An Econometric Analysis of Macroeconomic Determinants of Investment Function

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ABSTRACT

The goal of this study is to carry out an econometric analysis of determinants of investment behavior in three different countries namely Brazil, Malaysia and India within the period 1960-2011.

To this end, we use multiple regression and panel regression analysis to investigate the effect of each one of the following parameters on the rate of investment.

Trade openness in GDP, the share of Budget Balance in GDP, Inflation Rate, Last Year Growth Rate of GDP, and real Interest Rate of each country.

Using multiple regression analysis the likely effect of each one of these parameters on each country is estimated individually and then, we will use panel data (pooled cross-sectional time series) to analyze the effect of each one of these parameters on the rate of investment as a group of these countries.

The result of this study suggests that the share of gross fixed capital formation in GDP is negatively associated with real interest rate and positively associated with trade openness, the share of budget balance in GDP, the GDP growth of last year and inflation rate.

Keywords: Trade openness, the share of budget balance, inflation rate, last year of growth rate of GDP, interest rate and investment function

ÖZ

Bu tezin amaci Brezilya, Malezya ve Hindestan ekonomisine ilişkin verileri kullanarak yatirım oranını etkileyebilecek olası parametrelerin yatırımlar üzerindeki etkilerini ekonometrik analize incelemek.

Bu amaca yönelik olarak çoklu regresyon ve panel regresyon teknikleri kullanılarak asagidaki parametrelerin hem ülke bazında de bazında yatırım oranlarını nasıl etkiledığı tahmin edilmiştir:Diş Ticarete AçıklıK oranı (İhracatın ve İthalatın), G.S.Y.İ.H. içindeki payı , Kamu Bütce Dengesinin ,Enflasyon Oranı ,Geçmiş Dönem G.S.Y.İ.H'nın büyüme hızı ve reel faiz oranı.

Regresyon sonuçları genel olarak yatirım oranlarını reel faiz oranı tarfından negatif olarak,diş ticarete açıklıK oranı, Enflasyon Oranı, Bütce Dengesinin, G.S.Y.İ.H. 'ya oranı ve Geçmiş Dönem G.S.Y.İ.H'nın büyüme hızı tarfından pozitif etkilendigini göster mektedir.

Anahtar Kelimeler: Ticaret açıklık ,Bütçe Dengesi , Enflasyon Oranı, Geçmiş Dönem G.S.Y.İ.H'nın büyüme hızı, Faiz Oranı ve yatırım fonksiyonu.

I dedicate this thesis to my beloved husband Mohammad, who supported me each step of the way and also, to my father, who taught me that even the largest task can be accomplished if it is done one step at a time. It is also dedicated to my mother, who gave me hope and courage in all levels of my life.

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Chapter 1

INTRODUCTON

1.1 The Aim of the Study:

> "If only we knew more about the determinants of investment! One might well ask, what is wrong with the theory of investment? Or, perhaps, what is wrong with the subject matter itself! For one thing, this variable, -- the pivot of modern macroeconomics -- has apparently lived a somewhat nomadic life among the various chapters of economic theory. Perhaps it has not stayed long enough in any one place. Perhaps it has been ill-treated."[1](Trygve Haavelmo, 1960)

Investors persistently aim to upgrade their alternatives of investment in capital markets until they attained new forms of investment occasions. (Markku Kallio, Markku Kuula, Sami Oinonen, 2011)[2]

The endogenous growth study implies that the financial development level can impress long-run economic growth. (Romer, 1986)[3](Lucas, 1993) [4]

[1] Trygve Haavelmo, 1960. A Study in the Theory of Investment: p.3)
[2] Markku Kallio, Markku Kuula, Sami Oinonen ,2011.Real options valuation of forest plantation investments in Brazil ,Department of Information and Service Economy, Aalto University School of Economics, P.O. Box 21220, FI-00076 AALTO, Finland
[3] Romer,P. ,1986. Increasing return and long-run growth. Journal of Political Economy, 94, 1002–1037.
[4] Lucas, R., 1993. On the determinants of direct foreign investment: Evidence from East and Southeast Asia. World Development, 21, 391–409.

There is a debate that financial development intensifies economic growth straight or non-straight by its effect on total factor productivity and domestic capital accumulation. (Sajid Anwar, Sizhong Sun, 2011)[5]

Financial evolution boosts savings circulation as well as a decrease information irregularity, which causes better resource allocation. Financial development reduced risk and makes it easier for managers to control their corporation.[6](Martin , 1992).

Developing countries amend their financial sector to amplify their financial globalization. Countries with effective financial development can bypass currency crises easier.[7] (Federici, Carioli, 2009).

Financial developments can help with economic growth in different ways. In good financial system households may encourage to save more, which exceed the funds supply to be used by large investors. Further, good apply of financial capital can be happened when there is a good financial development. (Levine, R, 2005)[8,] (Ang, 2009)[9]

[5]Sajid Anwar, Sizhong Sun ,2011. Financial development, foreign investment and economic growth in Malaysia§ a Faculty of Business, University of the Sunshine Coast, Maroochydore DC, QLD 4558, Australia b School of Business, James Cook University, Douglas, QLD, 4811, Australia

[6] R. & S. -i-Martin, 1992. Financial repression and economic growth. Journal of Development Economics, 39, 5–30.

[7] Federici, D., & Carioli, F.,2009. Financial development and growth: An empirical analysis. Economic Modelling, 26(2), 285–294.

[8] Levine, R., 2005. Finance and growth: theory and evidence. In P. Aghion & S. Durlauf (Eds.), Handbook of economic growth (pp. 865–934). Netherlands: Elsevier Science.

The goal of this study is to carry out an econometric analysis of determinants of investment behavior in three different countries namely Brazil, Malaysia and India within the period 1960-2011.

To this end, we use multiple regression and panel regression analysis to investigate the effect of each one of the following parameters on the rate of investment.

Trade openness, the share of Budget Balance in GDP, Inflation Rate, Last Year Growth Rate of GDP, and real Interest Rate of each country.

Then, I will use panel data (pooled cross-sectional time series) analysis to test these assumptions:

An increase in GDP growth of last year has *positive* effect on investment or gross capital formation.

We will test relationship between Trade Openness and gross capital formation in three forms.

1. An increase in share of Exports of goods and services as a percentage of GDP has *positive* effect on investment.

[9] Ang, 2009. Considered the issue of whether or not public investment and FDI crowd out private domestic investment in Malaysia. This study is based on annual data from 1960 to 2003.

2. An increase in trade openness as a percentage of GDP has *positive* impact on investment.

3. An increase in the share of Imports of goods and services in GDP has *positive* impact on investment.

An increase in Cash surplus/deficit as a percentage of GDP or budget balance has *positive* impact on investment.

An increase in Real interest rate has *negative* impact on investment.

An increase in Inflation rate has *negative* impact on investment for all three countries taken together.

This thesis contains 8 chapters.

In chapter 1, I make an introduction for purpose of this study. In chapter 2, I will talk about the literature review and brief explanation about investment concept, the types of investment and advantages and disadvantages of investment. In chapter 3, I will explain some investment theories such as Classical theory, Ne-classical theory and Keynesian theory. Chapter 4, is about the Methodology .In this section, the technique that is used to examine the hypothesis according to the effect of macroeconomic determinants such as GDP growth of last year, the trade openness, the share of imports and exports, inflation rate, interest rate and budget balance of investment function. In chapter 5, a

multi regression result for each individual country is presented. The three countries which are contained in our estimation are Brazil, Malaysia and India. In chapter 6, the panel data results are shown and chapter 7, the individual and panel regression results are shown in tables and chapter 8 is the conclusion part.

Chapter 2

LITERATURE REVIEW

2.1 Investment Concept:

In macroeconomic, the amount which is consumed to buy per unit of goods which is not spent but it is used for future consumption is called investment. In other words, investment is the flow of spending which adds value to physical capital stock. Investment is a function of (Income, Interest rates) which means a raise in income leads to an increase in investment, whereas an increase in interest rate decreases investment because the cost of borrowing money increases. If a company selects to consume its own finance in an investment, the interest rate shows an investment opportunity cost that finances instead of lending that amount of money for interest out.(Kevin A. Hassett, 2008). [10]

2.1.1 Types of Investment:

- **Gross Investment:** is the investment value before subtracting depreciation.
- **Replacement Investment:** the investment value after depreciation.
- **Net Investment:** gross investment minus replacement investment.
- **Private Investment:** investment is done by private section.
- **Public Investment:** investment is done by government or public section.
- **Business Fixed Investment:** investment which is done on fix capital.

[10]Kevin A. Hassett, 2008, 2nd ed. Investment, the Concise Encyclopedia of Economics. Library of Economics and Liberty.

- **Residential investment:** investment is done by household by purchasing new homes.
- **Inventory Investment**: include of increase to inventories stock. (Eljaili, 2006)[11]

2.2.2 Investment Benefit & Cost:

- The size of the market is relied on the openness of an economy.
- The extent the investors benefit from investment includes tax, official expenses, on-official expenses, theft and corruption.
- Investor uncertainty increases when there is an ambiguity in economic situation.
- The cost of investment can be resourced to be used to evolve new idea, spending on physical capital and bureaucracy affairs.
- When the investment cost is low or the benefit is high countries have zealous to invest more. (Jes´us Fern´andez-Villaverde)[12]

[11], Eljaili,2006,Macro-Economic, Investment Theory
[12] Jes´us Fern´andez-Villaverde,Macroeconomics: an Introduction, University of Pennsylvania

Chapter 3

THE INVESTMENT THEORY:

3.1 The Investment Theories:

3.3.1 Classical Theory:

Making an exception Thomas Malthus and Karl Marx and other classical economist such as David Ricardo (1817) and Adam Smith (1776) believed that supply generates its demand, according to Say's Law of Markets. (Colin Richardson and Peter Romilly, 2007) [13]

The basic idea of the this theory explains that an economy has a mechanism which is self-adoption which means it is be able to reach the level of real GDP which is acquired when the resources of an economy is employed at its full level. The classical principle is based on two ideas: Say's Law and the principle which prices, interest rate and wages are flexible.[14](Anandi P. Sahu Ph.D.,2012)

Say's law stated that supply produce its own specific demand - that is, sum of production is able to result in an enough income to buy all the generated output. Another assumption of classical theory is the sameness of investment and savings,

[13]Colin Richardson and Peter Romilly, 2007. Investment Functions and the Profitability Gap

[14] Anandi P. Sahu Ph.D., 2012. http://www.referenceforbusiness.com/encyclopedia/Eco-Ent/Economic-Theories.html

suppose that flexible interest rates is always able to reach equilibrium. (Jean-Baptiste Say, 2010)[15]

Of course, no assurance is available to state that all of the income is going to be spent. Some of it is going to be saved. That amount of saving sooner or later is going to be borrowed and converted to investment expense that is one of the elements of real GDP. When the saving goes beyond the borrowers' requirement in a certain economy, the real GDP declines below its primitive level because investment expenses is going to be less than the level of total saving. This debate is shown below. (Andrew B.Abel, 2010) [16]

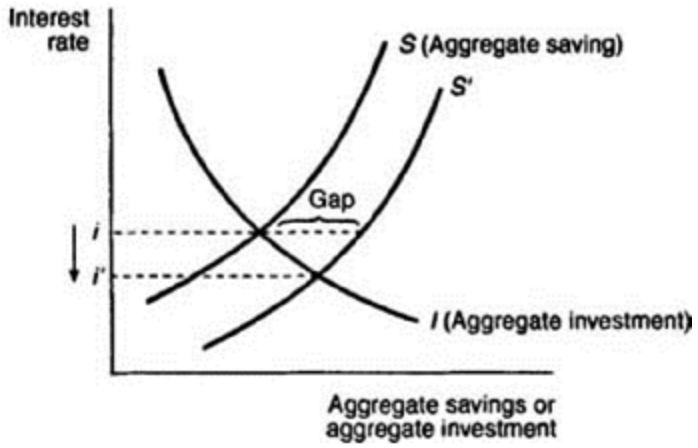

Figure 3.1.Relation between saving, investment and interest rate

Aggregate saving, shown by S curve , has positive relation with the interest rate; if the interest rate goes up, more saving is done by economy. Aggregate investment, illustrated by I curve , has a negative relation with the interest rate; if the interest rate

[15] Say, Jon-Baptiste, Retrieved 2010-12-20Jean-Baptiste Say. newschool.edu.
[16] Andrew B.Abel,Ben S.Bernanke,Dean Croushore,Chapter 4, 1995-2010 Saving and investment in an open economy.

increases, the borrowing cost goes up and investment expenses fall. Initially, aggregate saving and investment are in equilibrium at the same interest rate, when aggregate saving goes up, making the S curve to move to the right side to S′, and then a gap appears between savings and investment at the same interest rate. Aggregate savings is going to be upper than aggregate investment, indicating that real GDP equilibrium to be below its primitive level. (Wiley, 2010)[17]

Classical economists think that under some conditions, the decrease in interest rate makes investors to claim more for existence savings. Meaning, the interest rate declines to develop equality for all investors the supply of funds from aggregate saving and the demand for fund. As a result, a rise in savings makes a rise in investment expenses as result of a fall of the interest rate so the economy gets to its normal real GDP level. The interest rate flexibility makes the loanable funds, or the money market, in equilibrium always and helps real GDP from dropping below its primitive level. (John Maynard Keynes)[18]

In the same way, flexibility in the rate of wage holds the labor market or workers market in equilibrium always. When the supply of workers goes beyond companies'

[17], John Wiley & Sons,2010, topicArticleId-9789,articleId-9741
[18] John Maynard Keynes, 1936.The General Theory of Employment, Interest and MoneyBook IIIThe Propensity to Consume Chapter 9. The Propensity to Consume: II. TheSubjective Factors

demand for labor, then workers paid wages is going to decrease as a result to be certain that the labor force is employed fully. (John Maynard Keynes) [19]

The graph below shows when there is a fall in aggregate demand. Figure 3-2 explains a fall in aggregate demand when it moves from AD1 to AD2.

