolutionary coups, *ASS* = frequencies of assassinations, *PPI60DEV* = deviation of 1960 purchasing power parity investment deflator from the sample mean.

Among the findings of the study was that political violence and Gastil's political and civil liberties indicators were insufficient proxies for the quality of institutions that protect property rights. In the growth equation, ICRG/BERI indices were found to have greater explanatory power relative to political violence indicators. The effect of institutions on growth persists even after controlling for investment. The Private Investment regression, ICRG and BERI indices had greater economic and statistical significance, and the explanatory power of models with only ICRG and BERI indices was greater than those that the presence of institutions that protect property rights affects the magnitude of investment and growth.

Aysan et al (2007) in a study on Governance institutions and private investment, used simultaneous equations and 3SLS method of estimation on a panel data of 32 developing countries in the Middle East and North Africa (MENA). The study employed indexes developed by combining variables published by private firms namely: PRS Group, Freedom House, Fraser Institute and Heritage Foundation to construct four measures that were used as proxies for Governance. The four indicators were: Public accountability (PA), Political stability (PS); Administrative quality (QA) and Global indicator of Governance (GOV)

Administrative quality comprised of: level of corruption, quality of bureaucracy, security of property rights, soundness of taxation and regulation policies and presence of adhered law and order indicators as compiled by PRS Group. Political stability index comprised of: government stability, internal conflict, external conflict and ethnic tensions from PRS group. Public accountability comprised of civil liberties and political rights as compiled by Freedom House.

The model for estimation was specified as:

$$PI = \alpha_0 + \alpha_1 QI_{1it} + \alpha_2 X_{1it} + \varepsilon_{1it}$$

$$QI = \gamma_0 + \beta_1 PI_{2it} + \beta_2 X_{2it} + \varepsilon_{1it}$$

where:

PI = share of private investment in GDP

QI = various indices of governance (GOV)

X_{1it}, X_{2it} = other controls in PI and Governance equations

$\varepsilon_{1it}, \varepsilon_{2it}$ = error terns of each equation, it represents country and time respectively.

The study found out that the quality of administration as comprising of above indicators was a top consideration in a firm's decision to invest. The political stability coefficient was found to be positive and significant at five per cent, implying that a sound political environment favours private investment. The results however did not yield strong evidence in support of importance of political accountability in investment decision. Given that this variable was controlling for quality of governance institutions, this outcome could have been due to the unresolved debate of the role of democratic institutions in economic growth (Aysan et al, 2007)

2.3 Overview of literature

From the previous section it is clear that investment is influenced by Keynesian, neo-classical and other factors classified under the neo-liberal approach such as uncertainty in the economic environment. It is also apparent from the readings that long-run and short-run determinants of investment may differ slightly as witnessed by Acosta and Loza (2004) and King'ori (2005). In addition, public and private investments respond to different conditions in a varied manner, given that the government has some advantages in the economic environment which do not accrue to the private sector like financing among others. It is therefore important to separate the two types of investment. This study is concerned with private investment behavior only.

From the foregoing section of literature review, private investment responds to: public investment, economic growth expectations, investor confidence, uncertainty brought about by political and governance issues, macro-economic instability (changes in inflation, exchange rates, relative prices of producer goods) and indebtedness of a country, opportunity cost of capital, rates of return, capital financing, economic openness and foreign aid with its attached conditions. However, the response of private investment to the above effects differs from country to country (cross-section) and over time within a country.

Le (2004) reveals that in addition to economic determinants of private investment are other non-economic factors that influence private investment decision especially in the under-developed and developing countries. In particular the study shows that political dynamics affect private investment decisions.
The role of governance and other institutional factors in guiding private investment decision has also been highlighted in Aysan et al (2007) and Knack and Keefer (1995). These two studies have emphasized the need to re-specify the flexible accelerator model to reflect some unique factors that may affect private investment, and mostly manifested in under-developed and developing countries.

From the literature review, there is has not been any study done to establish the relative impact of liberalization vis-à-vis that of institutional factors in developing countries, yet liberalization has been advocated and implemented as a key strategy for improving private investment and economic growth. The minimal achievement of liberalization in Kenya is a pointer that liberalization should have been preceded and supported by relevant institutional adjustments for it to have a meaningful impact on private investment.

This study attempts to establish the impact of institutional factors on private investment in Kenya before and after liberalization, as well as establish the relative significance of liberalization and institutional factors in influencing private investment in Kenya.

The study departs from the methodology used by others in that we employ Vector Autoregression which does not rely on theoretical or a priori relationships between variables of the study.

Liberalization policies considered by the study include: interest rate and trade liberalization in 1992. Institutional factors suspected to have influenced private investment behavior in Kenya include: collapse of the East African Community in 1977 which is believed to have reduced the market access for manufactured products and raw materials for Kenya to other regions; Establishment of Kenya Revenue Authority in 1995 which aimed at effective and efficient administration, assessment, collection of taxes and enforcement of tax policies and laws (www.kra.go.ke). This is in light of the fact that even if tax incentives are given to private investors, they may not achieve much in absence of proper administration. Moreover, the establishment of Kenya Investment Authority in 2004 is believed to have attracted more private investment, given that the authority is mandated with: assisting private investors with information on available investment opportunities; granting investment certificates to those private investors who qualify for them; and ensuring speedy issuance of licenses through provision of a 'one-stop-shop' for business registration services (Republic of Kenya, 2004).

Political institutional factors are also expected to play a major role in influencing private investment decisions through their effect on improved certainty of business environment. In this respect, the impact on private investment of the attempted coup de tat of 1982; struggles and instabilities during introduction of multiparty democracy in 1992 and political-ethnic clashes of 1997 will be assessed by this study.

2.4 Theoretical Framework

In deriving the neo-classical model (Flexible Accelerator) of investment, we follow Branson (2005) derivation of Jogernson's investment demand function. Assuming a profit maximizing firm with a technologically given production function;

$$Y_t = Y(N_t, K_t) \qquad \text{...(3.1)}$$

Where:

Y_t – output per unit of time

N_t – labour –work hours of input

K_t – capital stock (plant and equipment)

Since the capital of the firm wears out during production, some portion of investment goes towards replacing the worn out capital every period. Assuming that this proportion, δ, is fixed per period, total investment of a firm at a time *t* is given as:

$$K_{t+1} = K_t + I_t - \delta K_t$$

$$= (1-\delta)K_t + I_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3.2)$$

The intuition here is that once a firm has a given capital stock K_t at any given time t, it uses up δK_t in production and installs I_t, which is assumed not to start depreciating until the next year.

The firm's problem becomes maximization of the present value of its future profit stream, subject to constraints in equations 3.1 and 3.2.

The profit function of a firm can be given as:

Value of sales – wage bill- expenditure on investment goods

$$\pi = P_0Y_0 - W_0N P`_0I_0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3.3)$$

where:

P- price per unit of firm's output

Y- Total output of firm

W – wage rate

N- total labour employed

P`- price per unit of plant and equipment

I_t – total plant and equipment purchased in period t.

Present value of a firm life time is given by discounting the profit of consequent years by r- the interest rate, so that

$$PV = P_0Y_0 - W_0N_0 - P`_0I_0 + (1/1+r)[\ P_1Y_1 - W_1N_1 - P`_1I_1] + \ldots\ldots\ldots + 1/(1+r)^t[P_tY_t - W_tN_t - `_tI_t] \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3.4)$$

If a firm expects to continue its operations indefinitely, the summation will go into the future infinitely so that

$$PV = \sum_{t=0}^{\infty} 1/(1+r)^t \left[P_t Y_t - W_t N_t - P'_t I_t\right] \ldots\ldots (3.5)$$

Given that the production function holds for all periods, it can be substituted into equation 5 so that the present value maximization problem becomes:

$$PV = \sum_{t=0}^{\infty} 1/(1+r)^t \left[P_t Y(N_t K_t) - W_t N_t - P'_t I_t\right]$$

Subject to

$$K_{t+1}=(1-\delta)K_t\, I_t \ldots\ldots (3.6)$$

The constraint links capital stocks over time through investment (Branson, 2005)

The firm seeks to choose optimal labour N_t, Capital K_t and Investment I_t for maximization of its present value (*PV*)

If we assume that depreciation is not constant over the years we then have a separate constraint for each period

Introducing the langrage multiplier for maximization:

$$Maxl(N_t, K_t, I_t, \lambda_t) = \sum 1/(1+r)^t \left[P_t Y(K_t, N_t) - W_t N_t - P'_t I_t\right] + \sum \lambda t\left[I_t + (1-\delta)K_t - K_{t+1}\right] \ldots\ldots 3.7$$

First order Condition (FOC)

Partial differentiation of equation 7 with respect to N's, I's and λ's gives us entire investment program and employment demand into the indefinite future:

The FOC for each typical period:

$$\partial l/\partial N_t = 1/(1+r)^t\, [P_t Y_N - W_t] = 0 \ldots\ldots (3.8a)$$

$$\partial l/\partial K_t = 1/(1+r)^t [P_t Y_K] + \lambda_t(1-\delta) - \lambda_{t-1} = 0 \ldots\ldots (3.8b)$$

$\partial l/\partial I_t = -1/(1+r)^t P`_t + \lambda_t = 0$ ....(3.8c)

$\partial l/\partial \lambda_t = I_t + (1-\delta)K_t - K_{t+1} = 0$ ....(3.8d)

where

$Y_N = \partial Y/\partial N_T$ and $Y_K = \partial Y/\partial K_t$ are partial differentials of the langrage equation with respect to labour and capital respectively; λ_{t-1} comes in 3.8(b) because K_t is the end of period capital stock for the period $t-1$ Branson (2005).

From equations 3.8 (c)

$\lambda_t = P`_t/(1+r)^t$ ....(3.9)

for period $_{t-1}$ the same equations yields:

$\lambda_{t-1} = P`_{t-1}/(1+r)^{t-1}$ ....(3.10)

Substituting equation 3.9 and 3.10 into 3.8(b),

$1/(1+r)^t\{[P_t Y_K + [P`_t(1-\delta)]/(1+r)^t - P`_{t-1}/(1+r)^{t-1}\} = 0$ ....(3.11)

multiplying { } by $(1+r)^t$ and solving for marginal product of capital Y_k,

$Y_k = \{\delta P`_t + rP`_{t-1} - (P`_t - P`_{t-1})\}/P_t$ ....(3.12)

In equation (3.12),

$\delta P`_t$ = the depreciation charge per unit of capital used in time t.

$rP`_{t-1}$ = the interest charge for holding the capital stock valued at $P`_{t-1}$ at the beginning of period t

$(P`_t - P`_{t-1})\}/P_t$ = any capital gain on the capital stock from the beginning of the period

$\{\delta P`_t + rP`_{t-1} - (P`_t - P`_{t-1})\}$ = the Nominal (user cost of Capital) C_t- cost per period of using capital stock.

Simplifying equation 3.12 further,

$Y_K = \{\delta P`_t + rP`_{t-1} - (P`_t - P`_{t-1})\}/P_t = C_t/P_t$ ....(3.13)

This equation states that capital stock should be expanded until marginal product of capital; Y_K equals its real user cost c_t

From the above, it can be deduced that equilibrium capital stock K^E is a function of output Y, user cost of capital C and price of output P

$K^E = K_t(Y, C, P)$ ....(3.14)

Where;

$\partial K^E/\partial Y > 0;\ \partial K^E/\partial P > 0;\ \partial K^E/\partial C < 0$

from equation 3.2,

I_t(gross) renamed hereinafter as $I^g_t = K_{t+1} - K_t + \delta K_t$..(3.15)

Where;

$K_{t+1} - K_t$ = net investment i^n

δK_t depreciation or replacement investment i^r thus

$I^g = i^n + i^r$ ....(3.16)

$i^n = \Delta K^E$ ....(3.17)

(net investment in absence of lags in adjustment process of actual capital stock) this is the flexible accelerator principle.

The net investment is dependent on changes in desired level of capital stock, while replacement investment depends on actual level of capital stock.

Further, assuming a Cobb-Douglas production function (with constant returns to scale)

$Y = aK^{\alpha}N^{1-\alpha}$

$\partial Y/\partial K = [\alpha a\, K^{\alpha} N^{1-\alpha}]/K = \alpha Y/K.$

$\partial Y/\partial K = mpK = \alpha Y/K = C/P$ *from equation (3.13)*

further,

$\alpha Y\, p/c = CK$

$K^{E} = \alpha Y/(C/P)$……………………………………………………………………….(3.18)

I.e. the equilibrium capital stock rises with increase in Y and falls with increase in real user cost of capital.

Thus incorporating equation (3.18) into (3.17)

$i_n = \alpha\, p/c\, \Delta Y$

thus, in the long run with no trend in C/P it is the growth of output or demand that gives level of net investment.

Re-stating the gross investment function, $I^g = i^n + i^r$

$Ig = \alpha\, p/c\, \Delta Y + \delta K$……………………………………………………………….(3.19)

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

Given the nature of interrelations between institutional factors and liberalization policies, the best empirical approach to achieve our objectives would be to use a VAR approach. VAR as a method of time series analysis does not assume any structural relationships between economic variables. This makes it very appropriate in analyzing cases in which theoretical relationships are weak and endogeneity between variables are expected (Oduor, 2008)

3.1 Vector Autoregression Approach

Vector Autoregression is an alternative non-structural approach to modeling relationships among time series variables. The structural approach to time series modeling relies heavily on economic theory to model relationships among variables. However, theory is often not accurate enough to provide dynamic specifications that identify all relationships; hence the need for VAR. This approach sidesteps the need for structural modeling by treating every endogenous variable as a function of lagged values and lagged values of all other endogenous variables in the system (Oduor, 2008). Moreover, VAR is commonly used for analyzing the dynamic impact of random disturbances on the system of variables and it is therefore justifiable to use it for achieving the objectives of this study. A VAR is mathematically represented as:

$$x_t = Ax_{t-1} + ...Apx_{t-p} + By_t + \varepsilon_t \qquad (3.20)$$

where:

x_t is a K vector of endogenous variables

y_t is a vector of exogenous variables

ε_t is a vector of innovations

A and B are matrices of coefficients.

3.2 Empirical model specification

This study adopts the flexible accelerator theory of investment. From equation 3.19,

$$I = f(p/c, \Delta Y, \delta k, D_{1j}, D_{2s})$$

where:

I = Private investment,

p/c = price as a ratio of user cost of capital

ΔY = growth in income

δK = depreciation of capital stock.

To capture the effect of liberalization policies and institutions on investment, we add D_{1j} and D_{2s} respectively to the above specification so that:

$$I = f(p/c, \Delta Y, \delta k, D_{1j}, D_{2s}) \qquad (3.21)$$

where D_{1j} are dummy variables representing $j = 1,2,3...N$ institutional factors and D_{2s} are dummy variables representing $s = 1,2,3...M$ liberalization factors. The institutional factors that will be considered for this study are: collapse of the East African Community in 1977 (D11); establishment of Kenya Revenue Authority in 1995 (D12) and Kenya Investment Authority in 2004 (D13) coup attempt in 1982; political-ethnic disturbances in 1992 and 1997 (D15), while liberalization factors include; interest rate, exchange rate and price liberalization in 1992 (D21).

The variables that enter the VAR will therefore be:

$I, p/c, \Delta Y, \delta K, D_{1j}, D_{2s}$

Further, p/c, ΔY and δK will be denoted as m, y and k respectively.