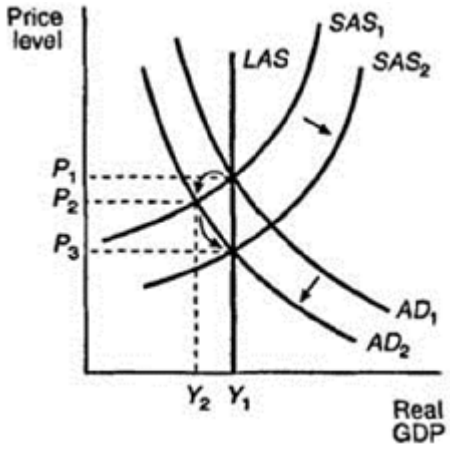

Figure 3.2. Shows price level and output adjustment during a recession

The instant short-time effect is the economy shifts right where the SAS curve is marked SAS1, making the price level of equilibrium to decrease from P1 to P2, and cause a fall in equilibrium of real GDP to below its primitive level of Y1 to Y2. If real GDP decline under its primitive level, the resources and labors of the economy are not in full employing level. If unemployed resources exist, the paid wages to resources is going to decrease. When decrease in wages happened, suppliers can supply cheaper goods, making the SAS curve to move to the right from SAS1 to SAS2.as a result the

[19] John Maynard Keynes ,1936.The General Theory of Employment, Interest and Money,chapter 19,changes in money-wage

equilibrium price level drops to P3 and the economy goes back to its primitive real GDP level.(Michael Parkin,2007) [20]

3.3.2 Neo-Classical Approach:

Neoclassical economics is applied to economics approaches and usually concentrating on the determination of outputs, prices and markets of income distribution in demand and supply and it interferes in maximization of utility hypothesis by profits and of income-constrained individuals by cost-constrained firms using obtainable information and production factor, in line with rational choice theory. (Antoinetta Campus, 1987)[21]

Neoclassical economics rules microeconomics, and altogether with Keynesian theory makes the neoclassical synthesis, which dictates mainstream economic today. (Clark, B, 1998)[22]

Neoclassical economics is applied base on three assumptions; different assumption can be used for different version of new classic theory.

- People behave according to their economic and social behavior for the value of outcomes.(Lawrence E.Blume and David Easley,2008)[23]
- Individuals' cardinal utility (Ellsberg, Daniel, 1954)[24] and firm's profits maximized.

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[20] Michael Parkin, 2005. Economics, Chapter 27
[21]Antonietta Campus, 1987. "Marginal economics", The New Palgrave: A Dictionary of Economics, v. 3, p. 323.
[22] Clark, B., 1998. Principles of political economy: A comparative approach. Westport, Connecticut: Praeger.
[23] Lawrence E.Blume and David Easley, 2008. "Rationality".The New Palgrave Dictionary of Economics, 2nd Edition. Abstract & pre-publication copy

- People use certain data independently. (E. Roy Weintraub, 2007)[25]

One of the research subjects in modern economic is Business investment behavior which is being considered thoroughly and empirical studies are gathering swiftly. (R. Eisner and R. Strotz,1960)[26] and serious progresses in the investment behavior economic theory are done instantly.(K. J. Arrow,1964)[27] It has more than 30 years those econometric studies for investment behavior is done.(J. Tinbergen,1932)[28]

An investment goods demand function based on purely neoclassical considerations is taken which is rest on the capital expense; such an investment behavior theory is taken from the optimal capital accumulation of neoclassical theory. (Dale Jorgenson, 1967)[29]

Another foundation postulation of the theory of investment is that firms maximized utility described more mainly than in the descriptions of firm objectives in the optimal capital accumulation neoclassical theory. (Meyer and Kuh,1957) [30]

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[24] Ellsberg, Daniel, 1954."Classic and current notions of 'Measurable utility'". Economic Journal 64(255): 528-556

[25] E. Roy Weintraub, 2007. Neoclassical Economics. The Concise Encyclopedia Of Economics. Retrieved September 26, 2010, from http://www.econlib.org/library/Enc1/NeoclassicalEconomics.html

[26]R. Eisner and R. Strotz, 1960. "The Determinants of Business Investment,"

[27] K. J. Arrow, 1964."Optimal Capital Policy,The Cost of Capital, and Myopic Decision Rules," Annals of the Institute of StatisticalMathematics, pp. 2 1—3

[28] J. Tinbergen, 1939, Statistical Testing of Business Cycle Theories, Part I, "A Methodand its Application to Investment Activity," Geneva

[29] Dale Jorgenson,1967 The Theory of Investment BehaviorChapter http://www.nber.org/chapters/c123 pages in book: (p. 129 - 188)

[30]Meyer and Kuh, 1957. Investment Decision, p. 9.

3.3.3 Keynesian Theory:

The Keynesian investment theory highlights the significance of interest rates in investment determination. However, other elements also come into the model - not in any way the anticipated of moneymaking investment project. Modification in interest rates should have a cause under consideration the level of investment taken part by private section dealing in a specific economy. A decrease in interest rate leads to decrease in the investment cost comparative to the potential gains so projected capital investment plans on the margin may earn profit. A company will invest only when the discount earning excesses the project cost. (John Maynard Keynes, 1936)[31]

3.3.3.1 Interest Rates and Planned Capital Investment:

There is an inverse relation between investment and the rate of interest as can be seen below in the graph. The relation between the two mentioned variables is shown by the capital investment marginal efficiency (MEC) curve. A decrease in the interest rate from R1 to R2 makes an enlargement of projected investment. (John Maynard Keynes, 1936)[32]

[31 ,32] John Maynard Keynes,1936 .The General Theory of Employment, Interest and Money. chapter 11

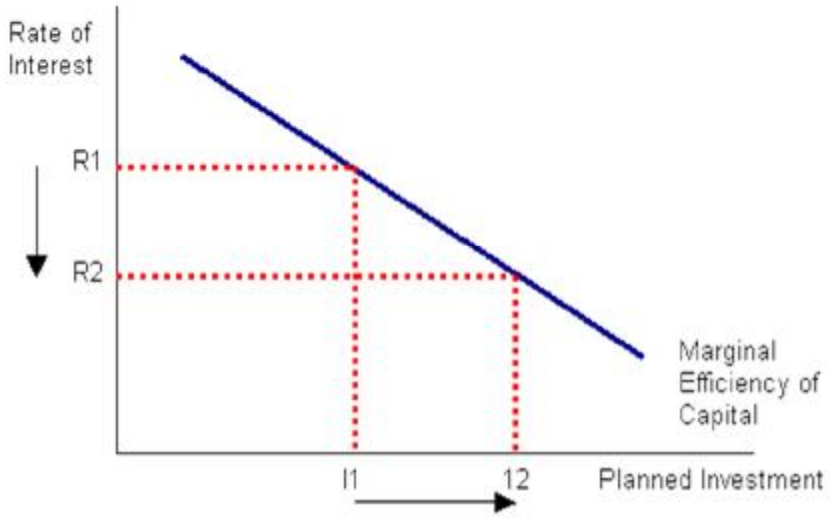

Figure 3.3. Interest rates and planned capital investment:

3.3.3.2 Shifts in the Marginal Efficiency of Capital

Planned investment can modify at each interest rate. When there is a rise in the expected rates of return on investment projects it would make an out shift in the marginal efficiency of capital curve. This is presented by a shift from MEC1 to MEC2 in the graph below. Contrary a drop in business certainty (maybe as a result of recession fear) would make a decline in anticipated rates of return on capital investment plans as a result the MEC curve conversions from the left (MEC3) and leads to a fall in planned investment at each rate of interest.(Steve Margetts; Aug. 13, 2011)[33]

[33] Steve Margetts; Aug. 13, 2011.RevisionGuru.com; Marginal Efficiency of Investment.

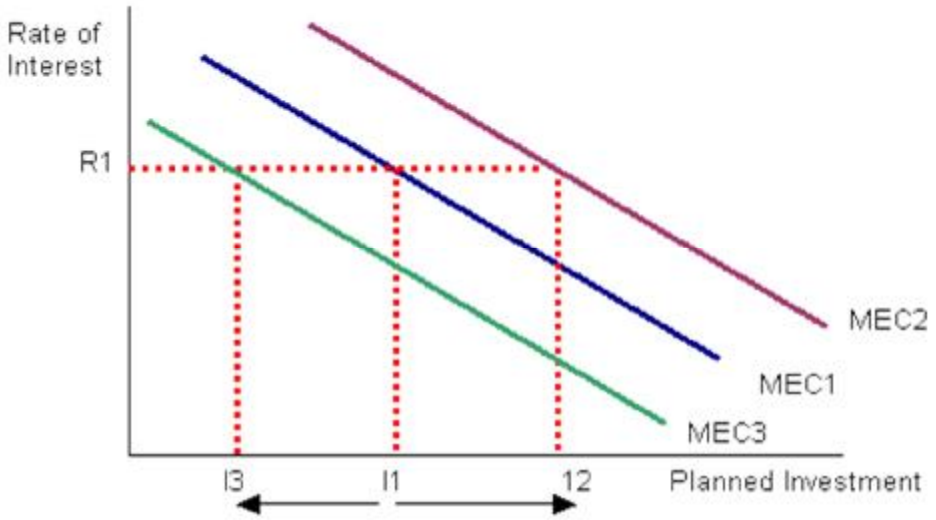

Figure 3.4. Shifts in the marginal efficiency of capital

3.3.4 The Accelerator Model of Investment in Macroeconomics

In the accelerator model a positive correlation can be seen between the growth rate of output or demand and investment. The assumption in investment accelerator theories is that a desired capital stock is available for a certain level of output and interest rate. A decrease in interest rates or increase in output may immediately increase investment level as firms adapt to get to the new optimum capital stock level. The accelerator model applies on the base of a fixed capital to output ratio which suggests that if a firm wants to produce more goods and services it requires adapting its investment to reach to changes in demand.[34] (Geoff Riley, 2006)

The accelerator effect in economics goes to a positive effect on private fixed investment of the growth of the market economy. Increasing in GNP applies that businesses are experiencing an increase the amount of profit profits, sales and cash flow, and more

[34] Geoff Riley, Eton College, September 2006

applying of available capacity. Expectation in profit increase makes businesses to develop more factories, buildings and more machinery. The result is a rise in an economy growth via the encouragement of consumer incomes and purchases (multiplier effect). (Richard F. Kahn, 1931)[35]

The accelerator effect in modern economy is more flexible. Businesses are involved in net investment in fixed capital goods to fill the gap that exists between the desired stock of capital goods and available stock of capital goods which is remained from the past. The desired stock of capital goods is concluded by the interest rate (the finance cost), expected profit rate, technology and the expected level of output. Because of existence of the expected level of output, this model shows behavior explained by the accelerator effect but more moderate than that of the simple accelerator. Because the existing capital stock increases over time according to net investment in the past, a gradually growth of output (GDP) can make the gap between the desired capital and the existing capital to constringe, converge or even turn negative, making current net investment to decrease.(Bill Mitchell,2011)[36]

Of course, ceteris paribus, an actual decrease in output reduces the desired stock of capital goods and so does net investment. In the same way, an increase in output makes a growth in investment. At last, if the desired capital stock is lower than the actual stock, then net investment may be reduces for a long period.In the Jorgenson's model, the desired capital stock is stemming from the aggregate production function supposing that profit maximization and perfect competition. In this model, the acceleration effect

[35] Richard F. Kahn, 1931.Multiplier Article
[36] http://bilbo.economicoutlook.net

does not exist, while the investment has instant effect, so the capital stock can increase.[37](Jorgenson, 1963)

[37] Capital Theory and Investment Behavior", 1963, American Economics Review, Vol 53: 247-25

Chapter 4

METHODOLOGY

4.1 Regression Analysis Methodologies

In this section, the technique that is used to examine the hypothesis according to the effect of macroeconomic determinants such as GDP growth of last year, the trade openness, the share of imports and exports, inflation rate, interest rate and budget balance of investment function.

4.2 Simple Regression Analysis

The simple regression model is defined to look at the relationship between two variables. However, it has some limitations for using as empirical tool.

Y and x are two variables which is representing some population that we are interesting in studying “how to explain y in terms of x”.

Simple linear regression model is

$Y=c+\beta_1 X+\mu$

Y: the dependent variable

X: the independent variable

μ: the error term

$\beta_{1:}$ the slope parameter

c: the intercept parameter

μ is expected to have value equal to zero if others factors held constant in μ,Δ μ=0 so X has linear effect on Y.

The regression coefficient β defines the change in Y that is related with a unit change in X.

4.3 Multiple Regression Analysis

Multiple regression model allows more control over factors that affects the dependent variable. When more factors can be added to model to explain y, more variation in y can be explained by independent variables. Multiple regression model makes superior prediction for y. The model includes k independent variables.

$Y= c + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 +\ldots + \beta_kX_k + \mu$

Y: the dependent variable

X: the independent variable

μ: the error term (it includes factors except $X1, X_{2,}\ldots, X_k$ that affect y.)

c: the intercept parameter

$\beta_{1:}$ the parameter has connection with X_1

$\beta_{2:}$ the parameter has connection with X_2

4.4 OLS (Ordinary Least Square)

OLS is one of the most basic and most consistently apply prediction techniques.

The sum of the squared is minimized the differences between the dependent variable value prediction and the actual dependent variable in this model. The OLS estimator is compatible when the independent variables are exogenous and no multicollinearity exists. k independent variables are in this model.

$\hat{Y} = c\hat{} + \beta\hat{}_1 X_1 + \beta\hat{}_2 X_2 + \beta_3\hat{} X_3 + \ldots + \beta_k\hat{} X_k$

$c\hat{}_{:}$ OLS intercept estimate (when $X_1=0 \ldots X_k=0$, $c\hat{}$ is predicted value of y.)