To model this relationship, we use a Vector error correction model which is a special variant of a VAR. The complete VECM (p) matrix is given as:

$$\begin{bmatrix} \Delta I_t \\ \Delta m_t \\ \Delta y_t \\ \Delta k_t \\ D_{1j} \\ D_{2s} \end{bmatrix} = \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} & \beta_{15} & \beta_{16} \\ \beta_{21} & \beta_{22} & \beta_{23} & \beta_{24} & \beta_{25} & \beta_{26} \\ \beta_{31} & \beta_{32} & \beta_{33} & \beta_{34} & \beta_{35} & \beta_{36} \\ \beta_{41} & \beta_{42} & \beta_{43} & \beta_{44} & \beta_{45} & \beta_{46} \\ \beta_{51} & \beta_{52} & \beta_{53} & \beta_{54} & \beta_{55} & \beta_{56} \\ \beta_{61} & \beta_{62} & \beta_{63} & \beta_{64} & \beta_{65} & \beta_{66} \end{bmatrix} \begin{bmatrix} \Delta I_{t-i} \\ \Delta m_{t-i} \\ \Delta y_{t-i} \\ \Delta k_{t-i} \\ D_{1j} \\ D_{2s} \end{bmatrix} + \begin{bmatrix} \delta_{11} & \delta_{12} & \delta_{13} & \delta_{14} & \delta_{15} & \delta_{16} \\ \delta_{21} & \delta_{22} & \delta_{23} & \delta_{24} & \delta_{25} & \delta_{26} \\ \delta_{31} & \delta_{32} & \delta_{33} & \delta_{34} & \delta_{35} & \delta_{36} \\ \delta_{41} & \delta_{42} & \delta_{43} & \delta_{44} & \delta_{45} & \delta_{46} \\ \delta_{51} & \delta_{52} & \delta_{53} & \delta_{54} & \delta_{55} & \delta_{56} \\ \delta_{61} & \delta_{62} & \delta_{63} & \delta_{64} & \delta_{65} & \delta_{66} \end{bmatrix}$$

$$\begin{bmatrix} 1 & \alpha_{12} & \alpha_{13} & \alpha_{14} & \alpha_{15} & \alpha_{16} \\ \alpha_{21} & \alpha_{22} & \alpha_{23} & \alpha_{24} & \alpha_{25} & \alpha_{26} \\ \alpha_{31} & \alpha_{32} & \alpha_{33} & \alpha_{34} & \alpha_{35} & \alpha_{36} \\ \alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44} & \alpha_{45} & \alpha_{46} \\ \alpha_{51} & \alpha_{52} & \alpha_{53} & \alpha_{54} & \alpha_{55} & \alpha_{56} \\ \alpha_{61} & \alpha_{62} & \alpha_{63} & \alpha_{64} & \alpha_{65} & \alpha_{66} \end{bmatrix} \begin{bmatrix} I_{t-1} \\ m_{t-1} \\ y_{t-1} \\ k_{t-1} \\ D_{1j} \\ D_{2s} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \end{bmatrix} \quad \text{..................................(3.22)}$$

3.3 Vector Error Correction Model (VECM)

A VECM is a restricted VAR for use with non-stationary series that are known to be cointegrated. Cointegration relationships are built into the specification so that it restricts the long run behavior of the endogenous variables to converge to their cointegrating relationships while allowing for short run adjustment dynamics. The Cointegration term is known as error correction term because the deviation from long run equilibrium is corrected gradually through a series of partial short-run adjustments (Oduor, 2008) Assuming a one-lag autoregressive process, a general VAR (1) can be written in matrix form as:

$x_t = Ax_{t-1} + \varepsilon_t$ ....(3.23)

where x_t is a (n×1) vector of ($x_{1t}, x_{2t}, \ldots, x_{nt}$) endogenous variables, ε_t is a (n×1) vector of ($\varepsilon_{1t}, \varepsilon_{2t}, \ldots, \varepsilon_{nt}$) and A is a matrix of parameters.

If the vector x_t contains non-stationary variables it can be made stationary by differencing. This is done by subtracting x_{t-1} from both sides so that,

$x_t - (x_{t-1}) = (Ax_{t-1}) - (x_{t-1}) + \varepsilon_t$ ....(3.24)

$\Delta x_t = (A-1)x_{t-1} + \varepsilon_t$ ....(3.25)

Letting $(A-1) = \pi$ implies that (3.25) can be written as:

$\Delta x_t = \pi_{t-1} + \varepsilon_t$ ....(3.26)

Adding more stationary processes to equation (3.26) does not change its stability conditions. If the vector x_t is an autoregressive process of order *p*, we have a stationary process given as:

$$\Delta x_t = \pi x_{t-1} + \sum_{i=1}^{p} \phi_i \Delta x_{t-i} + \varepsilon_{kt} \quad \text{...(3.27)}$$

where:

$\pi = -\left\{1 - \sum_{i=1}^{p} A_i\right\}$ and $\Phi_i = -\sum_{j=i+1} A_j$

A is a matrix of parameters, while x_t is (n×1) vector of $(x_{1t}, x_{2t,}, \ldots x_{nt})$

The expression πx_{t-1} is the error correction term and equation (3.27) is called the Vector Error Correction Model.

After specifying the empirical model as above, the study will then estimate the general VAR model. The appropriate lag length will be chosen using the different information criteria. The VAR model will then be re-estimated with the appropriate lag length. Johansen's co integration test will then be carried out to determine the number of cointegrating equations. Tests for Weak-exogeneity will then be conducted and the model identified using economic theory. The structural (SVAR) will then be estimated to generate impulse responses and Variance decompositions which will be used for final analysis.

3.4 Johansen's Cointegration test

There could be several long-run relationships governing the relationships among the variables of the system. Since the Engel and Granger (EG) Cointegration test is only limited to situations where we have a single long run relationship, it is not appropriate when we suspect that the cointegrating equations could be more than one. The EG two step test also implies that an error made in the first step is carried on to the second step which will ultimately lead to a wrong inference. Because of these limitations of the EG two step method, we use Johansen's test in this study.

From equation (3.27), the expression πx_{t-1} is the error correction term if there is only one cointegrating vector. If the rank$(\pi = n)$, all variables are unit root processes and not cointegrated.

If rank$(\pi = n)$, all variables are stationary with n cointegrating vectors. Since the rank (π) is the number of characteristic roots of the π matrix, then task of obtaining the number of cointegrating vectors is reduced to checking the significance of the characteristic roots of the π matrix (Oduor, 2008). Testing for the number of characteristic roots that are insignificantly different from zero is conducted using a trace test, given as

$$\lambda_{trace} = (r) = -T\sum_{i=r+1}^{n}\ln(1-\lambda_i)$$

$r = 0,1,2,......n-2, n-1$

λ_i = estimated value of the characteristic roots obtained from the estimated π matrix

T = number of observations. The null hypothesis of the statistic is that the number of distinct cointegrating vectors is utmost equal to r against a general alternative.

3.5 Weak Exogeneity Tests

After testing for Cointegration we will test whether any of the variables in our model is weakly exogenous. A weakly exogenous variable is one that does not respond to deviations from the long run path. If the speed of adjustment α_i in the Vector Error Correction Model is equal to zero, then variable i is weakly exogenous and it does not contribute to feedback mechanism. If all variables happen to be weakly exogenous, the use of a system of equation and VAR approach in the study will not be justified (Oduor, 2008). Weak exogeneity tests are therefore necessary to detect specification errors in our model.

3.6 Identification and long-run estimation

There is no theoretical meaning in the VECM representation of the model in 3.22. VECM only implies that there are feedback mechanisms among the variables in the model and a single equation approach of the model is a misspecification. Restricting the model to reflect economic theory will yield intuitive results out of 3.22. To be able to restrict our model, we must identify theoretical relationships among our model variables.

3.7 Structural (Identified) VAR

The purpose of a structural VAR estimation is to obtain non-recursive orthogonalisation of the error terms for impulse response analysis. This requires that we identify the orthogonal (structural) components of the error terms (Oduor, 2008)

Given our vector of endogenous model x_t, we let $\Sigma = E[\varepsilon_t \varepsilon'_t]$ be the residual covariance matrix. According to Amisano and Giannini (1997) the SVAR estimates may be written as:

$$A\varepsilon_t = B\mu_t$$

where:

ε_t and μ_t are vectors of length n. ε_t is the observed (or reduced form) residuals, while μ_t is the unobserved structural innovations. A and B are $n \times n$ matrices to be estimated. The assumption of orthonormal innovations μ_t imposes the following identifying restrictions on and A and B:

$$A \Sigma A' = BB'$$

Given that the expressions on both sides are symmetric, this imposes $n(n+1)/2$ restrictions on the $2n^2$ unknown elements in A and B. Thus in order to identify A and B, we need to supply at least $2n^2 - n(n+1)/2 = n(3n-1)/2$ additional restrictions.

3.8 Theoretical relationships among variables in the model.

Depreciation of capital stock is determined by growth in income through increased production activities and profits (Branson, 2005). GDP growth is determined by private investment, price as a ratio of user cost of capital through demand for consumption and investment goods and services, institutions that support economic enterprises and liberalization policies through wider markets for goods and services.

Private investment is determined by prices and user cost of capital, GDP growth and depreciation of capital stock (m) (Branson, 2005)

Price as a ratio of user cost of capital (m) is determined by income growth through demand for goods and services and liberalization policies through increased competition and wider markets for goods and services. Institutions and liberalization policies are exogenous variables. These theoretical relationships can be summarized as:

$$k = \theta_{12} y$$
$$y = \theta_{23} y + \theta_{24} m$$
$$I = \theta_{32} y + \theta_{34} m + \theta_{35} D_{11} + \theta_{36} D_{12} + \theta_{37} D_{13} + \theta_{38} D_{15} + \theta_{39} D_{21}$$
$$m = \theta_{43} y + \theta_{49} D_{21}$$
$$D_{11}$$
$$D_{12}$$
$$D_{13}$$
$$D_{15}$$
$$D_{21}$$

3.9 The B-Matrix

The B-matrix is a $n \times n$ matrix specifying the restrictions necessary for identification of the model.

The B-Matrix can be represented as follows:

$$\begin{bmatrix} 1 & \gamma_{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & \gamma_{23} & \gamma_{24} & 0 & 0 & 0 & 0 & \gamma_{29} \\ 0 & \gamma_{32} & 1 & \gamma_{34} & \gamma_{35} & \gamma_{36} & \gamma_{37} & \gamma_{38} & \gamma_{39} \\ 0 & 0 & \gamma_{43} & 1 & 0 & 0 & 0 & 0 & \gamma_{49} \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} k \\ y \\ I \\ m \\ D_{11} \\ D_{12} \\ D_{13} \\ D_{15} \\ D_{21} \end{bmatrix} \quad \text{..................} 3.26$$

3.10 Impulse Responses and Variance Decomposition

An impulse response function enables one trace the effect of one time shock to one of the innovations on the current and future values of the endogenous variables.

The impulse response functions are obtained from a VARMA – a moving average representation of the VAR. In a VARMA, system variables are expressed in terms of present and the past values of all the shocks in the system. Given a general representation of a VARMA as:

$$\Delta x_t = \sum_{j=0}^{\infty} \varphi_i \varepsilon_{t-i} \quad \text{i=0, 1, 2,..., n}$$

Where ϕ_i = impact multipliers denoting the response of each variable to innovations in each of the corresponding error terms on impact.

ε_{t-1} are innovations

n= number of variables in the system

$\phi_i(0)$, $\phi_i(1)$, $\phi_i(n)$ are the impulse response functions which will be plotted to trace the time path of the system variables as they respond to various shocks overtime. Impulse response will help us to achieve the first objective of the study by tracing the time path of private investment as it responds to among other variables, liberalization policies and institutional shocks.

3.11 Variance Decomposition

While the impulse response functions trace the effects of a shock to one endogenous variable on the other variables in the VAR, Variance decomposition separates the variation in an endogenous variable into the component shocks to the VAR. Thus Variance decomposition provides information about the relative importance of each random innovation in affecting the variables in the VAR. To determine what proportion of the Variance in a series is due to its own shock and other identified shocks, forecast error variance decomposition technique which allocates weights to each identified shock in the system at every forecast horizon for a particular variable will be used (Oduor, 2008). Over a short horizon the 'own shock' dominates the variance forecast and shocks to other variables in the system may gain importance relative to own shock as the horizon lengthens.

Thus to achieve our second objective, we will carry out a variance decomposition to determine the proportions of the shock in private investment that are accredited to liberalization policies and institutional factors and therefore establish their relative importance in determining private investment in Kenya.

3.12 Definition and Measurement of variables

a) Cost of capital will be measured by 'commercial bank lending rate' available in economic surveys

b) GDP will be measured in Kenya shillings and deflated using GDP deflator

c) Private investment will be measured as "private fixed capital formation in Kenya shillings" available in economic surveys and statistical abstracts.

d) Depreciation of capital stock will be measured as given in economic surveys in Kenya Shillings.

e) GDP growth rate will be taken as given in the economic surveys.

f) CPI will be taken as given in economic surveys and statistical abstracts.

g) Institutional variables will be expressed by dummies representing the happening of an event or events that were felt to be important for enhancing or worsening business investment environment. This is because of dearth of appropriate published data in Kenya and the difficulty attributed to measuring such aspects of society.

D_{1j} = set of dummy variables (j = 1,2,3 and 5) denoting economic and political institutional factors. The events that are chosen for purposes of this study to represent these institutional factors are: Collapse of East African Community in 1977 [D11], establishment of Kenya Revenue Authority in 1995 [D12] and establishment of Kenya Investment Authority [D13].

D_{1j} =1 when an institution was there and 0 if it did not exist.

Political institutional factors will be represented by the politics-related instabilities namely: attempted coup of 1982, multiparty democracy and related strife in 1992 and election conflicts in 1997[D15]

D_{1j} =1 when the political event occurred and zero otherwise

D_{2s} is a dummy variable (s =I,) denoting liberalization policies; Trade liberalization, exchange rate liberalization and interest liberalization in 1992 [D21].

3.13 Data type and sources

This study is a secondary research and secondary data from published sources for the period 1965-2007 will be used .GDP growth rates, interest rates, Consumer price indices and Depreciation of capital stock will be taken as given published National statistical abstracts and economic surveys of various years. Private investment and GDP data will be sourced from economic surveys.

Information of institutional factors (establishment of institutions and happening of events associated with institutional factors) will be got from perusal of published papers on liberalization policies and various National Development Plans.

The period of study is from 1965-2007.

The original data was collected on annual basis and missing data for private investment was computed based on percentages of earlier years. However, the observations were not enough for estimation purposes. To increase the observations, the annual data was extrapolated to monthly data.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.0 Introduction

This section will deal with the procedures of data analysis and interpretation of the results following the steps described in chapter 3. The econometric software that was used for this analysis is eviews 6.0

4.1 Test for unit roots

Time series data is known to be non-stationary and analysis of such data may give spurious correlations because estimates obtained from such data will possess non-constant mean and variance. Since this study used time series data, it was therefore important to establish whether data was stationary or integrated of what order, to ensure that the results obtained are valid. In this study two existing tests for unit root namely: Augmented Dickey Fuller Test (ADF) and Philips Peron test (PP) were used. The difference between the two tests is that while ADF corrects for serial correlation through introduction of lagged terms in its equation to ensure that the error terms are white noise (Parametric method), the PP test uses non-parametric method where by it modifies the statistics after estimation in order to take into account the impact of auto-correlated errors on the results. Thus, unlike the ADF, the PP does not result into loss of degrees of freedom.

The unit root results revealed that depreciation, GDP growth rate , prices as a ratio of lending rates and private investment as a ratio of GDP were non-stationary at 1 percent level of significance, and upon differencing once, they attained stationarity. This implied that the variables were all integrated of order one, I (1).

4.2 Lag Selection

To select the number of lags, the general VECM model given in (3.22) was first estimated with 8 lags and lag selection is conducted using various information criteria. The results obtained are given in table A2 in the appendix. Using the various lag selection criteria, FPE, AIC and HQ indicated that we use two lags. The number of lags adopted was the one chosen by many criteria.

4.3 Tests for Cointegration

Given that all the variables in the series were found to be integrated of first order, the next step was to test for the existence of a long run relationship among the variables. This study adopted the Johansen's Cointegration test over the Engel Granger test for the reason given in chapter three. This was done with all the I(1) variables at their levels. The trace and Maximum Eigen value statistics for Cointegration tests are given in table A3 in the appendix.

From the results obtained, the trace test statistic indicated that there were at most two cointegrating equations; the Maximum eigenvalue test statistic indicated no cointegration (long run relationship) amongst the model variables. This contradicts the trace test and where such contradiction exists, Enders (2004) suggests that one looks at the theoretical possibility of existence of the number of relationships proposed by the two tests. Given the theoretical relationships of the model variables discussed earlier on, it is logical to expect two cointegrating equations as opposed to none.

The following section discusses the results of exogeneity tests to establish the two cointegrating equations.

4.4 Exogeneity test

Exogeneity tests were conducted to pick out the variables that were weakly exogenous and could not therefore contribute to the feedback mechanism. If all variables in a system were weakly exogenous, there would be no feedback in the model and a single equation formulation of the model would be appropriate. The Null hypothesis for this test was that a variable is weakly exogenous (exogenous), against an alternative that the variable is endogenous. A p-value of less than 0.05 led to rejection of the null hypothesis (exogeneity), in favor of the alternative (endogeneity); at 5 per cent level of significance. The results of exogeneity tests are shown in tables A4, A5, A6 and A7 of the appendix

From the results (see table A4), depreciation had a p-value of 0.028 at two cointegrating equations, implying that the null hypothesis (that depreciation is weakly exogenous) was rejected in favor of the alternative (depreciation is endogenous).

GDP growth rate had a p-value of 0.033 (refer to table A5), less than 0.05 implying that the null hypothesis was rejected in favor of the alternative. GDP growth rate was therefore endogenous in the model.

The exogeneity test for private investment as a ratio of GDP yielded a p-value of 0.0034 (see table A6), less than 0.005 at five per cent level of significance. This led to a rejection of the null hypothesis (exogeneity) in favour of the alternative (Endogeneity). Private investment was therefore endogenous in the model.

Test for exogeneity of prices as a ratio of lending rates resulted into a p-value of 0.343 (see table A). This was greater than the required 0.05 at five percent level of significance. The null hypothesis (exogeneity) could not be rejected. Prices as a ratio of lending rates were therefore exogenous in the model.

The dummy variables were supposed to introduce external shocks to the private investment model. They were therefore assumed to be exogenous, irrespective of the results of their exogeneity tests.

4.5 Structural VAR and long-run results

To obtain non-recursive orthogonalisation of the error terms for impulse responses and Variance decomposition, this study used AB model as proposed by Amisano and Giannini (1997). According to this model, a set of at least $2n^2$ - $\left(\frac{n(n+1)}{2}\right)$ restrictions on the parameters of the A and the B matrices must be imposed.

With nine variables, at least $2 \times 9^2 - \left(\frac{9(9+1)}{2}\right) = 117$ restrictions must be imposed on the model. We placed 70 restrictions making our model to be over-identified. The restrictions were placed using theoretical underpinnings as shown below:

Variable	Determinant	Theoretical basis
depreciation	Economic growth rate	Branson (2005)
Economic growth rate	Private investment, prices as a ratio of lending rate	Branson (1989)
Private investment	GDP growth rate, Prices as a ratio of user cost of capital,tax administration, availability of market, political instabilities, Liberalization, and investment promotion.	Branson, (2005); le (2004); KIPPRA /World Bank (2004); Republic of Kenya (2004)

The A-matrix can thus be written as:

$$\begin{bmatrix} 1 & \gamma_{12} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & \gamma_{23} & \gamma_{24} & 0 & 0 & 0 & 0 & \gamma_{29} \\ 0 & \gamma_{32} & 1 & \gamma_{34} & \gamma_{35} & \gamma_{36} & \gamma_{37} & \gamma_{38} & \gamma_{39} \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

The B-Matrix is a 9*9 matrix with ones in the diagonals.

With these restrictions in place, a structural VAR was estimated using the method of scoring. The results were as shown in table A8 in the appendix.

The results of the structural VAR allowed the following long run relationships to be picked from the system of equations:

$$\lg dpr = 1.033lprigdp - 0.164lry + 0.363D_{21}$$
$$lprigdp = -0.028\lg dpr - 0.092lry - 0.0004D_{11} - 0.127D_{12} + 0.07D_{13} - 0.0001D_{15} + 0.005D_{21}$$

From the long run results (refer to table A8), the coefficient for EAC dummy had a p-value of 0.97, implying that the null hypothesis (value of coefficient equal zero) could not be rejected at five per cent level of significance. The coefficient was therefore insignificant in the private investment equation. The impact of collapse of EAC on private investment in Kenya was not significantly different from zero.

The coefficient for dummy of establishment of KRA had a p-value of 0.00, implying that the null hypothesis of coefficient equal to zero was rejected in favor of the alternative (coefficient is not equal to zero) at five percent level of significance. This implies that dummy for establishment of KRA was significance in the long-run private investment equation. This result is similar to that of KIPRRA/World Bank (2004), who found out that taxation issues affected private investor behavior in Kenya (KIPPRA/ World Bank, 2004).

The dummy for establishment of KIA had a p-value of 0.00, implying that the variable was significant in explaining variation in private investment in the long-run. However, the dummy for political disturbances had a p-value of 0.98, implying that the coefficient was insignificant in the equation.

Lastly, the coefficient for the liberalization dummy was significant at five per cent level, with a p-value of 0.005. Liberalization was therefore a determinant of private investment in the long-run.

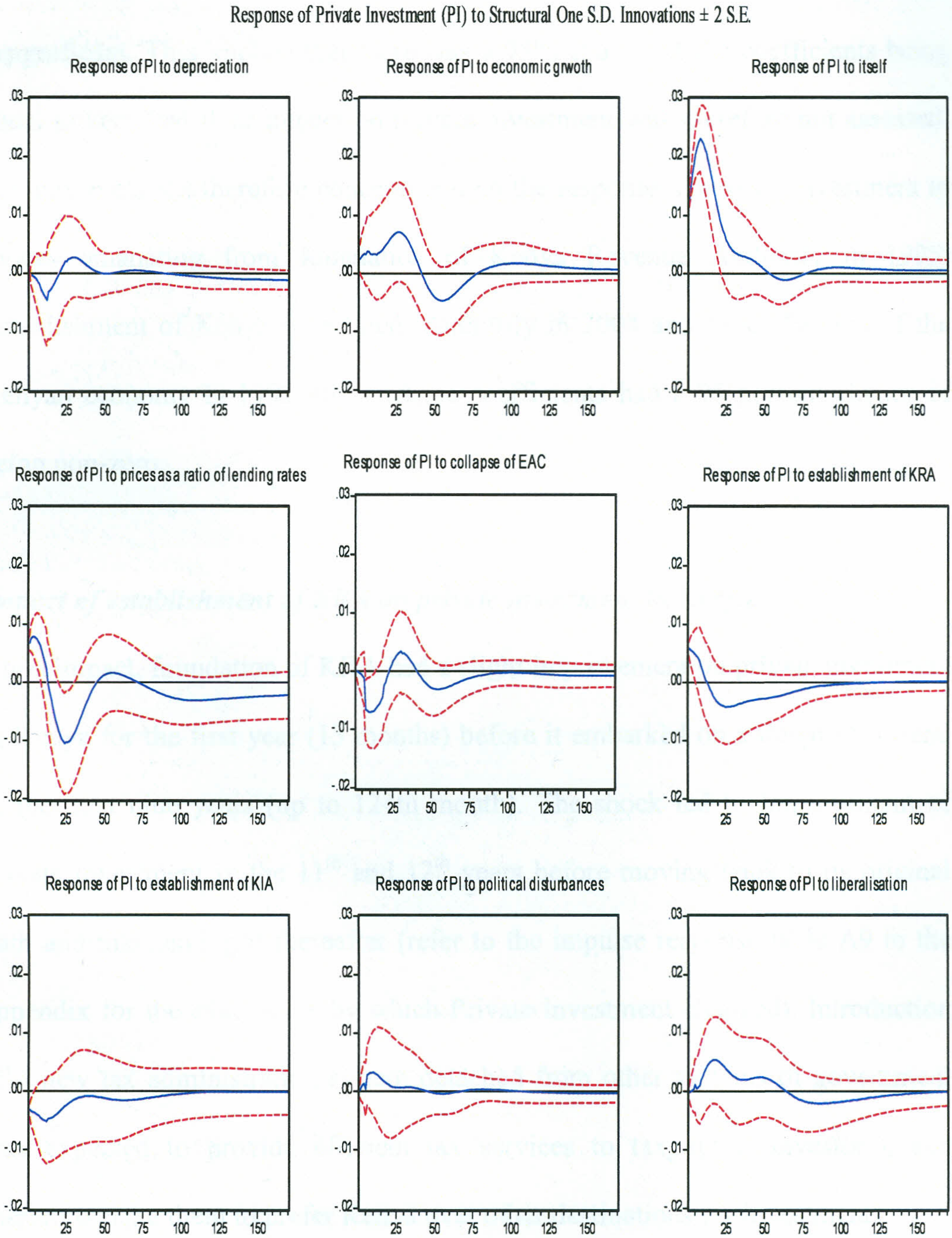
It can therefore be drawn from the results that the shocks emanating from establishment of KRA, establishment of KIA and liberalization had significant impact on private investment in Kenya.

The next procedures enabled the study assess the nature and relative magnitude of these impacts on private investment in Kenya.

4.6 Impulse Response Analysis

Impulse response analysis helped to trace the impact of a shock in one variable to the expected time path of private investment in Kenya. Plotting the impulse response functions was a better way of tracing the time path of the system variables as they responded to various shocks over time. To fulfill the second objective of this study, impulse response was employed and the response of private investment to shocks caused by liberalization and institutional factors (Establishment of KRA and Kenya investment Authority) plotted. The results are shown in figure 4.1 below:

Figure 4.1: Impulse response graphs



This study was interested in the impact of institutional variables on private investment. From the long-run results obtained earlier on, the coefficients for the dummies representing collapse of EAC in 1977 and political instabilities were insignificant. This implies that there was a 95% chance of the coefficients being equal to zero and their impact on private investment was therefore not assessed. The interpretation therefore concentrated on the response of private investment to shocks emanating from foundation of Kenya Revenue Authority in 1995; Establishment of Kenya investment Authority in 2004 and Liberalization of the Kenyan economy in 1992 all of whose coefficients had a 95 percent chance of being non-zero.

Impact of establishment of KRA on private investment in Kenya.

Upon impact, foundation of KRA had a slight improvement on private investment in Kenya for the first year (13 months) before it embarked on a downward trend in the next nine years (up to 124th month). The shock led to improvement of private investment in the 11^{th} and 12^{th} years before moving back to its original path and maintaining it thereafter (refer to the impulse response table A9 in the appendix for the exact units by which Private investment changed). Introduction of a new tax administration system detached from other systems of government was expected to provide efficient tax services to taxpayers (investors), and therefore make them to prefer Kenya over other destinations for investment.

Impact of establishment of KIA on private investment in Kenya

Introduction of Kenya investment Authority had a negative impact on private investment which was maintained from the time of the shock (2004) up to the 8^{th} year. This shows that KIA dampened and still continues to dampen private investment in Kenya up to the year 2012, when it is expected to go back to its long-run path. This is contrary to the expected results, because the mandate of KIA was to promote Kenya as an investment destination for both locals and foreigners, and therefore increase private investment.

Impact of liberalization measures on private investment in Kenya

Liberalization measures led to an improvement of private investment in the first five years of implementation, after which a negative trend was recorded for the next seven years before recovery towards its original path. Liberalization was expected to promote private investment by opening up more ventures, previously limited to the public sector. This finding supports the views of White and Leavy (2000); that liberalization did not lead to a meaningful increase in private investment and economic growth as it was envisaged at the time of formulation and implementation of the policies.

4.7 Forecast Error Variance Decomposition

The Forecast Error Variance Decomposition (FEVD) technique was used by this study to determine what proportion of the variance in private investment series was due to own and other identified shocks. The below figure shows the structural decomposition of the variation in private investment into its (significant) component shocks.

Figure 4.2: Variance decomposition of Private investment

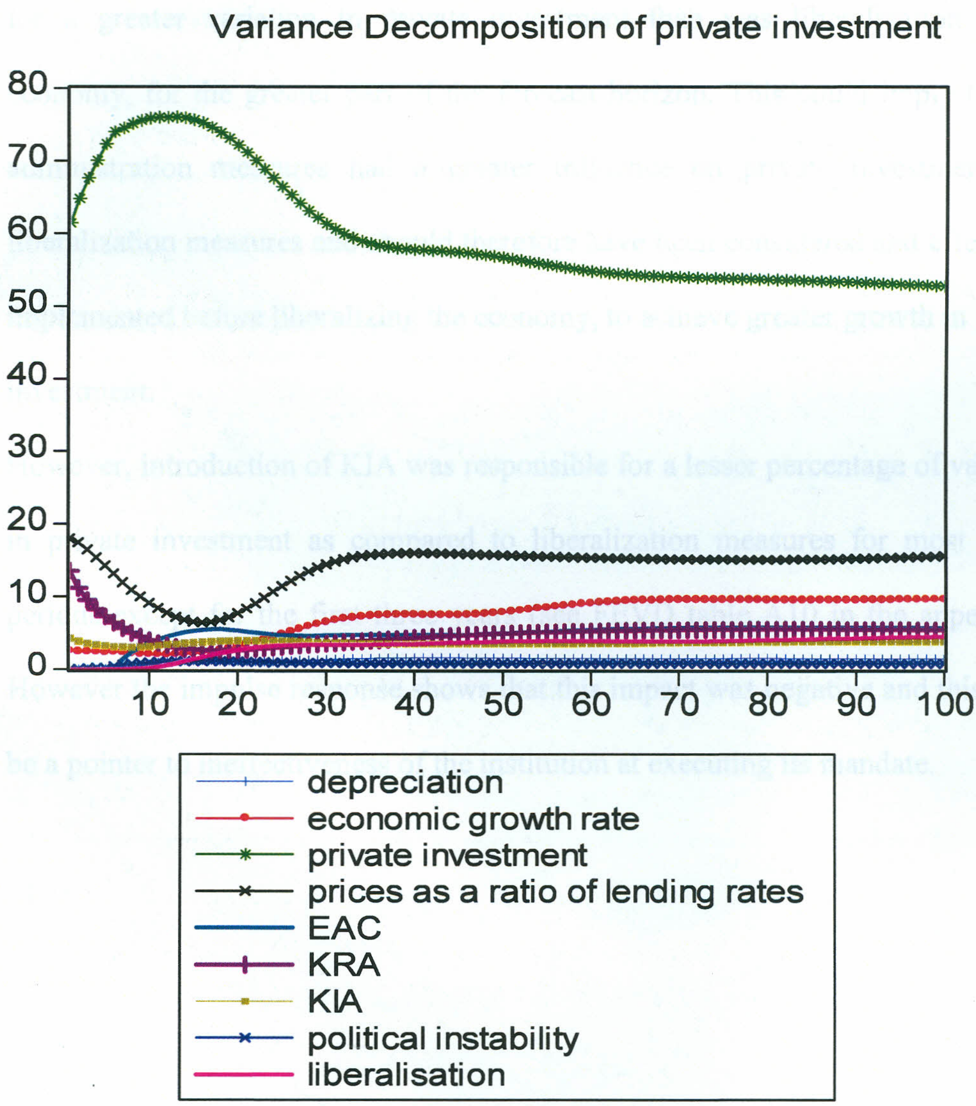


Table 4.1: FEVD of Private investment in Kenya.