$\beta\hat{}_1 \ldots \beta_k\hat{}$: OLS slop estimator

4.5 Interpreting of the OLS

$\hat{Y} = c\hat{} + \beta\hat{}_1 X_1 + \beta\hat{}_2 X_2$

The estimated $\beta\hat{}_1 \ldots \beta_2\hat{}$ have ceteris paribus (kept other factors unchanged) effect.

$\Delta\, y\hat{} = \beta_1 \Delta\, X_1 + \beta_2 \Delta\, X_2$

The predicted change in y is shown by changes in X_1 and X_2.when $\Delta X_2=0$ as a result

$$\Delta \hat{y} = \beta_1 \Delta X_1$$

X_2 is held constant vice versa and the same result is true for X_2 when $\Delta X_1=0$. (Wooldridge, 2009)[38]

4.6 Disadvantages of OLS Model

The OLS model has some disadvantages. The assumptions to OLS model are uncompromising. If any of them are not satisfied, the OLS estimation doesn't apply and the estimator no longer satisfied the assumptions.

There are the two assumptions of OLS that cause problem. One of them is the assumption of homogeneous variance in the residuals and the other one is normally distributed residuals. The OLS estimator will be unbiased and consistent if these conditions do not satisfy. But, the estimate is going to be inefficient. OLS will give incorrect estimates of the parameter standard errors. (Orlaith BurkeMichaelmas Term, 2010)[39,40]

4.7 Multicollinearity

Multicollinearity can also raise problem. OLS estimation does not allow independent variable to be correlated.

[38] Wooldridge, 2009, The introductory econometrics.
[39,40] Orlaith Burke Michaelmas Term, 2010,University of Oxford More Notes for Least Squares, Department of Statistics, 1 South Parks Road,Oxford OX1 3TG

It means that the independent variables cannot be strongly collinear. Multicollinearity sometimes raised problem in multiple regression. This situation happened when one independent variable is a result of a fixed multiple or exact combination of another. (Orlaith BurkeMichaelmas Term, 2010)[40]

4.8 Pooled Regression Analysis

This approach is applied when the groups that are used to be pooled are homogenous or relatively similar. This method used by Ordinary Least Squares. (Metriscient, 2010)[41]

Pooling regression which is included by cross section over time data is controlled by time or has units over the common panel data set conditioned to the time periods number.

Generally, there are three types of data sets which are applied in economics:

1-Time series – the most frequent forms of data which is accessible simply.

2-Cross Section – This data usually is noted over geographic or demographic groups.

3-Panel Data – This model has combination the two above forms. There is a cross section, but cross sectional observation is happened over the time.

[41] http://metriscient.com/pooledreg.htm

Panel data (Longitudinal data) is a statistical method that is applied by epidemiology, econometrics researchers. Panel analysis is a suitable method to examine group of people considering the time dimension of data. (Yaffee, 2010)[42]

The unification of cross-sections and time series can boost the data quantity and quality. (Gujarati, 2002)[43]

4.9 Multicollinearity and Heterosckedasticity

Muticollinearity happens when a precise or perfect linear relation among all or some of the control variables is observed. When multicollinearity exists, the statistically significant of control variable can become weak. By increasing the number of observation in a sample or omitting variable that causes multicollinearity or the correlated control variable must be eliminated, the problem of multicollinearity can be solved.

One of the assumptions of linear regression model is homoscedasticity which means the variance of μi for all values of the regressor variable is the same.

If this assumption not satisfies, heteroskedasticity occurred. It means the standard deviations of a variable, which is observed during a particular period of time, are not constant and usually happened in cross-sectional data.

[42]Robert Yaffee, 2010. A Primer for Panel Data Analysis.
[43]Gujarati,2002. Basic Econometrics.

The problem with heteroskedasticity is that the t-statistics cannot be trusted, because the standard errors estimations are biased. For this problem they are too many solutions. White's robust variance covariance Matrix is used in this thesis to produce the standard errors for t-statistics.

4.10 Goodness of Fit (R^2)

The regression R^2 determined how well regressors explain regressand jointly in percentage proportion. R^2 changes between zero (no relation) and one (perfect fit). Add on a variable to regression model never abate R^2 because by adding a variable to regression result, the sum of squared residual never goes up.

t-test is a test for statistical significance that is used with ratio level data and interval.

The t-test is going to be more closed to the normal distribution whenever the size of sample goes up to more than 30.By comparing the calculated t-score with the normal curve it can be noted how far the calculation t-value is from the distribution mean.

A t-score can be above or below the mean of the normal curve.

A t-value must fall far from the mean in order to achieve statistical significance. It means when α=.05, t-value will fall into the extreme of the 5% of the distribution.

If a hypothesis indicates the direction of expected result, then the calculated t-score is predicted to fall into one of the end of the normal distribution which is estimated to fall into the limit of 5% of the distribution.

When a hypothesis has no direction, a "two-tailed" t-test is needed. Looking at a value of which falls into one of the ends limits ("tails") of the distribution is required and since t falls into any of the tails, if we select α=.05, divide the 5% into two parts of 2.5% each must be done.

The tables of t-values are available in statistics books. The degree freedom and the values of alpha are listed. There are different tables exist for t-test of one-tailed and two-tailed.

According to tables find the degree of freedom and the value of α in the table and read interception number. That number is t-tabular which calculated t-value must be equal or gone beyond it to be statistical significance.

If the computed t-score is equal or overreached the value of t that is illustrated in the table, it results in a statistically significant probability. This leads to support the research hypothesis.

4.11 Data

The data for this thesis is collected form The World Bank website from databank category.[44] The selected macroeconomic indicators are gathered from World Bank.

The chosen macroeconomic factors are:

GDP growth rate of last year

[44] http://www.worldbank.org/

Gross capital formation as a percentage of GDP

Inflation rate

The share of Imports of goods and services as a percentage of GDP

The share of Exports of goods and services as a percentage of GDP

Cash surplus/deficit as a percentage of GDP

Real interest rate

The trade openness in GDP is the sum of the share of the Imports of goods and services as a percentage of GDP and Exports of goods and services as a percentage of GDP.

The selected data is collected from 1961 till 2011 and number of data is 50 for each country which the total number is 150.

The countries of study are Brazil, Malaysia and India.

4.12 Hypothesis to be Tested

1-higher GDP growth of last year has *positive* effect on investment or gross capital formation.

2- The higher share of Imports of goods and services as a percentage of GDP has *positive* impact on investment.

3-The higher share of Exports of goods and services as a percentage of GDP has *positive* effect on investment.

4- The higher share of the trade openness as a percentage of GDP has *positive* impact on investment.

5-Cash surplus as a percentage of GDP or budget balance has *positive* and Cash deficit has *negative* impact on investment.

6- Real interest rate has *negative* impact on investment.

7-Inflation rate has *negative* impact on investment.

Chapter 5

MULTI REGRESSION RESULTS FOR EACH INDIVIDAUAL COUNTRY

5.1 Multiple Regression Result for Brazil, Malaysia and India

In this section, multi regression results for each country are presented. The three countries which are contained in our estimation are Brazil, Malaysia and India. Regressions present in this thesis are multi regressions and data is gathered during the period of 1961-2011 from the World Bank databank.

Results are studied in 9 forms.

1.The Effect of Imports of Good & Services in GDP and Real Interest Rate on Gross Capital Formation in GDP

2.The Effect of Imports of Good & Services in GDP and Cash Surplus/Deficit on Gross Capital Formation in GDP

3.The Effect of Imports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

4.The Effect of Imports of Good & Services in GDP and The GDP Growth rate of Last Year and Real Interest Rate on Gross Capital Formation in GDP

5.The Effect of Exports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

6.The Effect of Exports of Good & Services in GDP, Real Interest Rate and The GDP Growth rate of Last Year on Gross Capital Formation in GDP

7.The Effect of Trade Openness as a percentage of GDP and Real Interest Rate on Gross Capital Formation in GDP

8.The Effect of Trade Openness as a percentage of GDP, The GDP Growth rate of Last Year and Cash Surplus/Deficit on Gross Capital Formation in GDP

9.The Effect of Trade Openness as a percentage of GDP, The GDP Growth of Last Year and Real Interest Rate on Gross Capital Formation in GDP

The t-value of the result is written in ( ) under relate estimated coefficient. The t-value which is significant at 10% is shown by * and the one which is significant at 5% is indicated by ** and at 1% is shown with *** which is statistically significant.

R-squared is also written for each estimated result. Finding the best qualified equation is not the goal of this study but to find out how explanatory variable is related to explained variable and to understand their significant.

To prevent muticollinearity the inflation rate and interest rate are not applied together in an equation.

Abbreviations for Independent variables in estimated equation are:

GDP growth rate of last year	grol
Gross capital formation as a percentage of GDP	gross
Inflation rate	inf
The share of Imports of goods and services as a percentage of GDP	im
The share of Exports of goods and services as a percentage of GDP	ex
Cash surplus/deficit as a percentage of GDP	cash
Real interest rate	real
The trade openness in GDP	emgdp

Each country result which is Brazil, Malaysia and India are shown below.

5.1 Brazil

5.1.1 The Effect of the share of the Imports of Good & Services in GDP and Real Interest Rate on Gross Capital Formation in GDP

The number of observation after adjustment is 14 during period of 1997-2010.

gross = 20.85 - 0.08 im - 0.05 real

(3.35) (-0.21) (-1.30) R^2=0.20

As can be seen, there is negative relation between gross capital formation in GDP versus the share of imports in GDP and real interest rate. Both independent variables are insignificant. 1% increase in the share of imports in GDP and real interest rate separately will result to 0.08% and 0.05% decrease in gross capital formation in GDP respectively. Hold other factor constant.

5.1.2 The Effect of the share of the Imports of Good & Services in GDP and Cash Surplus/Deficit on Gross Capital Formation in GDP

The number of observation after adjustment 18, from 1990-2009

gross = 22.97 - 0.44 im + 0.039 cash

(9.25) (-2.01)*[45] (0.16) R^2=0.21

A can be understood by estimated equation, positive relation is between budget balance and gross capital formation in GDP and there is negative one between the share of

[45] significant at 10% level

imports in GDP and dependent variable. The share of imports in GDP is significant at 10% level and cash surplus/deficit is insignificant. 1% increase in share of imports leads to decrease gross capital formation in GDP by 0.44%. 1% increase in budget balance increase regressand by 0.039%.Hold other factors fixed.

5.1.3 The Effect of the share of the Imports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

The collected observation is 50 after adjustment, from 1961-2010.

gross = 21.29 - 0.17 im + 0.0008 inf

(13.29) (-1.05) (1.20) R^2=0.065

The share of imports in GDP has negative effect on gross capital formation in GDP.1% increase in share of imports in GDP will result to decrease 0.17% in predicted variable.In contrary with theory, inflation has positive effect on gross capital formnation in GDP.1% increase in inflation rate cause 0.0008% decrease in dependent variable. Both independent variables are insignificant.

5.1.4 The Effect of the share of the Imports of Good & Services in GDP and The GDP Growth rate of Last Year and Real Interest Rate on Gross Capital Formation in GDP

14 observation after adjustment included during1997-2010

gross = 20.44 - 0.07 im + 0.05 grol - 0.05real

(3.07) (-0.17) (0.29) (-1.16) R^2=0.20

As can be seen the coefficient sign of share of imports in GDP and real interest rate are negative and GDP growth rate of last year is positive. All three independent variables are insignificant. 1% increase in the share of imports in GDP and real interest rate separately will lead to decrease gross capital formation in GDP respectively by 0.07% and 0.05% held other factors constant. 1% increase in GDP growth rate of last year is predicted to increase gross capital formation in GDP by 0.05%.

5.1.5 The Effect of the share of the Exports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

The data regression for Brazil from 1961 until 2010 included 50 observations after adjustment.

gross = 23.42 - 0.4 ex + 0.001 inf

(18.90) (-3.18)***[46] (1.75)*[47] R^2=0.21

The result above indicates that the correlation between Gross capital formation in GDP and the share of Exports of Good & Services in GDP is negative and the value estimation of coefficient is statistically significant. It means, 1% increase in share of export of good & services in GDP will lead to decrease gross capital formation in GDP by 0.4% held other variable constant. In above estimation, the sign of inflation rate shows a positive relationship between Inflation rate and Gross Capital Formation in GDP in contrary of what we expected according to theory which means, 1% increase in inflation rate will increase gross capital formation in GDP 0.001% ceteris paribus and it is significant at 10% level.

[46] statistically significant
[47] significant at 10% level

5.1.6 The Effect of the share of the Exports of Good & Services in GDP, Real Interest Rate and The GDP Growth rate of Last Year on Gross Capital Formation in GDP

The gathered date is from 1997 till 2010, included number of observation is 14 after adjustment.

gross = 24.61 - 0.29 ex - 0.084 real + 0.12 grol

(7.64) (-1.82)*[48] (-2.5)**[49] (0.8) R^2=0.40

According to estimated equation, there is a negative relationship between the share of Exports of Good & Services in GDP and Gross Capital Formation in GDP which means 1% increase in the share of export in GDP will decrease gross capital in GDP 0.29% held other variables constant and it is significant at 10% level. In case of real interest rate, the sign of real interest rate is negative as theoretically expected and it is significant at 5% level. As seen above, 1% increase in real interest rate will decrease share of gross capital formation in GDP by 0.084%.Positive correlation can be seen between the GDP growth rate of last year and the share of gross capital formation in GDP. The real interest rate coefficient indicates that 1% Increase in GDP growth rate of last year, the share of gross capital formation in GDP goes up by 0.12% and it is insignificant.

5.1.7 The Effect of Trade Openness as a percentage of GDP and Real Interest Rate on Gross Capital Formation in GDP

From 1997 until 2010, 14 observations are included after adjustment.

[48] significant at 10% level
[49] significant at 5% level

gross = 25.16 - 0.16 emgdp - 0.08 real

(5.72) (-1.33) (-2.19)*[50] R^2=0.31

In contrast with theory, the trade openness in GDP has negative effect on gross capital formation in GDP and is insignificant and also, there is a negative correlation between real interest rate and gross capital formation in GDP which is theoretically expected. Real interest rate coefficient is significant at 10% level.1% increase in trade openness in GDP and real interest rate separately decreases gross capital formation in GDP by 0.16% and 0.08% respectively ceteris paribus.

5.1.8 The Effect of Trade Openness as a percentage of GDP, The GDP Growth rate of Last Year and Cash Surplus/Deficit on Gross Capital Formation in GDP

The data for this equation is collected from 1990-2009, totally 18 observation after adjustment.

gross = 21.82 - 0.17 emgdp + 0.1 grol + 0.05cash

(8.80) (-1.55) (0.5) (0.19) R^2=0.14

As shown above, the trade openness in GDP has negative effect on share of gross capital formation in GDP, in contrast with theory. 1% increase in measure of trade will decrease share of gross capital formation in GDP 0.17% ceteris paribus and it is significant at 20% levels. On the other hand, the share of GDP growth rate of last year and the share of budget balance both have positive correlation with gross capital

[50] significant at 10% level

formation in GDP. Meaning that 1% increase in GDP growth rate of last year and the share of budget balance separately will increase gross capital formation in GDP by 0.1% and 0.05% individually held other variable constant respectively and both variables are insignificant.

5.1.9 The Effect of Trade Openness as a percentage of GDP, The GDP Growth of Last Year and Real Interest Rate on Gross Capital Formation in GDP

The number of observation is 14 after adjustment from 1997-2010.

gross = 25.18 - 0.17 emgdp + 0.09 grol - 0.08 real

(5.53) (-1.36) (0.55) (-2.12)[*51] R^2=0.33

This equation says that, there is a negative relation between gross capital formation in GDP versus trade openness and real interest rate and positive one versus GDP growth rate of last year.

1% increase in trade openness will lead to 0.17% decrease in gross capital formation in GDP, in contrast with theory, keep all variables constant and 1% increase in GDP growth rate of last year will result to 0.09% increase in dependent variable.1%increase in real interest rate decrease explained variable 0.08%.real interest rate is significant at 10% level. On the other hand, other variables are insignificant.

[51] significant at 10%level

5.2 Malaysia

5.2.1 The Effect of the share of the Imports of Good & Services in GDP and Real Interest Rate on Gross Capital Formation in GDP

The number of observation after adjustment is 24 during period of 1987-2010.

gross = 13.68 + 0.13 im + 0.63 real

(1.11) (1.00) (1.26) R^2=0.095

As can be seen, there is positive relation between gross capital formation in GDP versus the share of imports in GDP and real interest rate.1% increase in the share of imports in GDP and real interest rate separately will result to 0.13% and 0.63% increase in gross capital formation in GDP respectively, hold other factor constant. The two independent variable 9.5% explain dependent variable jointly. All variables are not significant at any levels.

5.2.2 The Effect of the share of the Imports of Good & Services in GDP and Cash Surplus/Deficit on Gross Capital Formation in GDP

The number of observation after adjustment 14, from 1996-2009

gross = 25.22 + 0.09 im + 2.79 cash

(1.69) (0.59) (6.62)***[52] R^2=0.82

[52] statistically significant

A can be understood by estimated equation, positive relation is between both the share of imports in GDP and budget balance versus gross capital formation in GDP. The share of imports in GDP is insignificant and cash surplus/deficit is statistically significant.1% increase in share of imports in GDP lead to increase in gross capital formation in GDP by 0.09%,ceteris paribus.1% increase in budget balance increase regressand by 2.79%, hold other factors constant. Both variables explain jointly response variable 82%.

5.2.3 The Effect of the share of the Imports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

The collected observation is 24 after adjustment, from 1987-2010.

gross = 18.31 + 0.1 im + 0.24 inf

(1.52) (0.74) (0.45) R^2=0.036

The share of imports in GDP has positive effect on gross capital formation in GDP.1%increase in share of imports in GDP will result to increase 0.1% in predicted variable, hold other factors constant. In contrary with theory, inflation has positive effect on gross capital formation in GDP.1% increase in inflation cause 0.24% increase in dependent variable, ceteris paribus. Both independent variables are insignificant and jointly describe investment 3.6%.

5.2.4 The Effect of the share of the Imports of Good & Services in GDP and The GDP Growth rate of Last Year and Real Interest Rate on Gross Capital Formation in GDP

24 observation after adjustment included during1987-2010

gross = 8.66 + 0.1 im + 0.51 real + 1.18 grol

(0.84) (1.04) (1.24) (3.33)***[53] R^2=0.41

As can be seen the coefficient sign of share of imports in GDP and real interest rate and GDP growth rate of last year is positive. 1%increase in the share of imports in GDP and real interest rate separately will lead to increase gross capital formation in GDP respectively 0.1% and 0.51%, hold other factors constant.1% increase in GDP growth rate of last year is predicted to positive change in gross capital formation in GDP by %1.18, ceteris paribus. The GDP growth of last year is statistically significant whereas the share of imports in GDP and real interest rate are insignificant. All three independent variables are 41% explain investment jointly.

5.2.5 The Effect of the share of the Exports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

50 observations after adjustment are seen from 1961 till 2010.

gross = 20.60 + 0.053 ex + 0.29 inf

(7.38) (1.45) (1.42) R^2=0.09

This equation says that there is a positive correlation between investment rate versus the share of the exports in GDP and inflation. According to theory, the share of exports in GDP has positive relation with gross capital formation in GDP whereas, inflation has negative one. As can be seen above, inflation rate has positive effect in case of

[53] statistically significant

Malaysia.1% increase in the share of exports in GDP will lead to 0.053% increase in investment; keep other factors constant.1% increase in inflation rate will result to 0.29% increase in gross capital formation in GDP, ceteris paribus. The shares of exports in GDP and inflation rate are both significant at 20% level. It is obvious that the 2 explanatory variables explained dependent variable weakly.

5.2.6 The Effect of the share of the Exports of Good & Services in GDP, Real Interest Rate and The GDP Growth rate of Last Year on Gross Capital Formation in GDP

The number of observation is 24 after adjustment during 1987-2010.

gross = 27.66 – 0.07 ex + 1.10 grol + 0.32 real

(2.63) (-0.87) (2.93)***[54] (0.74) R^2=0.40

As shown by the equation, 1% increase in the share of exports will decrease investment by 0.07%, keep other variable constant. Negative relation is observed between the share of the exports in GDP and investment rate and it is insignificant. GDP growth rate of last year and real interest rate have positive effect on investment in Malaysia.1% increase in GDP growth rate of last year will lead to 1.1 % increase in investment and 1% increase in real interest rate will increase investment by 0.32% keep other variable constant for each variable. GDP growth rate of last year is statistically significant at 1% level whereas other variables are insignificant. The predictor variables 40% explained response variable jointly.

[54] statistically significant at 1% level

5.2.7 The Effect of Trade Openness as a percentage of GDP and Real Interest Rate on Gross Capital Formation in GDP

From 1987 until 2010, 24 observations are included after adjustment.

gross = 31.27 - 0.028 emgdp + 0.48 real

(2.52) (-0.44) (0.92) R^2=0.06

In contrary to theory, a negative correlation can be observed between the trade openness in GDP and investment. It means, 1% increase in trade openness will result in decreasing investment by 0.028%, other factors keep constant. There is a positive relation between real interest rate and gross capital formation in GDP which illustrates that 1% increase in real interest rate increase gross capital formation in GDP by 0.48%, ceteris paribus. The trade openness and real interest rate are both insignificant.

5.2.8 The Effect of Trade Openness as a percentage of GDP, The GDP Growth rate of Last Year and Cash Surplus/Deficit on Gross Capital Formation in GDP

The data for this equation is collected from 1996-2009, totally 14 observation after adjustment.

gross = 37.65 - 0.017 emgdp - 0.01grol + 2.86 cash

(2.32) (-0.23) (-0.05) (5.87)***[55] R^2=0.81

[55] statistically significant

As explained in theory, there is positive relation between investment versus trade openness in GDP and growth rate of last year. In this equation; by contrast, negative correlation is observed.

1% increase in trade openness leads to 0.017% decrease in investment ceteris paribus and 1% increase GDP growth rate of last year will decrease gross capital formation in GDP by 0.01%, keep other factors constant. The both variable are insignificant. Positive correlation is seen between budget balance and investment.1% increase in budget balance will increase investment by 2.86%, ceteris paribus and it is statistically significant. The 3 control variables explained dependent variable 81% jointly.

5.2.9 The Effect of Trade Openness as a percentage of GDP, The GDP Growth rate of Last Year and Real Interest Rate on Gross Capital Formation in GDP

The number of observation is 24 after adjustment from 1987-2010.

gross =19.13 – 0.001 emgdp +1.19 grol + 0.43 real

(1.76) (-0.02) (3.25)***[56] (1.00) R^2=0.38

The trade openness in GDP has negative effect on investment whereas GDP growth rate of last year has positive effect.1% increase in the trade openness in GDP decrease investment by 0.001%, hold other factor constant.1% increase in GDP growth rate of last year leads an increase by 1.19%, ceteris paribus and it is statistically significant.1% increase in real interest rate cause an increase by 0.43%, other factors hold constant.

[56] statistically significant

The trade openness in GDP and real interest rate are both insignificant. The 3 variables explain investment 38% jointly.

5.3 India

5.3.1 The Effect of the share of the Imports of Good & Services in GDP and Real Interest Rate on Gross Capital Formation in GDP

The number of observation after adjustment is 32 during period of 1978-2009.

gross = 15.15+ 0.81 im – 0.03 real

(10.36) (13.01)***[57] (-0.19) R^2=0.85

As can be seen, there is positive relation between gross capital formation in GDP and the share of imports in GDP and a negative one between real interest rate and investment. The real interest rate is insignificant and the share of import in GDP is statistically significant.1% increase in the share of imports in GDP and real interest rate separately will result to 0.81% increase and 0.03% decrease in gross capital formation in GDP respectively, hold other factor constant. The two independent variable 85% explain dependent variable jointly.

5.3.2 The Effect of the share of the Imports of Good & Services in GDP and Cash Surplus/Deficit on Gross Capital Formation in GDP

The number of observation after adjustment 20, from 1990-2009

gross = 16.55 + 0.90 im + 1.08 cash

(12.73)(14.00)***[58] (3.47)***[59] R^2=0.92

[57] statistically significant

As can be understood by estimated equation, positive relation is between both the share of imports in GDP and budget balance versus gross capital formation in GDP. The share of imports and cash surplus/deficit are statistically significant.1% increase in share of imports in GDP lead to increase in gross capital formation in GDP by 0.90 %,ceteris paribus.1% increase in budget balance increase regressand by 1.08%,hold other factors constant. Both variables explain jointly response variable 92%.

5.3.3 The Effect of the share of the Imports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

The collected observation is 50 after adjustment, from 1961-2010.

gross = 12.14 + 0.94 im + 0.056 inf

(16.31) (19.29)***[60] (0.90) R^2=0.88

The share of imports in GDP has positive effect on gross capital formation in GDP.1%increase in share of imports in GDP will result to increase 0.94% in predicted variable, hold other factors constant. In contrary with theory, inflation has positive effect on gross capital formation in GDP.1% increase in inflation cause 0.056% increase in dependent variable, ceteris paribus. The share of imports in GDP is statistically significant whereas inflation rate is insignificant and they jointly describe investment 88%.

[58] statistically significant
[59] statistically significant
[60] statistically significant

5.3.4 The Effect of the share of the Imports of Good & Services in GDP and The GDP Growth rate of Last Year and Real Interest Rate on Gross Capital Formation in GDP

32 observations included after adjustment.

gross = 14.39 + 0.76 im + 0.25 grol – 0.04 real

(9.87) (11.74)***[61] (1.88)*[62] (-0.31) R^2=0.87

As can be seen the coefficient sign of share of imports in GDP and GDP growth rate of last year is positive. 1% increase in the share of imports in GDP and GDP growth rate of last year separately will lead to increase gross capital formation in GDP respectively 0.76% and 0.25%, hold other factors constant.1% increase in real interest rate is predicted to a negative change in gross capital formation in GDP by 0.04%, ceteris paribus. The real interest rate is insignificant whereas the share of imports in GDP is statistically significant and GDP growth rate of last year is significant at 10%. All three independent variables are 87% explain investment jointly.

5.3.5 The Effect of the share of the Exports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

50 observations after adjustment are seen from 1961 till 2010.

gross = 12.65 + 1.04 ex + 0.059 inf

(16.71) (18.45)***[63] (0.90) R^2=0.87

[61] statistically significant
[62] significant at 10% level

This equation says that there is a positive correlation between investment rate versus the share of the exports in GDP and inflation rate. According to theory, the share of exports in GDP has positive relation with gross capital formation in GDP whereas, inflation has negative one. As can be seen above, inflation rate has positive effect in case of India.1% increase in the share of exports in GDP will lead to 1.04% increase in investment; keep other factors constant.1% increase in inflation rate will result to 0.059% increase in gross capital formation in GDP, ceteris paribus. The share of exports in GDP is statistically significant. It is seen that the 2 explanatory variables explained dependent variable 87%.