	24th	48th	72nd	96th
KRA	3.04	4.86	5.5	5.5
KIA	3.9	3.5	3.7	3.8
Liberalization	3.2	3.8	3.9	4.5

(Refer to table A10 for all the percentages)

From the FEVD table and graph above, establishment of KRA was responsible for a greater variation in private investment than was liberalization of the economy, for the greater part of the forecast horizon. This could imply that tax administration measures had a greater influence on private investment than liberalization measures and should therefore have been considered and effectively implemented before liberalizing the economy, to achieve greater growth in private investment.

However, introduction of KIA was responsible for a lesser percentage of variation in private investment as compared to liberalization measures for most of the periods except for the first three years (see FEVD table A10 in the appendix.). However the impulse response shows that this impact was negative and this could be a pointer to ineffectiveness of the institution at executing its mandate.

CHAPTER 5

CONCLUSION AND POLICY RECOMMENDATION

5.0 Introduction

This section consists of the conclusions derived and policy recommendation stemming from the foregoing section of data analysis.

5.1 Conclusion

This study sought to establish the impact of institutional factors and liberalization measures on private investment in Kenya. The institutional variables considered by this study were, availability of market as depicted by collapse of EAC in 1977; tax administration issues depicted by establishment of KRA in 1995; investment promotion depicted by foundation of KIA in 2004, and political instabilities. Liberalization was depicted by liberalization measures carried out by the Kenyan government in 1992.

The long-run results derived from the structural VAR indicated that unavailability of market as depicted by collapse of EAC in 1977 and political instabilities are not determinants of private investment in Kenya. It could be that these variables required interaction with other variables for their impact to be seen. Moreover, primary research enquiring the impacts of these factors could also be applied to achieve what could not be achieved by this study.

Tax administration issues, investment promotion and liberalization measures were found to be determinants of private investment in Kenya (their coefficients in the SVAR were significant). As a result, only two (tax administration and investment promotion) out of the four chosen institutional factors made it to the impulse response analysis and variance decomposition stages of the study.

From impulse response, introduction of a new tax administration system (KRA) in 1992 had a predominantly negative impact on private investment in Kenya. This result could be attributed to the fact that investors were scared of a more tight tax system which would make tax avoidance and evasion impossible, or that the system was not investor friendly in general. Moreover, it could be that there was an accompanying increase in taxes which made investors to prefer other low tax destinations.

Kenya Investment Authority had dampening effect on private investment, from the results of impulse response analysis. The main mandate of KIA is investment promotion, which according to the results of the study was not fulfilled throughout the forecast period. This could be attributed to the fact that the institution did not achieve its mandate due to administrative; financing or such challenges. It is therefore important that the government re-evaluates the role of KIA and its capacity to undertake its responsibilities, so as to reverse the counter-productive effect on investment in Kenya.

From the results of variance decomposition, establishment of KRA had a larger impact on private investment than liberalization measures. If there were no accompanying tax increases these result implies that proponents of liberalization and the Government of Kenya should have enhanced tax administration before liberalization, to make the system effective and responsive to investor needs. Establishment of KIA was responsible for a lesser percentage of variance in private investment than liberalization. This implies that investment promotion mechanism did not necessarily have to be in place before liberalizing the Kenyan economy, although it is an important factor in enhancing business environment.

5.2 Policy Recommendation

- The Government and Kenya Revenue Authority should review the tax administration system and consult Kenya Investment Authority (and Kenya Private Sector Alliance and other stakeholders) on matters that impact negatively on private investors.
- The role of Kenya investment Authority should be re-evaluated by the Government and stakeholders, and consider capacity building to make the institution deliver on its mandate.
- Government should enhance Liberalization measures in addition to enhancing business environment to encourage more private investment and consequently growth in Kenya.

5.3 Suggestions for further Research

- The study suggests that primary research be conducted to be able to assess the separate impact of political instabilities and market availability on private investment behavior in Kenya, since this was not possible under the current study.
- The study also suggests enquiry into the evolution of the tax system before and after liberalization to establish whether liberalization was accompanied by higher or increased taxes in Kenya.

BIBLIOGRAPHY

Acosta, P. and Loza, A. (2004), "Short run and Long run determinants of Private investment in Argentina". In *Journal of Applied Economics*. Vol VIII No 2 (Nov 2005) Pp 389-406.

Amisano, G. and C. Giannini (1997), *Topics in Structural VAR Econometrics*. Springer.

Asante, Y. (2000) "Determinants of private investment behavior in Ghana". *AERC Research paper 100*. AERC, Nairobi.

Aysan, A.F., Nabli, M.K., and Varoudakis, M.V., (2007) "Governance, Institutions and Private Investment: An Application to the Middle East and North Africa". In *The Developing Economies*. XLV-3 Pp 339-377. Institute of developing Economies.

Branson, H.W., (1989) *Macroeconomic Theory and Policy*. Harper and Row. New York.

Branson, H.W., (2005) *Macroeconomic Theory and Policy (3rd edition)*. East-West Press Private Ltd. New Delhi.

Chirinko, R.S. (1993) "Business Fixed Investment Spending: A Critical Survey of Modelling Strategies, Empirical Results and policy implications." *Journal of Economic Literature* Vol 34 No 4: 1875-1911

Djankov,S., Glaeser, E.L., La Porta, R., Lopez-de-Silanes, and F. Shleifer, A. (2003) "The New Comparative Economics" In *Harvard Institute of Economic Research Working Papers 2002*, Institute of Economic Research, Harvard.

Gillis, M.,Perkins, D.W., Roemer, M. and Sodgrass, D.R., (1987) *Economics of Development*, (2nd edition). Norton.

Ghura, D and Goodwin B.(2000) "Determinants of Private investment: a Cross-regional Empirical Investigation". In *Journal of Applied Economics*. Vol 32, No. 14, Nov 2000 pp 1819-1829 (11)

Greene, H.W. (2000) *Econometric Analysis* . Fourth edition. Prentice Hall, N.J.

IFC (1970) *Trends in Private Investment in Developing Countries.* 1992 edition. World Bank, Washington.

Keefer, P. and Knack, S. (1995) "Institutions and Economic Performance: Cross Country Tests using alternative Institutional measures". In *Economics and Politics.* Vol 7 93) Pp 207-227.

Kennedy, P. (1985) *A Guide to Econometrics.* Second edition. Basil Blackwell Ltd. United Kingdom.

Kimani, R.N., (2005) "The Relationship between Budget Deficit Financing and Private investment in Kenya – *1970-2003".* Unpublished MA Thesis, Kenyatta University.

King'ori, Z.I. (2007) "Factors influencing private investment in Kenya". Unpublished M.A. Thesis. Makerere University.

KIPPRA/World Bank (2004) *Enhancing the competitiveness of Kenya's manufacturing Sector: The Role of Investment climate.* Africa Private Sector Group, Investment Climate Assessment. World Bank.

Le, Q. V., (2004) "Political and Economic Determinants of Private Investment". In *Journal of International Development*. 16, 589-604 (2004)

Mackinnon, R.I. (1973) *Money and capital in economic development*. The Brookings Institute. Washington DC.

Matwang'a, L.F. (2000) *Determinants and constraints to Private Investment: The Case of Kenya.*Africa Institute for Economic and Development and Planning (IDEP) Darkar Senegal.

Ngugi, R. W and Kabubo, J.W (1998) Financial Sector Reforms and Interest Rate Liberalization: The Kenya Experience. *AERC Research Paper 72*. African Economic Research Consortium. Nairobi.

Ngugi, R.W and Nyang'oro, O. (2005) Institutional Factors and Foreign Direct Investment Flows: Implications for Kenya. *KIPPRA Discussion Paper No. 48*, KIPPRA, Nairobi.

Ochieng', W. R. (1992) "The Post-Colonial State and Kenya's Economic Inheritance." In Ochieng', W. R. and Maxon, R. M. (Ed), *An Economic History of Kenya.* East Africa educational publishers Ltd. Pp 250-271.

Oduor, J. (2008) *Impacts of Real exchange rate misalignment on Trade Creation and Diversion within Regional Trading Blocs: The Case of COMESA.* Shaker Verlag. Germany.

OECD, (2006) *Promoting Private Investment for Development.* OECD. Paris, France.

Ouattara, B. (2004) "Modelling Long run determinants of Private investment in Senegal". *CREDIT Research paper No.* 04/05. Center for Research in economic Development and international trade, University of Nottingham.

Pfefferman, G.P., and Madarassy, A., (1990) *Trends in private investment in thirty developing Countries*. Washington, D.C.

Pindyck, R. (1988) "Irreversible Investment, Capacity choice and the value of the firm". In *American Economic Review* Pp 969-985.

Pindyck, R. I. (1991) "Irreversibility, Uncertainty and Investment". In *Journal of Economic Literature*, Vol XXIX.

Pindyck, R., S. and Solimano, A. (1993) Economic Instability and aggregate Investment. *NBER Working Paper Series No. 4340*. National Bureau of Economic Research. Cambridge.

Republic of Kenya (1964) *National Development Plan*. Government Print Printer, Nairobi

Republic of Kenya (1965) "African Socialism and its Application to Planning in Kenya". *Sessional Paper No 10, 1965*. Government printer, Nairobi.

Republic of Kenya (Various Issues) *Economic Survey*. Government Printer, Nairobi.

Republic of Kenya (1994) National Development Plan. Government Printer, Nairobi.

Republic of Kenya (2004) *Investment Promotion Act*. Government Printer, Nairobi.

Republic of Kenya (2006) *Kenya Vision 2030*. Government Printer, Nairobi.

Republic of Kenya (Various issues) *Statistical Abstracts*. Government print Printer, Nairobi.

Republic of Kenya (2009) *End Term Review of the Economic Recovery Strategy for Wealth Creation (ERS) 2003-2007*. Government Printer, Nairobi.

Serven, L., and Solimano, A., (1992) "Private investment and Macroeconomic Adjustment: *A Survey". The World Bank Research Observer*. January 1992, Pp 95-114.

Shaw, E.S., (1973) *Financial Deepening in Economic Development*. Oxford University Press. New York.

Yotopoulos, P.A., and Nugent, J.B., (1976) *Economics of Development: Empirical Investigations*. Harper and Row. New York.

APPENDIX

Table A1: ADF and PP test results

Variable	Test	Test at level	Test at first difference	Results
		Intercept and trend	Intercept and trend	
ldepre	ADF	-3.78	-5.34	I(1)
	PP	-3.53	-16.78	I(1)
lgdpr	ADF	-3.85	-5.71	I(1)
	PP	-3.45	-17.01	I(1)
lprigdp	ADF	-3.28	-6.58	I(1)
	PP	-3.09	-17.63	I(1)
lry	ADF	-3.45	-16.78	I(1)

Table A2: Lag selection Results

VAR Lag Order Selection Criteria						
Included observations: 488						
Endogenous variables: D11 D12 D13 D15 D21 LDEPRE LGDPR LPRIGDP LRY						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1132.54	NA	8.70e-10	4.67	4.75	4.70
1	7925.78	17745.41	9.14e-26	-32.11	-31.34*	-31.81
2	8084.21	304.51	6.66e-26*	-32.43*	-30.96	-31.85*
3	8147.93	120.13	7.15e-26	-32.36	-30.19	-31.51
4	8179.87	59.03	8.76e-26	-32.16	-29.29	-31.04
5	8218.75	70.43	1.04e-25	-31.99	-28.43	-30.59
6	8240.15	37.97	1.34e-25	-31.74	-27.49	-30.07
7	8441.20	349.36*	8.21e-26	-32.23	-27.29	-30.29
8	8464.56	39.74	1.05e-25	-31.99	-26.35	-29.78
* 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				

Table A3: Cointegration Test results

Included observations: 498 after adjustments				
Series: LDEPRE LGDPR LPRIGDP LRY D11 D12 D13 D15 D21				
Unrestricted Cointegration Rank Test **(Trace)**				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.100	213.07	197.37	0.006
At most 1 *	0.08	160.12	159.52	0.04
At most 2	0.06	115.16	125.61	0.18
At most 3	0.05	79.29	95.75	0.38
At most 4	0.04	51.27	69.81	0.58
At most 5	0.02	27.35	47.85	0.84
At most 6	0.01	12.41	29.79	0.91
At most 7	0.008	4.201	15.49	0.88
At most 8	0.0001	0.08	3.84	0.76
Trace test indicates **2 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		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.10	52.94	58.43	0.15
At most 1	0.08	44.96	52.36	0.23
At most 2	0.06	35.87	46.23	0.40
At most 3	0.05	28.01	40.07	0.56
At most 4	0.04	23.92	33.87	0.46
At most 5	0.02	14.94	27.58	0.75
At most 6	0.01	8.20	21.13	0.89
At most 7	0.008	4.11	14.26	0.84
At most 8	0.0002	0.08	3.84	0.76
Max-eigenvalue test indicates no cointegration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Table A4: Exogeneity test for Depreciation

Restrictions:					
B(1,1)=1, B(1,2)=0, B(1,3)=0, B(1,4)=0, B(1,5)=0, B(1,6)=0, B(1,7)=0, B(1,8)=0, B(1,9)=0					
Tests of cointegration restrictions:					
Hypothesized	Restricted	LR	Degrees of		
No. of CE(s)	Log-likehood	Statistic	Freedom	Probability	
1	8252.675	45.23915	8	0.000000	
2	8278.975	37.60157	23	0.028093	

Table A5: Exogeneity test for economic growth

Restrictions:					
B(2,1)=0, B(2,2)=1, B(2,3)=0, B(2,4)=0, B(2,5)=0, B(2,6)=0, B(2,7)=0, B(2,8)=0, B(2,9)=0					
Tests of cointegration restrictions:					
Hypothesized	Restricted	LR	Degrees of		
No. of CE(s)	Log-likehood	Statistic	Freedom	Probability	
2	8290.159	15.23507	7	0.033102	
3	8308.546	14.33270	6	0.026133	
4	8324.198	11.04298	5	0.050534	
5	8336.588	10.18707	4	0.037392	
6	8346.622	5.061042	3	0.167382	
7	8351.729	3.052079	2	0.217395	
8	8355.172	0.286444	1	0.592508	

Table A6: Exogeneity test for private investment as a ratio of GDP

Restrictions:					
B(3,1)=0, B(3,2)=0, B(3,3)=1, B(3,4)=0, B(3,5)=0, B(3,6)=0, B(3,7)=0, B(3,8)=0, B(3,9)=0					
Tests of cointegration restrictions:					
Hypothesized	Restricted	LR	Degrees of		
No. of CE(s)	Log-likehood	Statistic	Freedom	Probability	
3	8303.198	25.02986	6	0.000337	
4	8320.753	17.93377	5	0.003031	
5	8334.717	13.92909	4	0.007525	
6	8344.795	8.713722	3	0.033349	
7	8350.149	6.211648	2	0.044788	
8	8354.144	2.340889	1	0.126018	

Table A7: Exogeneity test for prices as a ratio of lending rates

Restrictions:					
B(4,1)=0, B(4,2)=0, B(4,3)=0, B(4,4)=1, B(4,5)=0, B(4,6)=0, B(4,7)=0, B(4,8)=0, B(4,9)=0					
Tests of cointegration restrictions:					
Hypothesized No. of CE(s)	Restricted Log-likehood	LR Statistic	Degrees of Freedom	Probability	
4	8326.901	5.638599	5	0.342987	
5	8340.843	1.676869	4	0.794915	
6	8348.347	1.610218	3	0.657075	
7	8353.115	0.280221	2	0.869262	
8	8355.266	0.098056	1	0.754175	

Table A8: Long-run results (SVAR)