5.3.6 The Effect of the share of the Exports of Good & Services in GDP, Real Interest Rate and The GDP Growth rate of Last Year on Gross Capital Formation in GDP

The number of observation is 32 after adjustment during 1978-2009.

gross = 15.05 + 0.84 ex + 0.22 grol – 0.03 real

(8.96) (9.7)***[64] (1.36) (-0.21) R^2=0.83

As shown by the equation, 1% increase in the share of exports in GDP will increase investment by 0.84%, keep other variable constant. Positive relation is observed between the share of the exports and investment rate and it is statistically significant. The GDP growth rate of last year also have positive effect on investment in India.1% increase in GDP growth rate of last year will lead to 0.22 % increase in investment and 1% increase in real interest rate will decrease investment by 0.3% ,keep other variable

[63] statistically significant
[64] statistically significant

constant for each variable. GDP growth rate of last year is significant at 20% level whereas real interest rate is insignificant. The predictor variables 83% explained response variable jointly.

5.3.7 The Effect of Trade Openness as a percentage of GDP and Real Interest Rate on Gross Capital Formation in GDP

From 1978 until 2009, 32 observations are included after adjustment.

gross = 15.26 + 0.42 emgdp - 0.021 real

(10.05) (12.43)***[65] (-0.13) R^2=0.84

According to theory, a positive correlation can be observed between the trade openness in GDP and investment. It means, 1% increase in the trade openness will result in increasing investment by 0.42%, other factors keep constant. There is also a negative relation between real interest rate and gross capital formation in GDP which illustrates that 1% increase in real interest rate decrease gross capital formation in GDP by 0.021%, ceteris paribus.

The trade openness is statistically significant and real interest rate is insignificant. The 2 control variables explain predicted variable 84% jointly.

5.3.8 The Effect of Trade Openness as a percentage of GDP, The GDP Growth rate of Last Year and Cash Surplus/Deficit on Gross Capital Formation in GDP

The data for this equation is collected from 1990-2009, totally 20 observation after adjustment.

[65] statistically significant

gross = 16.30 + 0.52 emgdp - 0.13grol + 1.13 cash

(9.58) (10.69)***[66] (-0.56) (3.24)***[67] R^2=0.91

As explained in theory, there is positive relation between investment versus trade openness in GDP and GDP growth rate of last year. In this equation; by contrast, negative correlation is observed in case of the GDP growth rate of last year.

1% increase in trade openness in GDP leads to 0.52% increase in investment, ceteris paribus and 1% increase in GDP growth rate of last year will decrease gross capital formation in GDP by 0.13%, keep other factors constant. The GDP growth rate of last year is insignificant. Positive correlation is seen between budget balance and investment.1% increase in budget balance will increase investment by 1.13%, ceteris paribus .The trade openness in GDP and budget balance are statistically significant. The 3 control variables explained dependent variable 91% jointly.

5.3.9 The Effect of Trade Openness as a percentage of GDP, The GDP Growth of Last Year and Real Interest Rate on Gross Capital Formation in GDP

The number of observation is 32 after adjustment from 1978-2009.

gross =14.61+ 0.40 emgdp + 0.23 grol - 0.039 real

(9.53) (10.98)***[68] (1.59) (-0.24) R^2=0.86

[66] statistically significant
[67] statistically significant

The trade openness in GDP and the GDP growth rate of last year have positive effect on investment whereas real interest rate has negative effect.1% increase in the trade openness in GDP increase investment by 0.40%, hold other factor constant.1% increase in GDP growth rate of last year leads an increase by 0.23%, ceteris paribus and the trade openness in GDP is statistically significant and the GDP growth rate of last year is significant at 20%.

1% increase in real interest rate cause decrease investment by 0.039%, other factors hold constant. The 3 variables explain investment 86% jointly.

[68] statistically significant

Chapter 6

POOLED REGRESSION

Pooled regression model is revised form of multiple regressions exercised in previous section for the three countries.

In pooled regression both time-series and cross –sectional data is applied.

The gathered information for each three country will be combined and imported to an Excel file. The data has organized by each country and the years. Eviews software helps keep record of each data and run operations in the cross-sectional dimension spontaneously, and use econometric methods to collect data from both cross –sectional and time-series dimensions.

6.Panel Data

6.1 The Effect of the share of the Imports of Good & Services in GDP and Real Interest Rate on Gross Capital Formation in GDP

The number of observation after adjustment is 70 during period of 1978-2010.

gross = 24.78+ 0.053 im – 0.15 real

(16.92) (2.30)**[69] (-3.34)***[70] R^2=0.28

As can be seen, there is positive relation between gross capital formation in GDP and the share of imports in GDP and a negative one between real interest rate and investment. The real interest rate is statistically significant and the share of imports in GDP is significant at 5%.1% increase in the share of imports in GDP and real interest rate separately will result to 0.053% increase and 0.15% decrease in gross capital formation in GDP respectively, hold other factor constant. The two independent variable 28% explain dependent variable jointly.

6.2 The Effect of the share of the Imports of Good & Services in GDP and Cash Surplus/Deficit on Gross Capital Formation in GDP

The number of observation after adjustment 52, from 1990-2009

gross = 25.20 + 0.049 im + 1.15 cash

(14.00) (1.93)*[71] (2.40)**[72] R^2=0.15

[69] significant at 5% level
[70] statistically significant

As can be understood by estimated equation, positive relation is between both the share of imports in GDP and budget balance versus gross capital formation in GDP. The share of imports in GDP and cash surplus/deficit is respectively significant at 10% and 5%.

1% increase in share of imports in GDP lead to increase in gross capital formation in GDP by 0.049 %,ceteris paribus.1% increase in budget balance increase regressand by 1.15%,hold other factors constant. Both variables explain jointly response variable 15% and they jointly describe investment 15%.

6.3 The Effect of the share of the Imports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

The collected observation is 150 after adjustment, from 1961-2010.

gross = 19.52 + 0.10 im + 0.0006 inf

(29.97) (6.81)***[73] (0.47) R^2=0.24

The share of imports in GDP has positive effect on gross capital formation in GDP.1%increase in share of imports in GDP will result to increase 0.10% in predicted variable, hold other factors constant. In contrary with theory, inflation rate has positive effect on gross capital formation in GDP.1% increase in inflation rate cause 0.0006% increase in dependent variable, ceteris paribus. The share of imports is statistically significant whereas inflation rate is insignificant and they jointly describe investment 24%.

[71] significant at 10% level
[72] significant at 5% level
[73] statistically significant

6.4 The Effect of the share of the Imports of Good & Services in GDP and The GDP Growth rate of Last Year and Real Interest Rate on Gross Capital Formation in GDP

70 observations included after adjustment from 1978 till 2010.

gross = 18.78 + 0.04 im + 1.02 grol – 0.08 real

(11.02) (2.33)**[74] (5.16)***[75] (-2.11)** [76] R^2=0.49

As can be seen the coefficient sign of share of imports in GDP and GDP growth rate of last year is positive. 1%increase in the share of imports in GDP and GDP growth rate of last year separately will lead to increase gross capital formation in GDP respectively 0.04% and 1.02%, hold other factors constant.1% increase in real interest rate is predicted to a negative change in gross capital formation in GDP by 0.08%, ceteris paribus. The real interest rate and the share of imports in GDP are significant at 5% and GDP growth rate of last year is statistically significant. All three independent variables are 49% explain investment jointly.

6.5 The Effect of the share of the Exports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

150 observations after adjustment are seen from 1961 till 2010.

[74] significant at 5% level
[75] statistically significant
[76] significant at 5% level

gross = 20.36 + 0.07 ex + 0.0001 inf

(30.86) (5.1)***[77] (0.11) R^2=0.15

This equation says that there is a positive correlation between investment rate versus the share of exports in GDP and inflation. According to theory, the share of exports in GDP has positive relation with gross capital formation in GDP whereas, inflation has negative one. As can be seen above, inflation rate has positive effect in panel data regression.1% increase in the share of exports in GDP will lead to 0.07% increase in investment; keep other factors constant.1% increase in inflation rate will result to 0.0001% increase in gross capital formation in GDP, ceteris paribus. The share of exports in GDP is statistically significant and inflation rate is insignificant. It is seen that the 2 explanatory variables explained dependent variable 15%.

6.6 The Effect of the share of the Exports of Good & Services in GDP, Real Interest Rate and The GDP Growth rate of Last Year on Gross Capital Formation in GDP

The number of observation is 70 after adjustment during 1978-2010.

gross = 19.57 + 0.02 ex + 1.05 grol – 0.09 real

(11.13) (1.35) (5.21)***[78] (-2.36)**[79] R^2=0.46

[77] statistically significant
[78] statistically significant
[79] significant at 5% level

As shown by the equation, 1% increase in the share of exports in GDP will increase investment by 0.02%, keep other variable constant. Positive relation is observed between the share of exports in GDP and investment rate and it is significant at 20%. The GDP growth rate of last year also have positive effect on investment.1% increase in GDP growth of last year will lead to 1.05 % increase in investment and 1% increase in real interest rate will decrease investment by 0.09%, keep other variable constant for each variable. The GDP growth rate of last year is statistically significant and real interest rate is significant at 5%. The predictor variables 46% explained response variable jointly.

6.7 The Effect of Trade Openness as a percentage of GDP and Real Interest Rate on Gross Capital Formation in GDP

From 1978 until 2010, 70 observations are included after adjustment.

gross = 25.54 + 0.017 emgdp - 0.16 real

(17.53) (1.64) (-3.54)*** [80] R^2=0.25

According to theory, a positive correlation can be observed between the trade openness and investment. It means, 1% increase in the trade openness will result in increasing investment by 0.017%, other factors keep constant. There is also a negative relation between real interest rate and gross capital formation in GDP which illustrates that 1% increase in real interest rate decrease gross capital formation in GDP by 0.16%, ceteris paribus.

[80] statistically significant

The trade openness in GDP is significant at 20% and real interest rate is statistically significant. The 2 control variables explain predicted variable 25% jointly.

6.8 The Effect of Trade Openness as a percentage of GDP, The GDP Growth rate of Last Year and Cash Surplus/Deficit on Gross Capital Formation in GDP

The data for this equation is collected from 1990-2009, totally 52 observation after adjustment.

gross = 20.53 + 0.01 emgdp + 1.07 grol + 0.99 cash

(11.25) (1.14) (4.76)***[81] (2.44) R^2=0.41

As explained in theory, there is positive relation between investment versus trade openness in GDP and GDP growth rate of last year and budget balance.

1% increase in trade openness in GDP leads to 0.01% increase in investment, ceteris paribus and 1% increase in GDP growth rate of last year will increase gross capital formation in GDP by 1.07%, keep other factors constant. The GDP growth rate of last year is statistically significant.1% increase in budget balance will increase investment by 0.99%, ceteris paribus .The trade openness is insignificant whereas budget balance is significant at 2% level. The 3 control variables explained dependent variable 41% jointly.

[81] statistically significant

6.9 The Effect of Trade Openness as a percentage of GDP, The GDP Growth of Last Year and Real Interest Rate on Gross Capital Formation in GDP

The number of observation is 70 after adjustment from 1978-2010.

gross = 19.20 + 0.016 emgdp + 1.04 grol - 0.09 real

(11.05) (1.79)*[82] (5.2)***[83] (-2.24)**[84] R^2=0.47

The trade openness in GDP and the GDP growth rate of last year have positive effect on investment whereas real interest rate has negative effect.1% increase in the trade openness in GDP increase investment by 0.016%, hold other factor constant.1% increase in GDP growth rate of last year leads an increase by 1.04%, ceteris paribus and the trade openness in GDP is significant at 10% and the GDP growth of last year is statistically significant.

1% increase in real interest rate cause decrease investment by 0.09%, other factors hold constant and it is significant at 5%. The 3 variables explain investment 47% jointly.

[82] significant at 10%
[83] statistically significant
[84] significant at 5%

Chapter 7

Regression Results Analysis Table For Individual Countries

Table 1: 7-1 t-statistics focusing on trade openness for Brazil

Variable	T-statistics
Ex & inf	**-3.18*** **
Ex & real & grol	**-1.82***
Emgdp & real	**-1.33**
Emgdp & grol & cash	**-1.55**
Emgdp & grol & real	**-1.36**

Table 2: 7-2 t-statistics focusing on trade openness for Malaysia

Variable	T-statistics
Ex & inf	**1.45**
Ex & real & grol	**-0.87**
Emgdp & real	**-0.44**
Emgdp & grol & cash	**-0.23**
Emgdp & grol & real	**-0.02**

Table 3: 7-3 t-statistics focusing on trade openness for India

Variable	T-statistics
Ex & inf	**18.45*** **
Ex & real & grol	**9.7*** **
Emgdp & real	**12.43*** **
Emgdp & grol & cash	**10.69*** **
Emgdp & grol & real	**10.98*** **

Table 4: 7-4 t-statistics focusing on the share of imports for Brazil

Variable	T-statistics
Im & real	**-0.21**
Im & cash	**-2.01***
Im & inf	**-1.05**
Im & grol & real	**-0.17**

Table 5: 7-5 t-statistics focusing on the share of imports for Malaysia

Variable	T-statistics
Im & real	**1.00**
Im & cash	**0.59**
Im & inf	**0.74**
Im & grol & real	**1.04**

Table 6: 7-6 t-statistics focusing on the share of imports for India

Variable	T-statistics
Im & real	**13.01*** **
Im & cash	**14.73*** **
Im & inf	**19.29*** **
Im & grol & real	**11.74*** **

Table 7:7-7 t-statistics focusing on Real Interest Rate for Brazil

Variable	T-statistics
Im & real	**-1.30**
Im & grol & real	**-1.16**
Ex & real & grol	**-2.5** **
Emgdp & real	**-2.19***
Emgdp & grol & real	**-2.12***

Table 8: 7-8 t-statistics focusing on Real Interest Rate for Malaysia

Variable	T-statistics
Im & real	**1.26**
Im & grol & real	**1.24**
Ex & real & grol	**0.74**
Emgdp & real	**0.92**
Emgdp & grol & real	**1.00**

Table 9:7-9 t-statistics focusing on Real Interest Rate for India

Variable	T-statistics
Im & real	**-0.19**
Im & grol & real	**-0.31**
Ex & real & grol	**-0.21**
Emgdp & real	**-0.13**
Emgdp & grol & real	**-0.24**

Table10:7-10 t-statistics focusing on GDP growth of last year for Brazil

Variable	T-statistics
Im & grol & real	**0.29**
Ex & real & grol	**0.8**
Emgdp & grol & cash	**0.5**
Emgdp & grol & real	**0.55**

Table11:7-11 t-statistics focusing on GDP growth of last year for Malaysia

Variable	T-statistics
Im & grol & real	**3.33*** **
Ex & real & grol	**2.93*** **
Emgdp & grol & cash	**-0.05**
Emgdp & grol & real	**3.25*** **

Table12:7-12 t-statistics focusing on GDP growth of last year for India

Variable	T-statistics
Im & grol & real	**1.88***
Ex & real & grol	**1.36**
Emgdp & grol & cash	**-0.56**
Emgdp & grol & real	**1.59**

Table13: 7-13 t-statistics focusing on cash surplus/deficit for Brazil

Variable	T-statistics
Emgdp & grol & cash	**0.19**
Im & cash	**0.16**

Table14: 7-14 t-statistics focusing on cash surplus/deficit for Malaysia

Variable	T-statistics
Emgdp & grol & cash	**5.87*** **
Im & cash	**6.62*** **

Table15:7-15 t-statistics focusing on cash surplus/deficit for India

Variable	T-statistics
Emgdp & grol & cash	**3.24*** **
Im & cash	**3.47*** **

Table16:7-16 t-statistics focusing on inflation for Brazil

Variable	T-statistics
Im & inf	**1.20**
Ex & inf	**1.75***

Table17:7-17 t-statistics focusing on inflation for Malaysia

Variable	T-statistics
Im & inf	**0.45**
Ex & inf	**1.42**

Table18:7-18 t-statistics focusing on inflation for India

Variable	T-statistics
Im & inf	**0.90**
Ex & inf	**0.90**

Table 19: 7-19 t-statistics focusing on trade openness for Panel data

Variable	T-statistics
Ex & inf	**5.13*** **
Ex & real & grol	**1.35**
Emgdp & real	**1.64**
Emgdp & grol & cash	**1.14**
Emgdp & grol & real	**1.79***

Table 20: 7-20 t-statistics focusing on the share of imports for Panel data

Variable	T-statistics
Im & real	**2.30****
Im & cash	**1.93***
Im & inf	**6.81*****
Im & grol & real	**2.33****

Table 21:7-21 t-statistics focusing on Real Interest Rate for Panel Data

Variable	T-statistics
Im & real	**-3.34*****
Im & grol & real	**-2.11****
Ex & real & grol	**-2.36****
Emgdp & real	**-3.54*****
Emgdp & grol & real	**-2.24****

Table 22:7-22 t-statistics focusing on GDP growth of last year for Panel Data

Variable	T-statistics
Im & grol & real	**5.16*****
Ex & real & grol	**5.21*****
Emgdp & grol & cash	**4.76*****
Emgdp & grol & real	**5.20*****

Table 23: 7-23 t-statistics focusing on cash surplus/deficit for Panel Data

Variable	**T-statistics**
Emgdp & grol & cash	**2.44**
Im & cash	**2.40****

Table 24:7-24 t-statistics focusing on inflation for Panel Data

Variable	**T-statistics**
Im & inf	**0.47**
Ex & inf	**0.11**

* Significant at %10
**Significant at %5
*** Statistically Significant

Chapter 8

CONCLUSION

According to results found by regression equations, in case of:

Brazil, there is a negative correlation between the share of imports in GDP, the share of the exports in goods and services in GDP and gross of capital formation in GDP. In general, as can be seen by results trade openness in GDP, in case of Brazil has negative impact on investment in contrary with theory. It can be as a result of higher interest rate in Brazil that makes the cost of borrowing higher for firms to be competitive to export. However, cash surplus has positive correlation with gross capital formation in GDP. It is obvious that foreign competitiveness of higher share of imports discourages domestic investment. Real interest rate has negative impact on investment and the GDP growth rate of last year leads to excess desired capital stock of firm's according to multiplier accelerator theory and inflation has positive correlation with investment maybe because firms will believe in increases in prices in the future as a result of inflation.

Malaysia, the share of imports in GDP has positive effect on investment, however; trade openness in GDP has negative and real interest has positive effect on gross capital formation in GDP. There is a positive correlation between cash surplus and investment as theoretically expected so it has positive impact on the rate of domestic investment. If budget deficit increase (as a percentage of GDP), this will have negative effect on investment rate. According to crowding out effect government is using available

financial savings to finance its own deficit so private sector has less financial resources to borrow from the bank to invest.

The GDP growth rate of last year has positive effect on investment. According to Multiplier accelerator theory of investment, if the growth of last year increases, it means last year sales and profits of firms increase, so desired capital stock of firm's increases as a result the share of gross capital formation in GDP increases.

India, the share of import goods and services in GDP, the share of export goods and services in GDP, in general, trade openness in GDP has positive impact on investment as theoretically expected. Trade openness in GDP helped private investors by reducing barriers on their potential and develops new opportunity for transferring ideas, technology and generate competition among intermediate producer to be more competitive.(Skipton,2007)[85]Cash surplus and GDP growth rate of lasts year have positive effect. Real interest rate has negative effect on investment according to theory.

According to panel regression result:

1-higher GDP growth rate of last year has positive effect on investment or gross capital formation in GDP theoretically expected and it is statically significant. According to Multiplier accelerator theory of investment, if the growth of last year increases, it means last year sales and profits of firms increase, so desired capital stock of firm's increases as a result the share of gross capital formation in GDP increases.

2- The higher share of Imports of goods and services as percentage of GDP has positive impact on investment accordance with theory and it is significant. It means that firms import more machinery.

[85]Dr. Chuck Skipton, 2007. Trade Openness, Investment, and Long-Run Economic Growth, University of Tampa.

3-The higher share of Exports of goods and services as percentage of GDP has positive effect on investment and it is significant according to theory.

4- The higher trade openness as percentage of GDP can have positive impact on investment theoretically expected.

5-Cash surplus/deficit as percentage of GDP or budget balance has positive impact on investment and it is significant according to theory.

6- Real interest rate has negative impact on investment theoretically expected and it is significant.

7-Inflation rate has positive impact on investment in contrary with theory and it is insignificant.

I make a suggestion according to panel data regression for increasing investment rate government should try to reduce their budget deficit to makes financial savings available for firm to be used for investment purposes. High GDP growth enables firms to invest more in coming year to increase their sales and profits and it results in increasing in their desired capital of stock so they will increase their investment. Another issue that helps investment is trade openness that means government should try to implement a trade policy that reduces trade barriers which makes it easier for firms to involve in trade as result it helps the firms improve their technology, knowledge and become more competitive.

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APPENDICES

Appendix A: Individual Regression Results

Brazil

1. The Effect of the share of the Imports of Good & Services in GDP and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1997 2010
Included observations: 14 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	20.85389	6.220505	3.352443	0.0064
Im	-0.088515	0.404603	-0.218770	0.8308
Real	-0.051764	0.039618	-1.306582	0.2180

R-squared	0.202444	Mean dependent var	17.35714
Adjusted R-squared	0.057434	S.D. dependent var	1.392681
S.E. of regression	1.352096	Akaike info criterion	3.628599
Sum squared resid	20.10981	Schwarz criterion	3.765540
Log likelihood	-22.40019	Hannan-Quinn criter.	3.615922
F-statistic	1.396067	Durbin-Watson stat	1.993959
Prob(F-statistic)	0.288195		

2. The Effect of the share of the Imports of Good & Services in GDP and Cash Surplus/Deficit on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1990 2009
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	22.97329	2.481457	9.257984	0.0000
Im	-0.446654	0.221764	-2.014098	0.0623
Cash	0.039146	0.231316	0.169234	0.8679

R-squared	0.213661	Mean dependent var	18.11111
Adjusted R-squared	0.108815	S.D. dependent var	1.936914
S.E. of regression	1.828496	Akaike info criterion	4.195877
Sum squared resid	50.15098	Schwarz criterion	4.344272
Log likelihood	-34.76289	Hannan-Quinn criter.	4.216338
F-statistic	2.037867	Durbin-Watson stat	1.249579
Prob(F-statistic)	0.164845		

3. The Effect of the share of the Imports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1961 2010
Included observations: 50 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	21.29926	1.601482	13.29971	0.0000
Im	-0.176333	0.167159	-1.054885	0.2969
Inf	0.000834	0.000694	1.200913	0.2358

R-squared	0.065736	Mean dependent var	19.92000
Adjusted R-squared	0.025980	S.D. dependent var	2.798250
S.E. of regression	2.761662	Akaike info criterion	4.927667
Sum squared resid	358.4585	Schwarz criterion	5.042388
Log likelihood	-120.1917	Hannan-Quinn criter.	4.971354
F-statistic	1.653483	Durbin-Watson stat	0.671853
Prob(F-statistic)	0.202320		

4. The Effect of the share of the Imports of Good & Services in GDP and The GDP Growth rate of Last Year and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1997 2010
Included observations: 14 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	20.44103	6.647500	3.074995	0.0117
Im	-0.075153	0.424998	-0.176831	0.8632
Grol	0.052371	0.178813	0.292881	0.7756
Real	-0.049269	0.042242	-1.166330	0.2705

R-squared	0.209227	Mean dependent var	17.35714
Adjusted R-squared	-0.028005	S.D. dependent var	1.392681
S.E. of regression	1.412047	Akaike info criterion	3.762915
Sum squared resid	19.93877	Schwarz criterion	3.945502
Log likelihood	-22.34040	Hannan-Quinn criter.	3.746013
F-statistic	0.881952	Durbin-Watson stat	2.005438
Prob(F-statistic)	0.482951		

5. The Effect of the share of the Exports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1961 2010
Included observations: 50 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	23.41754	1.238769	18.90388	0.0000
Ex	-0.406163	0.127443	-3.187027	0.0026
Inf	0.001090	0.000621	1.756416	0.0855

R-squared	0.213571	Mean dependent var	19.92000
Adjusted R-squared	0.180106	S.D. dependent var	2.798250
S.E. of regression	2.533760	Akaike info criterion	4.755411
Sum squared resid	301.7372	Schwarz criterion	4.870132
Log likelihood	-115.8853	Hannan-Quinn criter.	4.799097
F-statistic	6.381896	Durbin-Watson stat	0.893120
Prob(F-statistic)	0.003532		

6. The Effect of the share of the Exports of Good & Services in GDP, Real Interest Rate and The GDP Growth rate of Last Year on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1997 2010
Included observations: 14 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	24.61307	3.218532	7.647296	0.0000
Ex	-0.296407	0.162212	-1.827285	0.0976
Real	-0.084791	0.033790	-2.509338	0.0309
Grol	0.128891	0.159279	0.809212	0.4372

R-squared	0.405317	Mean dependent var	17.35714
Adjusted R-squared	0.226912	S.D. dependent var	1.392681
S.E. of regression	1.224520	Akaike info criterion	3.477932
Sum squared resid	14.99450	Schwarz criterion	3.660520
Log likelihood	-20.34552	Hannan-Quinn criter.	3.461030
F-statistic	2.271896	Durbin-Watson stat	2.982461
Prob(F-statistic)	0.142537		

7. The Effect of Trade Openness as a percentage of GDP and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1997 2010
Included observations: 14 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	24.61307	3.218532	7.647296	0.0000
ex	-0.296407	0.162212	-1.827285	0.0976
real	-0.084791	0.033790	-2.509338	0.0309
Grol	0.128891	0.159279	0.809212	0.4372

R-squared	0.405317	Mean dependent var	17.35714
Adjusted R-squared	0.226912	S.D. dependent var	1.392681
S.E. of regression	1.224520	Akaike info criterion	3.477932
Sum squared resid	14.99450	Schwarz criterion	3.660520
Log likelihood	-20.34552	Hannan-Quinn criter.	3.461030
F-statistic	2.271896	Durbin-Watson stat	2.982461
Prob(F-statistic)	0.142537		

8. The Effect of Trade Openness as a percentage of GDP, The GDP Growth rate of Last Year and Cash Surplus/Deficit on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1997 2010
Included observations: 14 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	24.61307	3.218532	7.647296	0.0000
Ex	-0.296407	0.162212	-1.827285	0.0976
Real	-0.084791	0.033790	-2.509338	0.0309
Grol	0.128891	0.159279	0.809212	0.4372

R-squared	0.405317	Mean dependent var	17.35714
Adjusted R-squared	0.226912	S.D. dependent var	1.392681
S.E. of regression	1.224520	Akaike info criterion	3.477932
Sum squared resid	14.99450	Schwarz criterion	3.660520
Log likelihood	-20.34552	Hannan-Quinn criter.	3.461030
F-statistic	2.271896	Durbin-Watson stat	2.982461
Prob(F-statistic)	0.142537		

9. The Effect of Trade Openness as a percentage of GDP, The GDP Growth of Last Year and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1997 2010
Included observations: 14 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	25.18084	4.545436	5.539806	0.0002
Emgdp	-0.177610	0.129970	-1.366551	0.2017
Grol	0.091561	0.165535	0.553124	0.5923
Real	-0.081155	0.038264	-2.120938	0.0599

R-squared	0.331579	Mean dependent var	17.35714
Adjusted R-squared	0.131053	S.D. dependent var	1.392681
S.E. of regression	1.298220	Akaike info criterion	3.594821
Sum squared resid	16.85375	Schwarz criterion	3.777409
Log likelihood	-21.16375	Hannan-Quinn criter.	3.577920
F-statistic	1.653547	Durbin-Watson stat	2.738925
Prob(F-statistic)	0.239155		