Structural VAR Estimates								
Included observations: 488 after adjustments								
Estimation method: method of scoring (analytic derivatives)								
Structural VAR is over-identified (25 degrees of freedom)								
Model: Ae = Bu where E[uu']=I								
A =								
-1	C(1)	0	0	0	0	0	0	0
0	1	C(3)	C(4)	0	0	0	0	C(10)
0	C(2)	1	C(5)	C(6)	C(7)	C(8)	C(9)	C(11)
0	0	0	1	0	0	0	0	0
0	0	0	0	1	0	0	0	0
0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	1	0	0
0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	0	0	1
B =								
C(12)	0	0	0	0	0	0	0	0
0	C(13)	0	0	0	0	0	0	0
0	0	C(14)	0	0	0	0	0	0
0	0	0	C(15)	0	0	0	0	0
0	0	0	0	C(16)	0	0	0	0
0	0	0	0	0	C(17)	0	0	0
0	0	0	0	0	0	C(18)	0	0
0	0	0	0	0	0	0	C(19)	0
0	0	0	0	0	0	0	0	C(20)
	Coefficient	Std. Error	z-Statistic	Prob.				
C(1)	0.00309	0.0028	1.1032	0.2700				

C(2)	-0.0287	0.0136	-2.1082	0.0350				
C(3)	1.0332	0.6209	1.6639	0.0961				
C(4)	-0.1643	0.0824	-1.9931	0.0462				
C(5)	-0.0921	0.0081	-11.312	0.0000				
C(6)	-0.0004	0.0138	-0.0357	0.9715				
C(7)	-0.1270	0.0123	-10.3062	0.0000				
C(8)	0.0696	0.0120	5.79626	0.0000				
C(9)	-0.00012	0.0052	-0.0237	0.9810				
C(10)	0.3634	0.0872	4.1637	0.0000				
C(11)	-0.0049	0.0130	-0.3780	0.0054				
C(12)	0.0056	0.0001	31.241	0.0000				
C(13)	0.0918	0.0033	27.465	0.0000				
C(14)	0.01276	0.0004	28.7230	0.0000				
C(15)	0.07139	0.0022	31.241	0.0000				
C(16)	0.0416	0.0013	31.2410	0.0000				
C(17)	0.04734 5	0.0015 15	31.2410 0	0.0000				
C(18)	0.0482	0.0015	31.2410	0.0000				
C(19)	0.1099	0.0035	31.2410	0.0000				
C(20)	0.0476	0.0015	31.2410	0.0000				
Log likelihood	7967.71							
LR test for over-identification:								
Chi-square(25)	282.051		Prob	0.0000				
Estimated A matrix:								
1.000000	0.00309	0.0000	0.00000	0.0000	0.0000	0.0000	0.0000	0.000 0
0.000000	1.00000 0	1.0332 16	- 0.16437 1	0.0000 00	0.0000 00	0.0000 00	0.0000 00	0.360 3
0.000000	- 0.028772	1.0000 00	- 0.09215 4	- 0.00049 6	- 0.12707 5	0.0696 46	- 0.00012 5	- 0.004 9
0.000000	0.00000 0	0.0000 00	1.00000 0	0.0000 00	0.0000 00	0.0000 00	0.0000 00	0.000 000
0.000000	0.00000 0	0.0000 00	0.00000 0	1.0000 00	0.0000 00	0.0000 00	0.0000 00	0.000 0
0.000000	0.00000 0	0.0000 00	0.00000 0	0.0000 00	1.0000 00	0.0000 00	0.0000 00	0.000 0
0.000000	0.00000 0	0.0000 00	0.00000 0	0.0000 00	0.0000 00	1.0000 00	0.0000 00	0.000 0

0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.0000
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.0000
Estimated B matrix:								
0.005698	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
0.000000	0.091801	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
0.000000	0.000000	0.012767	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000
0.000000	0.000000	0.000000	0.071398	0.000000	0.000000	0.000000	0.000000	0.0000
0.000000	0.000000	0.000000	0.000000	0.041628	0.000000	0.000000	0.000000	0.0000
0.000000	0.000000	0.000000	0.000000	0.000000	0.0473	0.000000	0.000000	0.0000
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.048249	0.000000	0.0000
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.109950	0.0000
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.0476

Table A9: Impulse Response table

Period	Shock1	Shock2	Shock3	Shock4	Shock5	Shock6	Shock7	Shock8	Shock9
1	0.000000	0.002565	0.012398	0.006718	2.00E-05	0.005843	-0.003263	1.33E-05	-0.000255
	(0.00000)	(0.00118)	(0.00045)	(0.00061)	(0.00056)	(0.00060)	(0.00057)	(0.00056)	(0.00057)
2	-0.000290	0.002845	0.014983	0.007547	-0.000119	0.005615	-0.003455	0.000608	-8.64E-05
	(0.00086)	(0.00164)	(0.00096)	(0.00110)	(0.00103)	(0.00107)	(0.00106)	(0.00111)	(0.00112)
3	-0.000476	0.003218	0.017107	0.007850	-0.000272	0.005413	-0.003593	0.001095	7.08E-05
	(0.00130)	(0.00204)	(0.00136)	(0.00144)	(0.00138)	(0.00146)	(0.00146)	(0.00154)	(0.00156)
4	-0.000677	0.003483	0.018901	0.007904	-0.000503	0.005177	-0.003725	0.001287	0.000347
	(0.00170)	(0.00239)	(0.00171)	(0.00174)	(0.00170)	(0.00181)	(0.00182)	(0.00192)	(0.00195)
5	-0.000891	0.003320	0.020348	0.007646	-0.000819	0.004922	-0.003864	0.000368	0.001088
	(0.00206)	(0.00271)	(0.00204)	(0.00201)	(0.00200)	(0.00213)	(0.00216)	(0.00227)	(0.00230)
6	-0.001310	0.003867	0.021576	0.007460	-0.001205	0.004565	-0.004039	0.002752	0.000418
	(0.00238)	(0.00298)	(0.00233)	(0.00227)	(0.00228)	(0.00242)	(0.00247)	(0.00258)	(0.00263)
7	-0.001784	0.003800	0.022461	0.006886	-0.006621	0.004221	-0.004233	0.003025	0.000616
	(0.00266)	(0.00318)	(0.00258)	(0.00249)	(0.00256)	(0.00270)	(0.00276)	(0.00288)	(0.00295)
8	-0.002655	0.003353	0.023061	0.006371	-0.006796	0.003667	-0.004539	0.003159	0.001011
	(0.00288)	(0.00331)	(0.00276)	(0.00267)	(0.00282)	(0.00297)	(0.00305)	(0.00318)	(0.00325)
9	-0.003183	0.003331	0.022823	0.005470	-0.007004	0.002867	-0.004760	0.003148	0.001873
	(0.00319)	(0.00351)	(0.00304)	(0.00290)	(0.00296)	(0.00310)	(0.00323)	(0.00341)	(0.00336)
10	-0.003688	0.003369	0.022273	0.004474	-0.007074	0.002029	-0.004943	0.003247	0.002585
	(0.00346)	(0.00367)	(0.00329)	(0.00311)	(0.00306)	(0.00320)	(0.00337)	(0.00363)	(0.00346)
11	-0.004160	0.003351	0.021478	0.003429	-0.006962	0.001182	-0.005084	0.003075	0.003316
	(0.00370)	(0.00380)	(0.00351)	(0.00330)	(0.00314)	(0.00327)	(0.00348)	(0.00383)	(0.00353)
12	-0.004608	0.003285	0.020669	0.002376	-0.006913	0.000348	-0.005189	0.002908	0.003964
	(0.00391)	(0.00391)	(0.00370)	(0.00348)	(0.00321)	(0.00332)	(0.00357)	(0.00401)	(0.00359)
13	-0.003109	0.003536	0.019672	-0.000183	-0.006706	8.55E-05	-0.004773	0.002749	0.004413
	(0.00408)	(0.00400)	(0.00386)	(0.00363)	(0.00326)	(0.00335)	(0.00364)	(0.00417)	(0.00365)
14	-0.002948	0.003689	0.018337	-0.001421	-0.006274	-0.000629	-0.004725	0.002471	0.004835
	(0.00420)	(0.00405)	(0.00398)	(0.00376)	(0.00328)	(0.00336)	(0.00368)	(0.00430)	(0.00368)
15	-0.002554	0.003898	0.017020	-0.002815	-0.005943	-0.001229	-0.004611	0.002164	0.005132
	(0.00429)	(0.00409)	(0.00408)	(0.00386)	(0.00330)	(0.00334)	(0.00369)	(0.00439)	(0.00369)
16	-0.002101	0.004182	0.015678	-0.004136	-0.005550	-0.001794	-0.004468	0.001873	0.005321
	(0.00434)	(0.00413)	(0.00415)	(0.00395)	(0.00331)	(0.00332)	(0.00369)	(0.00447)	(0.00370)
17	-0.001634	0.004542	0.014283	-0.005319	-0.005058	-0.002319	-0.004302	0.001722	0.005384
	(0.00436)	(0.00415)	(0.00419)	(0.00402)	(0.00331)	(0.00329)	(0.00370)	(0.00451)	(0.00372)
18	-0.001093	0.004894	0.012952	-0.006443	-0.004498	-0.002768	-0.004099	0.001482	0.005403
	(0.00435)	(0.00417)	(0.00422)	(0.00409)	(0.00331)	(0.00326)	(0.00371)	(0.00454)	(0.00373)
19	-0.000574	0.005260	0.011644	-0.007419	-0.002425	-0.003171	-0.003884	0.001277	0.005357
	(0.00431)	(0.00419)	(0.00422)	(0.00414)	(0.00332)	(0.00324)	(0.00372)	(0.00453)	(0.00375)
20	-1.91E-05	0.005686	0.010365	-0.008336	-0.001883	-0.003475	-0.003639	0.001124	0.005191
	(0.00424)	(0.00420)	(0.00421)	(0.00418)	(0.00332)	(0.00321)	(0.00373)	(0.00451)	(0.00377)

21	0.000530	0.006034	0.009275	-0.009056	-0.001034	-0.003716	-0.003384	0.000957	0.004979
	(0.00417)	(0.00421)	(0.00419)	(0.00423)	(0.00334)	(0.00320)	(0.00376)	(0.00445)	(0.00379)
22	0.001091	0.006361	0.008285	-0.009661	-0.000228	-0.003888	-0.003117	0.000806	0.004733
	(0.00408)	(0.00422)	(0.00417)	(0.00426)	(0.00336)	(0.00318)	(0.00379)	(0.00437)	(0.00381)
23	0.001635	0.006651	0.007418	-0.010135	0.000484	-0.004002	-0.002848	0.000708	0.004450
	(0.00399)	(0.00424)	(0.00414)	(0.00430)	(0.00339)	(0.00317)	(0.00382)	(0.00429)	(0.00383)
24	0.002165	0.006903	0.006653	-0.010485	0.001164	-0.004062	-0.002581	0.000648	0.004146
	(0.00390)	(0.00425)	(0.00412)	(0.00433)	(0.00342)	(0.00316)	(0.00386)	(0.00419)	(0.00385)
25	0.002124	0.007057	0.005853	-0.010252	0.001736	-0.004241	-0.002453	0.000641	0.003872
	(0.00381)	(0.00426)	(0.00409)	(0.00435)	(0.00345)	(0.00316)	(0.00390)	(0.00409)	(0.00387)
26	0.002468	0.007150	0.005303	-0.010298	0.002182	-0.004226	-0.002211	0.000605	0.003564
	(0.00372)	(0.00426)	(0.00407)	(0.00437)	(0.00348)	(0.00315)	(0.00394)	(0.00398)	(0.00388)
27	0.002628	0.007163	0.004795	-0.010088	0.002640	-0.004228	-0.002011	0.000606	0.003279
	(0.00364)	(0.00426)	(0.00404)	(0.00438)	(0.00351)	(0.00313)	(0.00397)	(0.00387)	(0.00389)
28	0.002728	0.007091	0.004382	-0.009778	0.002997	-0.004194	-0.001825	0.000619	0.003006
	(0.00356)	(0.00425)	(0.00402)	(0.00438)	(0.00352)	(0.00312)	(0.00401)	(0.00376)	(0.00389)
29	0.002781	0.006936	0.004056	-0.009380	0.003255	-0.004134	-0.001651	0.000641	0.002755
	(0.00350)	(0.00423)	(0.00400)	(0.00437)	(0.00354)	(0.00309)	(0.00403)	(0.00366)	(0.00389)
30	0.002771	0.006690	0.003791	-0.008889	0.003424	-0.004059	-0.001496	0.000631	0.002549
	(0.00344)	(0.00420)	(0.00397)	(0.00435)	(0.00354)	(0.00307)	(0.00405)	(0.00357)	(0.00389)
31	0.002725	0.006372	0.003588	-0.008337	0.003080	-0.003967	-0.001354	0.000650	0.002358
	(0.00338)	(0.00417)	(0.00393)	(0.00433)	(0.00353)	(0.00303)	(0.00406)	(0.00348)	(0.00387)
32	0.002630	0.005966	0.003439	-0.007710	0.003115	-0.003877	-0.001233	0.000651	0.002218
	(0.00331)	(0.00412)	(0.00389)	(0.00429)	(0.00350)	(0.00299)	(0.00407)	(0.00340)	(0.00386)
33	0.002481	0.005502	0.003303	-0.007046	0.002907	-0.003784	-0.001134	0.000658	0.002106
	(0.00325)	(0.00407)	(0.00384)	(0.00425)	(0.00347)	(0.00295)	(0.00407)	(0.00332)	(0.00384)
34	0.002292	0.004971	0.003195	-0.006343	0.002645	-0.003694	-0.001055	0.000656	0.002029
	(0.00319)	(0.00401)	(0.00377)	(0.00420)	(0.00343)	(0.00290)	(0.00406)	(0.00324)	(0.00381)
35	0.002070	0.004388	0.003096	-0.005619	0.002341	-0.003607	-0.000993	0.000645	0.001983
	(0.00311)	(0.00395)	(0.00370)	(0.00415)	(0.00338)	(0.00285)	(0.00405)	(0.00316)	(0.00379)
36	0.001817	0.003759	0.002997	-0.004882	0.001982	-0.003528	-0.000949	0.000620	0.001966
	(0.00303)	(0.00388)	(0.00362)	(0.00410)	(0.00332)	(0.00279)	(0.00403)	(0.00308)	(0.00376)
37	0.001697	0.003104	0.002947	-0.004278	0.001599	-0.003407	-0.000884	0.000569	0.001964
	(0.00295)	(0.00381)	(0.00353)	(0.00405)	(0.00325)	(0.00273)	(0.00401)	(0.00299)	(0.00373)
38	0.001435	0.002425	0.002841	-0.003563	0.001204	-0.003341	-0.000871	0.000529	0.001993
	(0.00286)	(0.00375)	(0.00343)	(0.00399)	(0.00318)	(0.00268)	(0.00399)	(0.00290)	(0.00369)
39	0.001232	0.001735	0.002747	-0.002932	0.000750	-0.003261	-0.000857	0.000470	0.002032
	(0.00276)	(0.00368)	(0.00332)	(0.00394)	(0.00310)	(0.00262)	(0.00396)	(0.00280)	(0.00366)
40	0.001031	0.001046	0.002635	-0.002325	0.000299	-0.003191	-0.000856	0.000404	0.002084
	(0.00266)	(0.00362)	(0.00321)	(0.00389)	(0.00303)	(0.00257)	(0.00394)	(0.00271)	(0.00363)
41	0.000838	0.000364	0.002505	-0.001755	-0.000152	-0.003130	-0.000866	0.000327	0.002146
	(0.00255)	(0.00355)	(0.00310)	(0.00384)	(0.00295)	(0.00251)	(0.00391)	(0.00260)	(0.00360)