Malaysia

1. The Effect of the share of the Imports of Good & Services in GDP and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1987 2010
Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.68821	12.28803	1.113946	0.2779
Im	0.138841	0.138037	1.005825	0.3259
Real	0.631770	0.500519	1.262229	0.2207

R-squared	0.095846	Mean dependent var	28.04167
Adjusted R-squared	0.009736	S.D. dependent var	8.779815
S.E. of regression	8.736970	Akaike info criterion	7.289472
Sum squared resid	1603.027	Schwarz criterion	7.436729
Log likelihood	-84.47367	Hannan-Quinn criter.	7.328540
F-statistic	1.113066	Durbin-Watson stat	0.647543
Prob(F-statistic)	0.347172		

2. The Effect of the share of the Imports of Good & Services in GDP and Cash Surplus/Deficit on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1996 2009
Included observations: 14 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	25.22738	14.85820	1.697876	0.1176
Im	0.094135	0.158504	0.593894	0.5646
Cash	2.793694	0.421452	6.628740	0.0000

R-squared	0.820937	Mean dependent var	25.00000
Adjusted R-squared	0.788380	S.D. dependent var	7.951778
S.E. of regression	3.657987	Akaike info criterion	5.619112
Sum squared resid	147.1895	Schwarz criterion	5.756053
Log likelihood	-36.33379	Hannan-Quinn criter.	5.606436
F-statistic	25.21550	Durbin-Watson stat	0.974391
Prob(F-statistic)	0.000078		

3. The Effect of the share of the Imports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1987 2010
Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	18.31036	12.01522	1.523930	0.1424
Im	0.104397	0.140487	0.743108	0.4656
Inf	0.249804	0.552518	0.452120	0.6558

R-squared	0.036627	Mean dependent var	28.04167
Adjusted R-squared	-0.055123	S.D. dependent var	8.779815
S.E. of regression	9.018552	Akaike info criterion	7.352913
Sum squared resid	1708.020	Schwarz criterion	7.500170
Log likelihood	-85.23496	Hannan-Quinn criter.	7.391980
F-statistic	0.399208	Durbin-Watson stat	0.259378
Prob(F-statistic)	0.675835		

4.The Effect of the share of the Imports of Good & Services in GDP and The GDP Growth rate of Last Year and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1987 2010
Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.668855	10.20791	0.849229	0.4058
Im	0.118936	0.113572	1.047225	0.3075
Real	0.515753	0.412712	1.249669	0.2258
Grol	1.181144	0.354397	3.332822	0.0033

R-squared	0.418694	Mean dependent var	28.04167
Adjusted R-squared	0.331499	S.D. dependent var	8.779815
S.E. of regression	7.178546	Akaike info criterion	6.931083
Sum squared resid	1030.630	Schwarz criterion	7.127425
Log likelihood	-79.17299	Hannan-Quinn criter.	6.983172
F-statistic	4.801772	Durbin-Watson stat	1.282672
Prob(F-statistic)	0.011181		

5. The Effect of the share of the Exports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1961 2010
Included observations: 50 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	20.60036	2.788316	7.388100	0.0000
Ex	0.053646	0.036892	1.454129	0.1526
Inf	0.296159	0.207457	1.427571	0.1600

R-squared	0.091859	Mean dependent var	25.32000
Adjusted R-squared	0.053215	S.D. dependent var	7.600859
S.E. of regression	7.395857	Akaike info criterion	6.897842
Sum squared resid	2570.839	Schwarz criterion	7.012563
Log likelihood	-169.4460	Hannan-Quinn criter.	6.941528
F-statistic	2.377034	Durbin-Watson stat	0.323758
Prob(F-statistic)	0.103897		

6. The Effect of the share of the Exports of Good & Services in GDP, Real Interest Rate and The GDP Growth rate of Last Year on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1987 2010
Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	27.66900	10.51422	2.631578	0.0160
Ex	-0.079807	0.091314	-0.873993	0.3925
Grol	1.100819	0.374576	2.938837	0.0081
Real	0.321756	0.430259	0.747819	0.4633

R-squared	0.409377	Mean dependent var	28.04167
Adjusted R-squared	0.320783	S.D. dependent var	8.779815
S.E. of regression	7.235849	Akaike info criterion	6.946984
Sum squared resid	1047.150	Schwarz criterion	7.143326
Log likelihood	-79.36381	Hannan-Quinn criter.	6.999074
F-statistic	4.620848	Durbin-Watson stat	1.094778
Prob(F-statistic)	0.012989		

7. The Effect of Trade Openness as a percentage of GDP and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1987 2010
Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	31.12796	12.32783	2.525015	0.0197
Emgdp	-0.028420	0.063255	-0.449287	0.6578
Real	0.480257	0.521003	0.921794	0.3671

R-squared	0.061311	Mean dependent var	28.04167
Adjusted R-squared	-0.028088	S.D. dependent var	8.779815
S.E. of regression	8.902264	Akaike info criterion	7.326957
Sum squared resid	1664.256	Schwarz criterion	7.474214
Log likelihood	-84.92348	Hannan-Quinn criter.	7.366024
F-statistic	0.685814	Durbin-Watson stat	0.585931
Prob(F-statistic)	0.514610		

8. The Effect of Trade Openness as a percentage of GDP, The GDP Growth rate of Last Year and Cash Surplus/Deficit on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Date: 03/05/12 Time: 12:20
Sample (adjusted): 1996 2009
Included observations: 14 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	37.65924	16.21305	2.322774	0.0426
Emgdp	-0.017911	0.076979	-0.232674	0.8207
Grol	-0.016334	0.303512	-0.053817	0.9581
Cash	2.861164	0.486621	5.879656	0.0002

R-squared	0.816201	Mean dependent var	25.00000
Adjusted R-squared	0.761062	S.D. dependent var	7.951778
S.E. of regression	3.886932	Akaike info criterion	5.788073
Sum squared resid	151.0824	Schwarz criterion	5.970661
Log likelihood	-36.51651	Hannan-Quinn criter.	5.771172
F-statistic	14.80247	Durbin-Watson stat	0.909939
Prob(F-statistic)	0.000522		

9.The Effect of Trade Openness as a percentage of GDP, The GDP Growth of Last Year and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1987 2010
Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	19.13986	10.85221	1.763684	0.0931
Emgdp	-0.001344	0.053041	-0.025342	0.9800
Grol	1.199199	0.368019	3.258530	0.0039
Real	0.435103	0.431703	1.007876	0.3256

R-squared	0.386839	Mean dependent var	28.04167
Adjusted R-squared	0.294865	S.D. dependent var	8.779815
S.E. of regression	7.372615	Akaike info criterion	6.984434
Sum squared resid	1087.109	Schwarz criterion	7.180776
Log likelihood	-79.81321	Hannan-Quinn criter.	7.036524
F-statistic	4.205951	Durbin-Watson stat	1.231965
Prob(F-statistic)	0.018463		

India

1. The Effect of the share of the Imports of Good & Services in GDP and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1978 2009
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	15.15059	1.462062	10.36248	0.0000
Im	0.812669	0.062448	13.01347	0.0000
Real	-0.031009	0.157901	-0.196383	0.8457

R-squared	0.859999	Mean dependent var	25.31250
Adjusted R-squared	0.850344	S.D. dependent var	5.354754
S.E. of regression	2.071508	Akaike info criterion	4.383491
Sum squared resid	124.4432	Schwarz criterion	4.520903
Log likelihood	-67.13585	Hannan-Quinn criter.	4.429039
F-statistic	89.07084	Durbin-Watson stat	1.501887
Prob(F-statistic)	0.000000		

2. The Effect of the share of the Imports of Good & Services in GDP and Cash Surplus/Deficit on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1978 2009
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	15.15059	1.462062	10.36248	0.0000
Im	0.812669	0.062448	13.01347	0.0000
Real	-0.031009	0.157901	-0.196383	0.8457

R-squared	0.859999	Mean dependent var	25.31250
Adjusted R-squared	0.850344	S.D. dependent var	5.354754
S.E. of regression	2.071508	Akaike info criterion	4.383491
Sum squared resid	124.4432	Schwarz criterion	4.520903
Log likelihood	-67.13585	Hannan-Quinn criter.	4.429039
F-statistic	89.07084	Durbin-Watson stat	1.501887
Prob(F-statistic)	0.000000		

3.The Effect of the share of the Imports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1961 2010
Included observations: 50 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.14567	0.744348	16.31719	0.0000
Im	0.941816	0.048818	19.29248	0.0000
Inf	0.056605	0.062646	0.903570	0.3708

R-squared	0.888232	Mean dependent var	22.46000
Adjusted R-squared	0.883476	S.D. dependent var	6.344562
S.E. of regression	2.165755	Akaike info criterion	4.441539
Sum squared resid	220.4532	Schwarz criterion	4.556261
Log likelihood	-108.0385	Hannan-Quinn criter.	4.485226
F-statistic	186.7572	Durbin-Watson stat	1.082075
Prob(F-statistic)	0.000000		

4.The Effect of the share of the Imports of Good & Services in GDP and The GDP Growth rate of Last Year and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 19 50
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	14.39611	1.457279	9.878759	0.0000
Im	0.764355	0.065099	11.74147	0.0000
Real	-0.048505	0.151634	-0.319880	0.7514
Grol	0.257932	0.136620	1.887949	0.0694

R-squared	0.875809	Mean dependent var	25.31250
Adjusted R-squared	0.862502	S.D. dependent var	5.354754
S.E. of regression	1.985579	Akaike info criterion	4.326167
Sum squared resid	110.3907	Schwarz criterion	4.509384
Log likelihood	-65.21867	Hannan-Quinn criter.	4.386898
F-statistic	65.81946	Durbin-Watson stat	1.714537
Prob(F-statistic)	0.000000		

5. The Effect of the share of the Exports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1961 2010
Included observations: 50 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.65936	0.757287	16.71673	0.0000
Ex	1.048829	0.056838	18.45297	0.0000
Inf	0.059069	0.065155	0.906592	0.3692

R-squared	0.879093	Mean dependent var	22.46000
Adjusted R-squared	0.873948	S.D. dependent var	6.344562
S.E. of regression	2.252564	Akaike info criterion	4.520140
Sum squared resid	238.4800	Schwarz criterion	4.634861
Log likelihood	-110.0035	Hannan-Quinn criter.	4.563826
F-statistic	170.8637	Durbin-Watson stat	1.185237
Prob(F-statistic)	0.000000		

6 .The Effect of the share of the Exports of Good & Services in GDP, Real Interest Rate and The GDP Growth rate of Last Year on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 19 50
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	15.05898	1.679458	8.966574	0.0000
Real	-0.037800	0.177152	-0.213377	0.8326
Ex	0.843841	0.086897	9.710871	0.0000
Grol	0.220408	0.161663	1.363377	0.1836

R-squared	0.831574	Mean dependent var	25.31250
Adjusted R-squared	0.813528	S.D. dependent var	5.354754
S.E. of regression	2.312308	Akaike info criterion	4.630838
Sum squared resid	149.7096	Schwarz criterion	4.814055
Log likelihood	-70.09341	Hannan-Quinn criter.	4.691570
F-statistic	46.08174	Durbin-Watson stat	1.533306
Prob(F-statistic)	0.000000		

7. The Effect of Trade Openness as a percentage of GDP and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1978 2009
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	15.26980	1.517943	10.05953	0.0000
Emgdp	0.429826	0.034566	12.43495	0.0000
Real	-0.021560	0.164319	-0.131208	0.8965

R-squared	0.848775	Mean dependent var	25.31250
Adjusted R-squared	0.838345	S.D. dependent var	5.354754
S.E. of regression	2.152949	Akaike info criterion	4.460614
Sum squared resid	134.4205	Schwarz criterion	4.598027
Log likelihood	-68.36983	Hannan-Quinn criter.	4.506163
F-statistic	81.38333	Durbin-Watson stat	1.459324
Prob(F-statistic)	0.000000		

8.The Effect of Trade Openness as a percentage of GDP, The GDP Growth rate of Last Year and Cash Surplus/Deficit on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1990 2009
Included observations: 20 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	16.30227	1.700893	9.584536	0.0000
Emgdp	0.522441	0.048827	10.69975	0.0000
Grol	-0.134197	0.238171	-0.563450	0.5809
Cash	1.133884	0.348987	3.249069	0.0050

R-squared	0.914573	Mean dependent var	27.50000
Adjusted R-squared	0.898556	S.D. dependent var	5.633546
S.E. of regression	1.794303	Akaike info criterion	4.183966
Sum squared resid	51.51234	Schwarz criterion	4.383113
Log likelihood	-37.83966	Hannan-Quinn criter.	4.222842
F-statistic	57.09830	Durbin-Watson stat	2.135576
Prob(F-statistic)	0.000000		

9.The Effect of Trade Openness as a percentage of GDP, The GDP Growth of Last Year and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Least Squares
Sample (adjusted): 1978 2009
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	14.61798	1.533796	9.530589	0.0000
Emgdp	0.405589	0.036923	10.98472	0.0000
Grol	0.232787	0.145499	1.599924	0.1208
Real	-0.039050	0.160443	-0.243386	0.8095

R-squared	0.861442	Mean dependent var	25.31250
Adjusted R-squared	0.846596	S.D. dependent var	5.354754
S.E. of regression	2.097287	Akaike info criterion	4.435635
Sum squared resid	123.1611	Schwarz criterion	4.618852
Log likelihood	-66.97016	Hannan-Quinn criter.	4.496366
F-statistic	58.02692	Durbin-Watson stat	1.659801
Prob(F-statistic)	0.000000		

Appendix B: Panel Regression Results

1. The Effect of the share of the Imports of Good & Services in GDP and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Panel Least Squares
Sample (adjusted): 1978 2010
Periods included: 33
Cross-sections included: 3
Total panel (unbalanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	24.78173	1.464185	16.92527	0.0000
Im	0.053745	0.023361	2.300567	0.0245
Real	-0.151602	0.045362	-3.342060	0.0014