42	0.000663	-0.000295	0.002359	-0.001228	-0.000598	-0.003076	-0.000886	0.000260	0.002203
	(0.00245)	(0.00350)	(0.00299)	(0.00379)	(0.00288)	(0.00247)	(0.00388)	(0.00250)	(0.00357)
43	0.000500	-0.000930	0.002192	-0.000744	-0.000906	-0.003029	-0.000915	0.000177	0.002264
	(0.00234)	(0.00344)	(0.00288)	(0.00374)	(0.00281)	(0.00242)	(0.00386)	(0.00239)	(0.00354)
44	0.000357	-0.001527	0.002008	-0.000311	-0.001331	-0.002986	-0.000951	9.90E-05	0.002313
	(0.00224)	(0.00339)	(0.00278)	(0.00370)	(0.00274)	(0.00238)	(0.00383)	(0.00228)	(0.00350)
45	0.000242	-0.002085	0.001814	7.16E-05	-0.001659	-0.002946	-0.000990	1.73E-05	0.002353
	(0.00214)	(0.00334)	(0.00269)	(0.00366)	(0.00267)	(0.00234)	(0.00381)	(0.00218)	(0.00347)
46	0.000150	-0.002594	0.001605	0.000405	-0.001964	-0.002909	-0.001033	-6.05E-05	0.002380
	(0.00205)	(0.00329)	(0.00260)	(0.00362)	(0.00261)	(0.00230)	(0.00378)	(0.00209)	(0.00344)
47	8.19E-05	-0.003052	0.001388	0.000688	-0.002238	-0.002874	-0.001078	-0.000136	0.002391
	(0.00197)	(0.00325)	(0.00253)	(0.00358)	(0.00256)	(0.00227)	(0.00376)	(0.00200)	(0.00341)
48	4.00E-05	-0.003454	0.001166	0.000923	-0.002473	-0.002839	-0.001125	-0.000205	0.002383
	(0.00190)	(0.00320)	(0.00247)	(0.00354)	(0.00250)	(0.00224)	(0.00373)	(0.00193)	(0.00338)
49	-2.28E-05	-0.003802	0.000927	0.001150	-0.002674	-0.002818	-0.001183	-0.000263	0.002359
	(0.00184)	(0.00316)	(0.00241)	(0.00351)	(0.00245)	(0.00221)	(0.00371)	(0.00186)	(0.00335)
50	-2.42E-05	-0.004090	0.000703	0.001296	-0.002843	-0.002781	-0.001229	-0.000320	0.002311
	(0.00179)	(0.00311)	(0.00237)	(0.00347)	(0.00240)	(0.00218)	(0.00368)	(0.00181)	(0.00332)
51	-3.16E-05	-0.004321	0.000473	0.001427	-0.002959	-0.002751	-0.001280	-0.000365	0.002246
	(0.00175)	(0.00307)	(0.00234)	(0.00343)	(0.00235)	(0.00215)	(0.00366)	(0.00178)	(0.00329)
52	-2.15E-05	-0.004495	0.000251	0.001519	-0.003046	-0.002718	-0.001328	-0.000401	0.002159
	(0.00173)	(0.00303)	(0.00232)	(0.00340)	(0.00230)	(0.00212)	(0.00363)	(0.00175)	(0.00326)
53	9.75E-07	-0.004613	3.97E-05	0.001579	-0.003097	-0.002681	-0.001374	-0.000426	0.002052
	(0.00171)	(0.00299)	(0.00229)	(0.00336)	(0.00225)	(0.00209)	(0.00360)	(0.00173)	(0.00323)
54	3.29E-05	-0.004680	-0.000160	0.001612	-0.003115	-0.002642	-0.001416	-0.000446	0.001928
	(0.00170)	(0.00295)	(0.00228)	(0.00333)	(0.00220)	(0.00206)	(0.00357)	(0.00173)	(0.00320)
55	7.40E-05	-0.004695	-0.000343	0.001619	-0.003138	-0.002598	-0.001454	-0.000453	0.001786
	(0.00170)	(0.00292)	(0.00226)	(0.00330)	(0.00215)	(0.00203)	(0.00354)	(0.00173)	(0.00317)
56	0.000121	-0.004665	-0.000509	0.001604	-0.003094	-0.002551	-0.001488	-0.000453	0.001630
	(0.00170)	(0.00289)	(0.00224)	(0.00327)	(0.00210)	(0.00200)	(0.00350)	(0.00173)	(0.00314)
57	0.000169	-0.004591	-0.000658	0.001571	-0.003053	-0.002500	-0.001519	-0.000443	0.001459
	(0.00170)	(0.00286)	(0.00222)	(0.00324)	(0.00205)	(0.00196)	(0.00347)	(0.00173)	(0.00312)
58	0.000219	-0.004480	-0.000785	0.001521	-0.002988	-0.002445	-0.001544	-0.000426	0.001279
	(0.00170)	(0.00283)	(0.00220)	(0.00321)	(0.00199)	(0.00193)	(0.00343)	(0.00174)	(0.00309)
59	0.000267	-0.004334	-0.000891	0.001458	-0.002907	-0.002387	-0.001565	-0.000401	0.001089
	(0.00170)	(0.00281)	(0.00217)	(0.00318)	(0.00194)	(0.00189)	(0.00338)	(0.00174)	(0.00306)
60	0.000313	-0.004159	-0.000977	0.001384	-0.002813	-0.002325	-0.001581	-0.000370	0.000892
	(0.00170)	(0.00278)	(0.00214)	(0.00316)	(0.00189)	(0.00185)	(0.00334)	(0.00174)	(0.00303)
61	0.000367	-0.003958	-0.001036	0.001289	-0.002709	-0.002256	-0.001589	-0.000334	0.000691
	(0.00169)	(0.00276)	(0.00211)	(0.00313)	(0.00184)	(0.00182)	(0.00330)	(0.00174)	(0.00300)
62	0.000403	-0.003737	-0.001079	0.001198	-0.002595	-0.002188	-0.001596	-0.000293	0.000489
	(0.00168)	(0.00274)	(0.00207)	(0.00311)	(0.00180)	(0.00178)	(0.00325)	(0.00173)	(0.00297)

63	0.000444	-0.003500	-0.001097	0.001092	-0.002482	-0.002114	-0.001596	-0.000249	0.000285
	(0.00167)	(0.00272)	(0.00203)	(0.00308)	(0.00176)	(0.00174)	(0.00320)	(0.00171)	(0.00295)
64	0.000477	-0.003249	-0.001096	0.000981	-0.002363	-0.002039	-0.001592	-0.000202	8.44E-05
	(0.00165)	(0.00270)	(0.00198)	(0.00306)	(0.00172)	(0.00170)	(0.00316)	(0.00169)	(0.00292)
65	0.000504	-0.002990	-0.001076	0.000865	-0.002244	-0.001962	-0.001583	-0.000154	-0.000112
	(0.00162)	(0.00268)	(0.00193)	(0.00303)	(0.00168)	(0.00166)	(0.00311)	(0.00167)	(0.00289)
66	0.000526	-0.002726	-0.001039	0.000744	-0.002127	-0.001883	-0.001570	-0.000105	-0.000304
	(0.00160)	(0.00266)	(0.00189)	(0.00301)	(0.00164)	(0.00163)	(0.00306)	(0.00164)	(0.00286)
67	0.000541	-0.002459	-0.000986	0.000620	-0.002001	-0.001804	-0.001553	-5.66E-05	-0.000488
	(0.00157)	(0.00264)	(0.00184)	(0.00298)	(0.00161)	(0.00159)	(0.00301)	(0.00160)	(0.00283)
68	0.000550	-0.002193	-0.000918	0.000493	-0.001892	-0.001724	-0.001533	-8.57E-06	-0.000665
	(0.00153)	(0.00261)	(0.00179)	(0.00295)	(0.00158)	(0.00155)	(0.00297)	(0.00157)	(0.00280)
69	0.000554	-0.001930	-0.000838	0.000362	-0.001778	-0.001644	-0.001510	3.72E-05	-0.000831
	(0.00149)	(0.00258)	(0.00174)	(0.00292)	(0.00156)	(0.00152)	(0.00292)	(0.00153)	(0.00278)
70	0.000552	-0.001671	-0.000749	0.000230	-0.001670	-0.001564	-0.001483	8.10E-05	-0.000988
	(0.00146)	(0.00255)	(0.00170)	(0.00289)	(0.00153)	(0.00148)	(0.00288)	(0.00148)	(0.00275)
71	0.000545	-0.001420	-0.000650	9.58E-05	-0.001566	-0.001486	-0.001454	0.000122	-0.001134
	(0.00141)	(0.00251)	(0.00165)	(0.00286)	(0.00151)	(0.00145)	(0.00284)	(0.00144)	(0.00272)
72	0.000534	-0.001178	-0.000545	-4.05E-05	-0.001468	-0.001409	-0.001423	0.000159	-0.001269
	(0.00137)	(0.00247)	(0.00161)	(0.00283)	(0.00149)	(0.00142)	(0.00280)	(0.00139)	(0.00269)
73	0.000515	-0.000944	-0.000436	-0.000175	-0.001375	-0.001335	-0.001390	0.000194	-0.001392
	(0.00133)	(0.00243)	(0.00158)	(0.00279)	(0.00146)	(0.00138)	(0.00276)	(0.00134)	(0.00266)
74	0.000496	-0.000721	-0.000323	-0.000314	-0.001287	-0.001262	-0.001355	0.000224	-0.001504
	(0.00128)	(0.00239)	(0.00155)	(0.00276)	(0.00144)	(0.00135)	(0.00272)	(0.00130)	(0.00263)
75	0.000472	-0.000510	-0.000209	-0.000450	-0.001203	-0.001192	-0.001320	0.000250	-0.001605
	(0.00124)	(0.00235)	(0.00152)	(0.00273)	(0.00142)	(0.00133)	(0.00268)	(0.00125)	(0.00260)
76	0.000445	-0.000309	-9.56E-05	-0.000588	-0.001124	-0.001124	-0.001283	0.000273	-0.001694
	(0.00120)	(0.00231)	(0.00149)	(0.00269)	(0.00140)	(0.00130)	(0.00265)	(0.00121)	(0.00258)
77	0.000415	-0.000120	1.62E-05	-0.000725	-0.001050	-0.001060	-0.001246	0.000291	-0.001772
	(0.00116)	(0.00227)	(0.00147)	(0.00266)	(0.00138)	(0.00127)	(0.00262)	(0.00117)	(0.00255)
78	0.000384	5.70E-05	0.000125	-0.000861	-0.000980	-0.000999	-0.001208	0.000305	-0.001840
	(0.00113)	(0.00223)	(0.00145)	(0.00262)	(0.00136)	(0.00125)	(0.00259)	(0.00113)	(0.00252)
79	0.000351	0.000223	0.000230	-0.000996	-0.000916	-0.000941	-0.001170	0.000316	-0.001899
	(0.00109)	(0.00219)	(0.00144)	(0.00259)	(0.00134)	(0.00122)	(0.00256)	(0.00109)	(0.00250)
80	0.000317	0.000377	0.000330	-0.001130	-0.000853	-0.000886	-0.001132	0.000323	-0.001947
	(0.00106)	(0.00215)	(0.00142)	(0.00256)	(0.00132)	(0.00120)	(0.00253)	(0.00106)	(0.00247)
81	0.000282	0.000521	0.000425	-0.001261	-0.000796	-0.000834	-0.001094	0.000327	-0.001987
	(0.00104)	(0.00211)	(0.00141)	(0.00253)	(0.00130)	(0.00118)	(0.00251)	(0.00104)	(0.00244)
82	0.000247	0.000655	0.000513	-0.001391	-0.000741	-0.000785	-0.001056	0.000327	-0.002019
	(0.00102)	(0.00208)	(0.00139)	(0.00250)	(0.00128)	(0.00116)	(0.00248)	(0.00101)	(0.00242)
83	0.000212	0.000778	0.000595	-0.001517	-0.000690	-0.000740	-0.001019	0.000325	-0.002044
	(0.00100)	(0.00205)	(0.00138)	(0.00248)	(0.00126)	(0.00114)	(0.00246)	(0.00099)	(0.00239)

84	0.000176	0.000892	0.000670	-0.001640	-0.000642	-0.000698	-0.000982	0.000320	-0.002061
	(0.00098)	(0.00202)	(0.00137)	(0.00245)	(0.00124)	(0.00112)	(0.00244)	(0.00098)	(0.00237)
85	0.000142	0.000997	0.000739	-0.001761	-0.000597	-0.000658	-0.000945	0.000312	-0.002073
	(0.00097)	(0.00200)	(0.00136)	(0.00242)	(0.00122)	(0.00110)	(0.00242)	(0.00097)	(0.00234)
86	0.000107	0.001094	0.000800	-0.001876	-0.000554	-0.000622	-0.000910	0.000303	-0.002079
	(0.00096)	(0.00198)	(0.00135)	(0.00240)	(0.00120)	(0.00109)	(0.00240)	(0.00096)	(0.00232)
87	7.33E-05	0.001182	0.000854	-0.001988	-0.000514	-0.000587	-0.000875	0.000292	-0.002080
	(0.00095)	(0.00196)	(0.00134)	(0.00238)	(0.00119)	(0.00107)	(0.00238)	(0.00095)	(0.00229)
88	4.01E-05	0.001263	0.000901	-0.002096	-0.000476	-0.000556	-0.000841	0.000279	-0.002076
	(0.00095)	(0.00194)	(0.00132)	(0.00236)	(0.00117)	(0.00106)	(0.00236)	(0.00094)	(0.00226)
89	7.81E-06	0.001337	0.000942	-0.002198	-0.000441	-0.000526	-0.000807	0.000265	-0.002068
	(0.00095)	(0.00192)	(0.00131)	(0.00234)	(0.00116)	(0.00104)	(0.00235)	(0.00094)	(0.00224)
90	-2.37E-05	0.001405	0.000977	-0.002295	-0.000409	-0.000498	-0.000775	0.000250	-0.002057
	(0.00095)	(0.00191)	(0.00130)	(0.00232)	(0.00115)	(0.00103)	(0.00233)	(0.00094)	(0.00221)
91	-5.44E-05	0.001466	0.001006	-0.002387	-0.000378	-0.000473	-0.000743	0.000234	-0.002043
	(0.00095)	(0.00190)	(0.00129)	(0.00230)	(0.00114)	(0.00102)	(0.00232)	(0.00094)	(0.00219)
92	-8.44E-05	0.001521	0.001029	-0.002473	-0.000351	-0.000448	-0.000712	0.000217	-0.002026
	(0.00095)	(0.00189)	(0.00128)	(0.00228)	(0.00113)	(0.00101)	(0.00230)	(0.00094)	(0.00216)
93	-0.000114	0.001571	0.001047	-0.002554	-0.000326	-0.000426	-0.000681	0.000200	-0.002007
	(0.00095)	(0.00188)	(0.00126)	(0.00226)	(0.00112)	(0.00100)	(0.00229)	(0.00094)	(0.00213)
94	-0.000142	0.001615	0.001061	-0.002628	-0.000303	-0.000404	-0.000652	0.000183	-0.001986
	(0.00096)	(0.00187)	(0.00125)	(0.00225)	(0.00112)	(0.00099)	(0.00227)	(0.00095)	(0.00211)
95	-0.000170	0.001654	0.001070	-0.002697	-0.000283	-0.000384	-0.000623	0.000166	-0.001962
	(0.00096)	(0.00186)	(0.00124)	(0.00223)	(0.00111)	(0.00098)	(0.00226)	(0.00095)	(0.00208)
96	-0.000197	0.001688	0.001076	-0.002760	-0.000265	-0.000365	-0.000595	0.000148	-0.001937
	(0.00097)	(0.00185)	(0.00123)	(0.00222)	(0.00111)	(0.00097)	(0.00225)	(0.00095)	(0.00205)
97	-0.000223	0.001717	0.001079	-0.002817	-0.000250	-0.000347	-0.000568	0.000131	-0.001911
	(0.00097)	(0.00184)	(0.00122)	(0.00220)	(0.00111)	(0.00096)	(0.00224)	(0.00095)	(0.00202)
98	-0.000249	0.001742	0.001078	-0.002869	-0.000238	-0.000329	-0.000542	0.000114	-0.001883
	(0.00098)	(0.00183)	(0.00121)	(0.00219)	(0.00110)	(0.00096)	(0.00223)	(0.00095)	(0.00200)
99	-0.000275	0.001763	0.001075	-0.002915	-0.000228	-0.000312	-0.000516	9.66E-05	-0.001854
	(0.00098)	(0.00182)	(0.00120)	(0.00217)	(0.00110)	(0.00095)	(0.00222)	(0.00095)	(0.00197)
100	-0.000300	0.001779	0.001070	-0.002955	-0.000221	-0.000296	-0.000491	7.96E-05	-0.001824
	(0.00099)	(0.00181)	(0.00119)	(0.00216)	(0.00110)	(0.00094)	(0.00221)	(0.00095)	(0.00194)
101	-0.000324	0.001791	0.001063	-0.002990	-0.000216	-0.000280	-0.000467	6.30E-05	-0.001793
	(0.00099)	(0.00179)	(0.00119)	(0.00214)	(0.00110)	(0.00094)	(0.00220)	(0.00095)	(0.00192)
102	-0.000348	0.001799	0.001054	-0.003020	-0.000213	-0.000264	-0.000444	4.65E-05	-0.001761
	(0.00100)	(0.00178)	(0.00118)	(0.00213)	(0.00110)	(0.00093)	(0.00219)	(0.00095)	(0.00189)
103	-0.000372	0.001804	0.001044	-0.003045	-0.000213	-0.000249	-0.000422	3.03E-05	-0.001728
	(0.00100)	(0.00176)	(0.00117)	(0.00212)	(0.00110)	(0.00093)	(0.00219)	(0.00095)	(0.00186)
104	-0.000396	0.001804	0.001033	-0.003065	-0.000215	-0.000234	-0.000400	1.43E-05	-0.001695
	(0.00100)	(0.00175)	(0.00117)	(0.00210)	(0.00110)	(0.00093)	(0.00218)	(0.00095)	(0.00184)

105	-0.000419	0.001801	0.001021	-0.003081	-0.000220	-0.000220	-0.000379	-1.41E-06	-0.001661
	(0.00100)	(0.00173)	(0.00116)	(0.00209)	(0.00110)	(0.00092)	(0.00217)	(0.00095)	(0.00181)
106	-0.000442	0.001795	0.001009	-0.003093	-0.000226	-0.000205	-0.000360	-1.69E-05	-0.001626
	(0.00101)	(0.00171)	(0.00116)	(0.00208)	(0.00110)	(0.00092)	(0.00217)	(0.00095)	(0.00179)
107	-0.000464	0.001786	0.000996	-0.003100	-0.000235	-0.000191	-0.000341	-3.21E-05	-0.001590
	(0.00101)	(0.00169)	(0.00115)	(0.00207)	(0.00110)	(0.00092)	(0.00216)	(0.00095)	(0.00176)
108	-0.000487	0.001774	0.000982	-0.003104	-0.000245	-0.000177	-0.000322	-4.72E-05	-0.001554
	(0.00101)	(0.00168)	(0.00115)	(0.00206)	(0.00110)	(0.00091)	(0.00215)	(0.00095)	(0.00174)
109	-0.000508	0.001759	0.000968	-0.003105	-0.000257	-0.000164	-0.000305	-6.20E-05	-0.001518
	(0.00101)	(0.00166)	(0.00115)	(0.00205)	(0.00110)	(0.00091)	(0.00215)	(0.00094)	(0.00171)
110	-0.000530	0.001741	0.000954	-0.003103	-0.000270	-0.000150	-0.000289	-7.65E-05	-0.001481
	(0.00101)	(0.00164)	(0.00114)	(0.00204)	(0.00110)	(0.00091)	(0.00214)	(0.00094)	(0.00169)
111	-0.000551	0.001721	0.000940	-0.003098	-0.000285	-0.000137	-0.000273	-9.09E-05	-0.001444
	(0.00101)	(0.00162)	(0.00114)	(0.00203)	(0.00110)	(0.00091)	(0.00214)	(0.00094)	(0.00167)
112	-0.000572	0.001699	0.000925	-0.003091	-0.000301	-0.000124	-0.000259	-0.000105	-0.001407
	(0.00101)	(0.00160)	(0.00114)	(0.00202)	(0.00110)	(0.00090)	(0.00213)	(0.00093)	(0.00165)
113	-0.000592	0.001675	0.000911	-0.003082	-0.000318	-0.000112	-0.000245	-0.000119	-0.001370
	(0.00100)	(0.00158)	(0.00114)	(0.00201)	(0.00110)	(0.00090)	(0.00213)	(0.00093)	(0.00163)
114	-0.000612	0.001649	0.000897	-0.003070	-0.000336	-9.95E-05	-0.000232	-0.000133	-0.001332
	(0.00100)	(0.00156)	(0.00113)	(0.00200)	(0.00110)	(0.00090)	(0.00212)	(0.00093)	(0.00161)
115	-0.000631	0.001622	0.000882	-0.003057	-0.000354	-8.74E-05	-0.000220	-0.000146	-0.001295
	(0.00100)	(0.00154)	(0.00113)	(0.00200)	(0.00110)	(0.00090)	(0.00212)	(0.00092)	(0.00159)
116	-0.000650	0.001594	0.000868	-0.003042	-0.000373	-7.56E-05	-0.000209	-0.000159	-0.001258
	(0.00100)	(0.00152)	(0.00113)	(0.00199)	(0.00110)	(0.00090)	(0.00211)	(0.00092)	(0.00157)
117	-0.000668	0.001564	0.000854	-0.003026	-0.000392	-6.41E-05	-0.000199	-0.000172	-0.001221
	(0.00099)	(0.00150)	(0.00113)	(0.00198)	(0.00110)	(0.00090)	(0.00211)	(0.00091)	(0.00155)
118	-0.000686	0.001534	0.000840	-0.003009	-0.000412	-5.29E-05	-0.000190	-0.000185	-0.001184
	(0.00099)	(0.00148)	(0.00113)	(0.00198)	(0.00110)	(0.00089)	(0.00210)	(0.00091)	(0.00154)
119	-0.000703	0.001503	0.000826	-0.002991	-0.000431	-4.20E-05	-0.000181	-0.000197	-0.001147
	(0.00099)	(0.00146)	(0.00112)	(0.00197)	(0.00110)	(0.00089)	(0.00210)	(0.00091)	(0.00152)
120	-0.000720	0.001472	0.000812	-0.002973	-0.000451	-3.14E-05	-0.000173	-0.000210	-0.001111
	(0.00098)	(0.00144)	(0.00112)	(0.00197)	(0.00110)	(0.00089)	(0.00210)	(0.00090)	(0.00150)
121	-0.000736	0.001441	0.000798	-0.002954	-0.000470	-2.11E-05	-0.000166	-0.000221	-0.001076
	(0.00098)	(0.00142)	(0.00112)	(0.00197)	(0.00110)	(0.00089)	(0.00209)	(0.00090)	(0.00149)
122	-0.000752	0.001410	0.000785	-0.002934	-0.000489	-1.11E-05	-0.000160	-0.000233	-0.001041
	(0.00097)	(0.00140)	(0.00112)	(0.00196)	(0.00110)	(0.00089)	(0.00209)	(0.00089)	(0.00148)
123	-0.000767	0.001379	0.000772	-0.002914	-0.000508	-1.49E-06	-0.000155	-0.000244	-0.001007
	(0.00097)	(0.00139)	(0.00111)	(0.00196)	(0.00110)	(0.00089)	(0.00208)	(0.00089)	(0.00146)
124	-0.000781	0.001349	0.000759	-0.002894	-0.000526	7.86E-06	-0.000150	-0.000254	-0.000973
	(0.00096)	(0.00137)	(0.00111)	(0.00196)	(0.00109)	(0.00089)	(0.00208)	(0.00088)	(0.00145)
125	-0.000795	0.001319	0.000746	-0.002874	-0.000544	1.69E-05	-0.000146	-0.000264	-0.000940
	(0.00096)	(0.00135)	(0.00111)	(0.00196)	(0.00109)	(0.00088)	(0.00207)	(0.00088)	(0.00144)

126	-0.000808	0.001289	0.000734	-0.002854	-0.000561	2.56E-05	-0.000142	-0.000274	-0.000908
	(0.00095)	(0.00133)	(0.00111)	(0.00196)	(0.00109)	(0.00088)	(0.00207)	(0.00087)	(0.00142)
127	-0.000821	0.001260	0.000722	-0.002833	-0.000577	3.41E-05	-0.000139	-0.000284	-0.000876
	(0.00095)	(0.00132)	(0.00110)	(0.00196)	(0.00109)	(0.00088)	(0.00206)	(0.00087)	(0.00141)
128	-0.000833	0.001233	0.000710	-0.002813	-0.000593	4.22E-05	-0.000137	-0.000292	-0.000846
	(0.00094)	(0.00130)	(0.00110)	(0.00196)	(0.00109)	(0.00088)	(0.00206)	(0.00086)	(0.00140)
129	-0.000845	0.001206	0.000699	-0.002793	-0.000608	5.01E-05	-0.000135	-0.000301	-0.000816
	(0.00094)	(0.00128)	(0.00109)	(0.00196)	(0.00109)	(0.00088)	(0.00206)	(0.00086)	(0.00139)
130	-0.000857	0.001180	0.000688	-0.002774	-0.000622	5.77E-05	-0.000134	-0.000309	-0.000787
	(0.00094)	(0.00127)	(0.00109)	(0.00196)	(0.00108)	(0.00088)	(0.00205)	(0.00085)	(0.00138)
131	-0.000867	0.001155	0.000678	-0.002754	-0.000636	6.50E-05	-0.000133	-0.000316	-0.000759
	(0.00093)	(0.00125)	(0.00109)	(0.00196)	(0.00108)	(0.00087)	(0.00205)	(0.00085)	(0.00137)
132	-0.000878	0.001131	0.000668	-0.002735	-0.000649	7.20E-05	-0.000132	-0.000323	-0.000732
	(0.00093)	(0.00124)	(0.00108)	(0.00196)	(0.00108)	(0.00087)	(0.00204)	(0.00084)	(0.00136)
133	-0.000888	0.001108	0.000659	-0.002716	-0.000661	7.88E-05	-0.000132	-0.000330	-0.000705
	(0.00092)	(0.00122)	(0.00108)	(0.00196)	(0.00108)	(0.00087)	(0.00204)	(0.00084)	(0.00135)
134	-0.000898	0.001086	0.000650	-0.002698	-0.000672	8.53E-05	-0.000132	-0.000336	-0.000679
	(0.00092)	(0.00121)	(0.00107)	(0.00196)	(0.00107)	(0.00087)	(0.00203)	(0.00083)	(0.00134)
135	-0.000907	0.001065	0.000641	-0.002679	-0.000683	9.16E-05	-0.000133	-0.000342	-0.000655
	(0.00091)	(0.00119)	(0.00107)	(0.00196)	(0.00107)	(0.00086)	(0.00203)	(0.00083)	(0.00134)
136	-0.000916	0.001045	0.000634	-0.002662	-0.000693	9.76E-05	-0.000134	-0.000347	-0.000631
	(0.00091)	(0.00118)	(0.00106)	(0.00196)	(0.00107)	(0.00086)	(0.00202)	(0.00082)	(0.00133)
137	-0.000925	0.001027	0.000626	-0.002644	-0.000702	0.000103	-0.000135	-0.000352	-0.000607
	(0.00091)	(0.00116)	(0.00106)	(0.00196)	(0.00106)	(0.00086)	(0.00202)	(0.00082)	(0.00132)
138	-0.000933	0.001009	0.000620	-0.002627	-0.000710	0.000109	-0.000136	-0.000356	-0.000585
	(0.00090)	(0.00115)	(0.00105)	(0.00196)	(0.00106)	(0.00086)	(0.00201)	(0.00081)	(0.00131)
139	-0.000941	0.000992	0.000613	-0.002610	-0.000718	0.000114	-0.000138	-0.000360	-0.000563
	(0.00090)	(0.00113)	(0.00105)	(0.00197)	(0.00106)	(0.00086)	(0.00201)	(0.00081)	(0.00131)
140	-0.000949	0.000976	0.000608	-0.002593	-0.000726	0.000120	-0.000140	-0.000364	-0.000541
	(0.00090)	(0.00112)	(0.00104)	(0.00197)	(0.00105)	(0.00085)	(0.00200)	(0.00081)	(0.00130)
141	-0.000957	0.000961	0.000602	-0.002577	-0.000732	0.000124	-0.000142	-0.000367	-0.000521
	(0.00089)	(0.00111)	(0.00103)	(0.00197)	(0.00105)	(0.00085)	(0.00200)	(0.00080)	(0.00129)
142	-0.000965	0.000947	0.000598	-0.002561	-0.000738	0.000129	-0.000144	-0.000370	-0.000501
	(0.00089)	(0.00110)	(0.00103)	(0.00197)	(0.00105)	(0.00085)	(0.00199)	(0.00080)	(0.00129)
143	-0.000972	0.000934	0.000593	-0.002545	-0.000744	0.000134	-0.000146	-0.000373	-0.000481
	(0.00089)	(0.00108)	(0.00102)	(0.00197)	(0.00104)	(0.00084)	(0.00199)	(0.00080)	(0.00128)
144	-0.000979	0.000921	0.000590	-0.002529	-0.000749	0.000138	-0.000148	-0.000376	-0.000462
	(0.00089)	(0.00107)	(0.00102)	(0.00197)	(0.00104)	(0.00084)	(0.00198)	(0.00079)	(0.00128)
145	-0.000986	0.000909	0.000586	-0.002514	-0.000754	0.000142	-0.000151	-0.000378	-0.000444
	(0.00088)	(0.00106)	(0.00101)	(0.00198)	(0.00103)	(0.00084)	(0.00198)	(0.00079)	(0.00127)
146	-0.000993	0.000897	0.000583	-0.002499	-0.000758	0.000146	-0.000153	-0.000379	-0.000426
	(0.00088)	(0.00105)	(0.00101)	(0.00198)	(0.00103)	(0.00084)	(0.00197)	(0.00079)	(0.00127)

147	-0.001000	0.000886	0.000581	-0.002485	-0.000762	0.000149	-0.000156	-0.000381	-0.000408
	(0.00088)	(0.00104)	(0.00100)	(0.00198)	(0.00103)	(0.00083)	(0.00197)	(0.00078)	(0.00126)
148	-0.001006	0.000876	0.000578	-0.002470	-0.000765	0.000153	-0.000158	-0.000382	-0.000391
	(0.00088)	(0.00103)	(0.00100)	(0.00198)	(0.00102)	(0.00083)	(0.00196)	(0.00078)	(0.00126)
149	-0.001013	0.000866	0.000576	-0.002456	-0.000769	0.000156	-0.000161	-0.000384	-0.000374
	(0.00088)	(0.00102)	(0.00099)	(0.00198)	(0.00102)	(0.00083)	(0.00196)	(0.00078)	(0.00125)
150	-0.001019	0.000856	0.000575	-0.002442	-0.000771	0.000159	-0.000164	-0.000385	-0.000358
	(0.00087)	(0.00101)	(0.00099)	(0.00199)	(0.00102)	(0.00082)	(0.00195)	(0.00078)	(0.00125)

Table A10: FEVD table

Period	S.E.	Shock1	Shock2	Shock3	Shock4	Shock5	Shock6	Shock7	Shock8	Shock9
1	0.005705	0.000000	2.629009	61.41865	18.03084	0.000161	13.64005	4.255219	7.12E-05	0.025998
2	0.009191	0.014427	2.513779	64.78727	17.48773	0.002513	11.24970	3.868756	0.063401	0.012425
3	0.012610	0.031341	2.522929	67.61982	16.50065	0.008933	9.572995	3.577387	0.158123	0.007815
4	0.016093	0.052410	2.532894	70.07649	15.41645	0.023296	8.300400	3.364793	0.219797	0.013478
5	0.019648	0.078447	2.418136	72.37528	14.28521	0.050853	7.327323	3.226839	0.168621	0.069285
6	0.023246	0.127240	2.450331	74.03255	13.20629	0.095691	6.474779	3.128415	0.424347	0.060359
7	0.026927	0.199703	2.397861	74.55479	11.98324	1.431038	5.707471	3.045397	0.620699	0.059805
8	0.030547	0.344875	2.267401	75.15232	10.93329	2.360845	5.057200	3.041136	0.767468	0.075468
9	0.034116	0.515905	2.180363	75.60679	9.998627	3.088649	4.502265	3.094022	0.872337	0.141041
10	0.037632	0.713518	2.131772	75.88605	9.162142	3.670394	4.031785	3.184584	0.967907	0.251847
11	0.041094	0.937719	2.105799	76.01816	8.422839	4.126411	3.641518	3.301594	1.030958	0.415005
12	0.044502	1.187604	2.088785	75.99552	7.767027	4.510679	3.321642	3.431767	1.072420	0.624558
13	0.047669	1.241072	2.117465	76.05341	7.198977	4.833677	3.078609	3.511466	1.103704	0.861625
14	0.050760	1.283067	2.172426	75.94965	6.782898	5.072318	2.894294	3.599306	1.118886	1.127160
15	0.053758	1.299639	2.254019	75.68469	6.527591	5.260830	2.761190	3.683973	1.120332	1.407735
16	0.056663	1.294702	2.366540	75.25726	6.440335	5.400074	2.674754	3.761696	1.112385	1.692257
17	0.059475	1.274668	2.516214	74.67026	6.518238	5.487381	2.631736	3.830636	1.103134	1.967734
18	0.062199	1.243149	2.700349	73.93888	6.761022	5.523863	2.625930	3.886589	1.089114	2.231105
19	0.064805	1.208312	2.922704	73.14916	7.160271	5.417898	2.655812	3.933057	1.073428	2.479357
20	0.067327	1.173752	3.186310	72.21070	7.701739	5.301005	2.709567	3.962776	1.056282	2.697871
21	0.069761	1.145191	3.481322	71.17196	8.352204	5.169920	2.781194	3.976144	1.037509	2.884559
22	0.072109	1.127961	3.804161	70.04756	9.088823	5.037987	2.863924	3.973206	1.017550	3.038827
23	0.074377	1.126575	4.149343	68.85949	9.883972	4.915548	2.952090	3.955385	0.997334	3.160268
24	0.076568	1.144848	4.511258	67.62873	10.71138	4.810201	3.040878	3.924620	0.977366	3.250723

25	0.078718	1.162005	4.882235	66.44038	11.46767	4.731160	3.143268	3.893854	0.959397	3.320035
26	0.080803	1.193494	5.251241	65.27218	12.20427	4.673556	3.241257	3.855425	0.942155	3.366420
27	0.082837	1.232036	5.610999	64.15882	12.88159	4.642223	3.337966	3.814078	0.926405	3.395877
28	0.084823	1.275100	5.953233	63.11848	13.49046	4.634636	3.431721	3.771739	0.912329	3.412308
29	0.086768	1.320648	6.271015	62.16422	14.02624	4.646773	3.521679	3.729968	0.900049	3.419408
30	0.088675	1.365968	6.557803	61.30665	14.48595	4.674482	3.608104	3.690360	0.889267	3.421421
31	0.090554	1.410116	6.811835	60.56433	14.87550	4.690172	3.691732	3.654672	0.880504	3.421145
32	0.092403	1.450996	7.027503	59.92437	15.19302	4.714408	3.772867	3.622840	0.873316	3.420675
33	0.094228	1.486977	7.205494	59.38814	15.44654	4.735321	3.852382	3.595628	0.867780	3.421736
34	0.096032	1.517171	7.345663	58.95032	15.64217	4.751341	3.930896	3.573191	0.863692	3.425556
35	0.097819	1.541214	7.449898	58.60206	15.78711	4.761741	4.008845	3.555394	0.860839	3.432897
36	0.099592	1.559044	7.521302	58.33322	15.88870	4.765899	4.086628	3.541980	0.858940	3.444291
37	0.101345	1.574946	7.563553	58.12681	15.96139	4.763979	4.161168	3.531502	0.857485	3.459163
38	0.103088	1.585660	7.582689	57.97481	16.00413	4.757878	4.235615	3.524433	0.856540	3.478249
39	0.104819	1.593139	7.584371	57.86331	16.02569	4.748271	4.308476	3.519866	0.855775	3.501098
40	0.106539	1.597819	7.574883	57.77973	16.03047	4.737562	4.379747	3.517265	0.855027	3.527502
41	0.108249	1.600185	7.560504	57.71219	16.02243	4.728092	4.449194	3.516102	0.854139	3.557156
42	0.109950	1.600740	7.547241	57.65007	16.00490	4.722216	4.516508	3.515879	0.853101	3.589345
43	0.111641	1.599866	7.540621	57.58515	15.98065	4.720305	4.581560	3.516259	0.851823	3.623766
44	0.113323	1.597882	7.545042	57.50940	15.95150	4.725563	4.643912	3.516865	0.850306	3.659534
45	0.114997	1.595093	7.564185	57.41840	15.91905	4.737796	4.703361	3.517479	0.848576	3.696054
46	0.116661	1.591663	7.600372	57.30897	15.88435	4.757649	4.759773	3.517974	0.846687	3.732560
47	0.118315	1.587706	7.654811	57.17981	15.84808	4.785235	4.813049	3.518298	0.844699	3.768314
48	0.119961	1.583302	7.727545	57.03144	15.81069	4.820114	4.863166	3.518482	0.842682	3.802573
49	0.121597	1.578485	7.817546	56.86456	15.77294	4.861623	4.910723	3.518763	0.840661	3.834704
50	0.123224	1.573339	7.923029	56.68286	15.73462	4.909053	4.955248	3.519107	0.838719	3.864024
51	0.124840	1.567936	8.041491	56.48966	15.69640	4.960497	4.997268	3.519789	0.836872	3.890087
52	0.126447	1.562353	8.169955	56.28888	15.65840	5.014957	5.036884	3.520963	0.835140	3.912468
53	0.128043	1.556684	8.305188	56.08465	15.62091	5.071060	5.074303	3.522804	0.833515	3.930890
54	0.129629	1.551030	8.444015	55.88083	15.58414	5.127489	5.109711	3.525465	0.832020	3.945294
55	0.131205	1.545478	8.583094	55.68021	15.54809	5.184731	5.143191	3.529012	0.830599	3.955592
56	0.132770	1.540171	8.719763	55.48693	15.51328	5.239903	5.175018	3.533608	0.829260	3.962073
57	0.134324	1.535188	8.851312	55.30286	15.47974	5.293394	5.205287	3.539289	0.827960	3.964965
58	0.135868	1.530625	8.975692	55.13007	15.44768	5.344379	5.234106	3.546080	0.826684	3.964687
59	0.137400	1.526552	9.091214	54.96989	15.41725	5.392405	5.261570	3.553976	0.825412	3.961732
60	0.138922	1.523015	9.196670	54.82309	15.38855	5.437205	5.287744	3.562937	0.824134	3.956660
61	0.140433	1.520110	9.291312	54.69013	15.36150	5.478611	5.312560	3.572836	0.822857	3.950084
62	0.141934	1.517772	9.374745	54.57068	15.33630	5.516489	5.336166	3.583647	0.821574	3.942621
63	0.143423	1.516038	9.446960	54.46422	15.31280	5.551108	5.358474	3.595206	0.820300	3.934888
64	0.144902	1.514868	9.508260	54.36998	15.29099	5.582464	5.379510	3.607395	0.819051	3.927482
65	0.146371	1.514216	9.559191	54.28691	15.27079	5.610758	5.399259	3.620076	0.817848	3.920949
66	0.147828	1.514021	9.600469	54.21389	15.25212	5.636196	5.417713	3.633104	0.816708	3.915783
67	0.149276	1.514215	9.633004	54.14984	15.23493	5.658702	5.434887	3.646349	0.815658	3.912413
68	0.150713	1.514713	9.657702	54.09335	15.21908	5.678848	5.450753	3.659661	0.814713	3.911172

69	0.152140	1.515452	9.675591	54.04337	15.20453	5.696599	5.465325	3.672910	0.813891	3.912330
70	0.153557	1.516350	9.687654	53.99874	15.19119	5.712210	5.478613	3.685973	0.813205	3.916066
71	0.154964	1.517337	9.694862	53.95840	15.17903	5.725863	5.490631	3.698737	0.812661	3.922482
72	0.156362	1.518352	9.698128	53.92142	15.16801	5.737721	5.501402	3.711100	0.812259	3.931606
73	0.157750	1.519311	9.698298	53.88694	15.15815	5.747941	5.510979	3.722993	0.811997	3.943389
74	0.159128	1.520197	9.696137	53.85424	15.14946	5.756671	5.519372	3.734318	0.811864	3.957740
75	0.160497	1.520947	9.692326	53.82270	15.14200	5.763999	5.526645	3.745033	0.811849	3.974504
76	0.161857	1.521538	9.687452	53.79176	15.13584	5.770056	5.532838	3.755084	0.811932	3.993495
77	0.163208	1.521945	9.682018	53.76100	15.13108	5.774929	5.538002	3.764437	0.812096	4.014495
78	0.164550	1.522157	9.676445	53.73003	15.12782	5.778702	5.542189	3.773067	0.812318	4.037263
79	0.165883	1.522166	9.671071	53.69854	15.12619	5.781490	5.545449	3.780957	0.812576	4.061552
80	0.167207	1.521973	9.666174	53.66631	15.12633	5.783314	5.547840	3.788104	0.812849	4.087107
81	0.168523	1.521583	9.661963	53.63310	15.12836	5.784276	5.549412	3.794509	0.813116	4.113678
82	0.169830	1.521004	9.658595	53.59878	15.13242	5.784426	5.550217	3.800181	0.813358	4.141023
83	0.171130	1.520251	9.656183	53.56320	15.13863	5.783821	5.550307	3.805134	0.813557	4.168911
84	0.172420	1.519338	9.654800	53.52628	15.14712	5.782517	5.549731	3.809388	0.813701	4.197129
85	0.173703	1.518284	9.654487	53.48793	15.15798	5.780563	5.548531	3.812962	0.813776	4.225482
86	0.174978	1.517104	9.655260	53.44812	15.17130	5.778008	5.546759	3.815887	0.813774	4.253793
87	0.176245	1.515818	9.657111	53.40679	15.18714	5.774903	5.544451	3.818188	0.813689	4.281905
88	0.177504	1.514444	9.660019	53.36395	15.20555	5.771292	5.541653	3.819896	0.813516	4.309681
89	0.178756	1.513001	9.663948	53.31960	15.22654	5.767220	5.538401	3.821042	0.813256	4.337001
90	0.180000	1.511506	9.668851	53.27375	15.25010	5.762731	5.534734	3.821658	0.812907	4.363766
91	0.181236	1.509975	9.674676	53.22646	15.27620	5.757862	5.530688	3.821778	0.812473	4.389890
92	0.182465	1.508426	9.681361	53.17778	15.30478	5.752660	5.526296	3.821435	0.811957	4.415306
93	0.183687	1.506875	9.688843	53.12777	15.33578	5.747159	5.521591	3.820660	0.811365	4.439955
94	0.184902	1.505335	9.697053	53.07653	15.36909	5.741398	5.516606	3.819488	0.810702	4.463795
95	0.186109	1.503823	9.705920	53.02416	15.40460	5.735412	5.511371	3.817950	0.809975	4.486793
96	0.187309	1.502351	9.715372	52.97076	15.44217	5.729236	5.505913	3.816079	0.809191	4.508923
97	0.188503	1.500934	9.725336	52.91646	15.48167	5.722903	5.500264	3.813905	0.808357	4.530169
98	0.189689	1.499583	9.735736	52.86138	15.52295	5.716444	5.494447	3.811459	0.807480	4.550522
99	0.190869	1.498312	9.746498	52.80567	15.56583	5.709888	5.488490	3.808769	0.806568	4.569977
100	0.192042	1.497132	9.757548	52.74945	15.61016	5.703264	5.482418	3.805865	0.805629	4.588534

Table A11: Annual Data used

Year	Depreciation	CPI	Private investment as a % of GDP	lending rates	GDP growth rates
1965	7.27E+08	107	10.48443	0.05	0.0145
1966	8.47E+08	110	10.86149	0.05	0.039
1967	8.95E+08	112	13.19924	0.05	0.075
1968	9.72E+08	113	12.81425	0.05	0.056
1969	1.05E+09	113	13.26145	0.05	0.063
1970	1.15E+09	101	15.04206	0.05	0.059
1971	1.27E+09	100.9	15.39677	0.05	0.067
1972	1.43E+09	103.9	15.33954	0.05	0.069
1973	1.65E+09	113	13.30869	0.053	0.041
1974	1.97E+09	92.1	12.4785	0.07	0.012
1975	2.26E+09	109	13.73709	0.06	0.051
1976	2.78E+09	259.3	13.42044	0.0437	0.088
1977	3.61E+09	314.7	13.7153	0.0152	0.086
1978	3.93E+09	151	17.91144	0.1	0.057
1979	4.36E+09	168.7	14.73515	0.1	0.033
1980	4.90E+09	190.9	14.7974	0.11	0.053
1981	5.71E+09	227.6	15.51461	0.14	0.034
1982	6.45E+09	259.3	12.53398	0.16	0.039
1983	7.32E+09	283.7	13.42929	0.15	0.009
1984	8.35E+09	314.7	12.38877	0.14	0.044
1985	9.44E+09	347.2	11.87077	0.14	0.057
1986	1.12E+10	361.1	13.3591	0.14	0.049
1987	1.24E+10	381.3	14.52512	0.14	0.052
1988	1.42E+10	419.5	13.91793	0.15	0.05
1989	1.63E+10	441.15	13.70566	0.155	0.045
1990	1.84E+10	493	12.79348	0.19	0.021
1991	2.10E+10	211.7	12.32725	0.29	0.005
1992	2.42E+10	246.4	11.13227	0.3	0.003
1993	2.97E+10	359.2	11.88733	0.72	0.03
1994	3.72E+10	463.5	11.68794	0.309	0.048
1995	4.23E+10	466.3	16.35903	0.331	0.046
1996	4.95E+10	523.1	14.41964	0.346	0.05
1997	5.90E+10	596.8	12.68186	0.3043	0.023
1998	6.53E+10	602.49	12.1599	0.271	0.018
1999	7.01E+10	618.38	11.2627	0.252	0.014
2000	7.54E+10	652.67	10.54149	0.196	-0.002
2001	8.44E+10	127.87	10.16579	0.195	0.012
2002	9.35E+10	130	9.363393	0.135	0.011
2003	1.25E+11	164.75	10.85922	0.135	0.029

2004	1.40E+11	164.75	9.92302	0.123	0.051
2005	1.56E+11	184.07	10.24332	0.132	0.058
2006	1.78E+11	220.08	11.78864	0.137	0.064
2007	2.01E+11	240.85	10.28668	0.133	0.071