R-squared	0.285014	Mean dependent var	24.65714
Adjusted R-squared	0.263671	S.D. dependent var	7.344298
S.E. of regression	6.302112	Akaike info criterion	6.561559
Sum squared resid	2661.014	Schwarz criterion	6.657923
Log likelihood	-226.6545	Hannan-Quinn criter.	6.599835
F-statistic	13.35408	Durbin-Watson stat	0.262520
Prob(F-statistic)	0.000013		

2. The Effect of the share of the Imports of Good & Services in GDP and Cash Surplus/Deficit on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Panel Least Squares
Sample (adjusted): 1990 2009
Periods included: 20
Cross-sections included: 3
Total panel (unbalanced) observations: 52

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	25.20755	1.799502	14.00807	0.0000
Im	0.049436	0.025539	1.935711	0.0587
Cash	1.158661	0.480897	2.409373	0.0198

R-squared	0.152406	Mean dependent var	23.57692
Adjusted R-squared	0.117810	S.D. dependent var	6.806416
S.E. of regression	6.392924	Akaike info criterion	6.604222
Sum squared resid	2002.604	Schwarz criterion	6.716793
Log likelihood	-168.7098	Hannan-Quinn criter.	6.647379
F-statistic	4.405342	Durbin-Watson stat	0.264381
Prob(F-statistic)	0.017402		

3. The Effect of The share of Imports of Good & Services and Inflation on Gross Capital Formation

Dependent Variable: GROSS
Method: Panel Least Squares
Sample (adjusted): 1961 2010
Periods included: 50
Cross-sections included: 3
Total panel (balanced) observations: 150

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	19.52373	0.651369	29.97336	0.0000
Im	0.109105	0.016003	6.817752	0.0000
Inf	0.000609	0.001295	0.470406	0.6388

R-squared	0.241854	Mean dependent var	22.56667
Adjusted R-squared	0.231539	S.D. dependent var	6.301610
S.E. of regression	5.524113	Akaike info criterion	6.275920
Sum squared resid	4485.826	Schwarz criterion	6.336132
Log likelihood	-467.6940	Hannan-Quinn criter.	6.300382
F-statistic	23.44698	Durbin-Watson stat	0.235264
Prob(F-statistic)	0.000000		

4. The Effect The share of Imports of Good & Services and The GDP Growth of Last Year and Real Interest Rate on Gross Capital Formation

Dependent Variable: GROSS
Method: Panel Least Squares
Sample (adjusted): 1978 2010
Periods included: 33
Cross-sections included: 3
Total panel (unbalanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	18.78204	1.703042	11.02853	0.0000
Im	0.046495	0.019915	2.334690	0.0226
Grol	1.021211	0.197782	5.163325	0.0000
Real	-0.086006	0.040611	-2.117787	0.0380

R-squared	0.490728	Mean dependent var	24.65714
Adjusted R-squared	0.467580	S.D. dependent var	7.344298
S.E. of regression	5.358924	Akaike info criterion	6.250849
Sum squared resid	1895.392	Schwarz criterion	6.379334
Log likelihood	-214.7797	Hannan-Quinn criter.	6.301885
F-statistic	21.19896	Durbin-Watson stat	0.820730
Prob(F-statistic)	0.000000		

5. The Effect of the share of the Exports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Panel Least Squares
Sample (adjusted): 1961 2010
Periods included: 50
Cross-sections included: 3
Total panel (balanced) observations: 150

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	20.36920	0.659853	30.86930	0.0000
Ex	0.074271	0.014450	5.139920	0.0000
Inf	0.000161	0.001363	0.117770	0.9064

R-squared	0.154143	Mean dependent var	22.56667
Adjusted R-squared	0.142635	S.D. dependent var	6.301610
S.E. of regression	5.834914	Akaike info criterion	6.385393
Sum squared resid	5004.794	Schwarz criterion	6.445606
Log likelihood	-475.9045	Hannan-Quinn criter.	6.409856
F-statistic	13.39413	Durbin-Watson stat	0.238739
Prob(F-statistic)	0.000005		

6. The Effect of The share of Exports of Good & Services, Real Interest Rate and The GDP Growth rate of Last Year on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Panel Least Squares
Date: 02/05/12 Time: 10:07
Sample (adjusted): 1978 2010
Periods included: 33
Cross-sections included: 3
Total panel (unbalanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	19.57186	1.757795	11.13432	0.0000
Ex	0.022963	0.016974	1.352875	0.1807
Grol	1.055618	0.202491	5.213164	0.0000
Real	-0.098924	0.041844	-2.364101	0.0210

R-squared	0.463546	Mean dependent var	24.65714
Adjusted R-squared	0.439161	S.D. dependent var	7.344298
S.E. of regression	5.500083	Akaike info criterion	6.302849
Sum squared resid	1996.561	Schwarz criterion	6.431334
Log likelihood	-216.5997	Hannan-Quinn criter.	6.353885
F-statistic	19.01001	Durbin-Watson stat	0.830221
Prob(F-statistic)	0.000000		

7.The Effect of Trade Openness in GDP and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Panel Least Squares
Sample (adjusted): 1978 2010
Periods included: 33
Cross-sections included: 3
Total panel (unbalanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	25.54935	1.457120	17.53414	0.0000
Emgdp	0.017857	0.010839	1.647445	0.1041
Real	-0.163306	0.046065	-3.545125	0.0007

R-squared	0.258569	Mean dependent var	24.65714
Adjusted R-squared	0.236437	S.D. dependent var	7.344298
S.E. of regression	6.417603	Akaike info criterion	6.597878
Sum squared resid	2759.437	Schwarz criterion	6.694242
Log likelihood	-227.9257	Hannan-Quinn criter.	6.636155
F-statistic	11.68289	Durbin-Watson stat	0.264322
Prob(F-statistic)	0.000044		

8. The Effect of Trade Openness as a percentage of GDP, The GDP Growth rate of Last Year and Cash Surplus/Deficit on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Panel Least Squares
Sample (adjusted): 1990 2009
Periods included: 20
Cross-sections included: 3
Total panel (unbalanced) observations: 52

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	20.53382	1.824732	11.25306	0.0000
Emgdp	0.011209	0.009773	1.146909	0.2571
Grol	1.079264	0.226297	4.769232	0.0000
Cash	0.997414	0.407272	2.449009	0.0180

R-squared	0.411965	Mean dependent var	23.57692
Adjusted R-squared	0.375213	S.D. dependent var	6.806416
S.E. of regression	5.380029	Akaike info criterion	6.277068
Sum squared resid	1389.346	Schwarz criterion	6.427164
Log likelihood	-159.2038	Hannan-Quinn criter.	6.334611
F-statistic	11.20925	Durbin-Watson stat	0.771578
Prob(F-statistic)	0.000011		

9.The Effect of Trade Openness as a percentage of GDP, The GDP Growth of Last Year and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Panel Least Squares
Sample (adjusted): 1978 2010
Periods included: 33
Cross-sections included: 3
Total panel (unbalanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	19.20210	1.736660	11.05691	0.0000
Emgdp	0.016496	0.009200	1.793061	0.0775
Grol	1.043546	0.200531	5.203901	0.0000
Real	-0.092842	0.041361	-2.244651	0.0281

R-squared	0.474279	Mean dependent var	24.65714
Adjusted R-squared	0.450382	S.D. dependent var	7.344298
S.E. of regression	5.444785	Akaike info criterion	6.282639
Sum squared resid	1956.615	Schwarz criterion	6.411124
Log likelihood	-215.8924	Hannan-Quinn criter.	6.333675
F-statistic	19.84726	Durbin-Watson stat	0.828949
Prob(F-statistic)	0.000000		

Appendix C: Heteroskedasticity:

1. The Effect of the share of the Imports of Good & Services in GDP and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Panel Least Squares
Sample (adjusted): 1978 2010
Periods included: 33
Cross-sections included: 3
Total panel (unbalanced) observations: 70
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	24.78173	1.258481	19.69179	0.0000
Im	0.053745	0.031627	1.699333	0.0939
Real	-0.151602	0.029575	-5.126045	0.0000

R-squared	0.285014	Mean dependent var	24.65714
Adjusted R-squared	0.263671	S.D. dependent var	7.344298
S.E. of regression	6.302112	Akaike info criterion	6.561559
Sum squared resid	2661.014	Schwarz criterion	6.657923
Log likelihood	-226.6545	Hannan-Quinn criter.	6.599835
F-statistic	13.35408	Durbin-Watson stat	0.262520
Prob(F-statistic)	0.000013		

2. The Effect of the share of the Imports of Good & Services in GDP and Cash Surplus/Deficit on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Panel Least Squares
Sample (adjusted): 1990 2009
Periods included: 20
Cross-sections included: 3
Total panel (unbalanced) observations: 52
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	25.20755	1.544290	16.32307	0.0000
Im	0.049436	0.021336	2.317045	0.0247
Cash	1.158661	0.503754	2.300053	0.0257

R-squared	0.152406	Mean dependent var	23.57692
Adjusted R-squared	0.117810	S.D. dependent var	6.806416
S.E. of regression	6.392924	Akaike info criterion	6.604222
Sum squared resid	2002.604	Schwarz criterion	6.716793
Log likelihood	-168.7098	Hannan-Quinn criter.	6.647379
F-statistic	4.405342	Durbin-Watson stat	0.264381
Prob(F-statistic)	0.017402		

3. The Effect of the share of the Imports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Panel Least Squares
Sample (adjusted): 1961 2010
Periods included: 50
Cross-sections included: 3
Total panel (balanced) observations: 150
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	19.52373	0.553976	35.24294	0.0000
Im	0.109105	0.021276	5.128136	0.0000
Inf	0.000609	0.000548	1.110561	0.2686

R-squared	0.241854	Mean dependent var	22.56667
Adjusted R-squared	0.231539	S.D. dependent var	6.301610
S.E. of regression	5.524113	Akaike info criterion	6.275920
Sum squared resid	4485.826	Schwarz criterion	6.336132
Log likelihood	-467.6940	Hannan-Quinn criter.	6.300382
F-statistic	23.44698	Durbin-Watson stat	0.235264
Prob(F-statistic)	0.000000		

4. The Effect of the share of the Imports of Good & Services in GDP and The GDP Growth rate of Last Year and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Panel Least Squares
Sample (adjusted): 1978 2010
Periods included: 33
Cross-sections included: 3
Total panel (unbalanced) observations: 70
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	18.78204	1.701415	11.03907	0.0000
Im	0.046495	0.027173	1.711068	0.0918
Grol	1.021211	0.208418	4.899823	0.0000
Real	-0.086006	0.031282	-2.749396	0.0077

R-squared	0.490728	Mean dependent var	24.65714
Adjusted R-squared	0.467580	S.D. dependent var	7.344298
S.E. of regression	5.358924	Akaike info criterion	6.250849
Sum squared resid	1895.392	Schwarz criterion	6.379334
Log likelihood	-214.7797	Hannan-Quinn criter.	6.301885
F-statistic	21.19896	Durbin-Watson stat	0.820730
Prob(F-statistic)	0.000000		

5.The Effect of the share of the Exports of Good & Services in GDP and Inflation rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Panel Least Squares
Sample (adjusted): 1961 2010
Periods included: 50
Cross-sections included: 3
Total panel (balanced) observations: 150
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	20.36920	0.566822	35.93577	0.0000
Ex	0.074271	0.019017	3.905552	0.0001
Inf	0.000161	0.000510	0.314760	0.7534

R-squared	0.154143	Mean dependent var	22.56667
Adjusted R-squared	0.142635	S.D. dependent var	6.301610
S.E. of regression	5.834914	Akaike info criterion	6.385393
Sum squared resid	5004.794	Schwarz criterion	6.445606
Log likelihood	-475.9045	Hannan-Quinn criter.	6.409856
F-statistic	13.39413	Durbin-Watson stat	0.238739
Prob(F-statistic)	0.000005		

6.The Effect of The share of Exports of Good & Services, Real Interest Rate and The GDP Growth rate of Last Year on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Panel Least Squares
Sample (adjusted): 1978 2010
Periods included: 33
Cross-sections included: 3
Total panel (unbalanced) observations: 70
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	19.57186	1.811293	10.80547	0.0000
Ex	0.022963	0.023308	0.985218	0.3281
Grol	1.055618	0.229121	4.607250	0.0000
Real	-0.098924	0.033752	-2.930894	0.0046

R-squared	0.463546	Mean dependent var	24.65714
Adjusted R-squared	0.439161	S.D. dependent var	7.344298
S.E. of regression	5.500083	Akaike info criterion	6.302849
Sum squared resid	1996.561	Schwarz criterion	6.431334
Log likelihood	-216.5997	Hannan-Quinn criter.	6.353885
F-statistic	19.01001	Durbin-Watson stat	0.830221
Prob(F-statistic)	0.000000		

7.The Effect of Trade Openness as a percentage of GDP and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Panel Least Squares
Sample (adjusted): 1978 2010
Periods included: 33
Cross-sections included: 3
Total panel (unbalanced) observations: 70
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	25.54935	1.262639	20.23489	0.0000
Emgdp	0.017857	0.014419	1.238477	0.2199
Real	-0.163306	0.030908	-5.283698	0.0000

R-squared	0.258569	Mean dependent var	24.65714
Adjusted R-squared	0.236437	S.D. dependent var	7.344298
S.E. of regression	6.417603	Akaike info criterion	6.597878
Sum squared resid	2759.437	Schwarz criterion	6.694242
Log likelihood	-227.9257	Hannan-Quinn criter.	6.636155
F-statistic	11.68289	Durbin-Watson stat	0.264322
Prob(F-statistic)	0.000044		

8.The Effect of Trade Openness as a percentage of GDP, The GDP Growth rate of Last Year and Cash Surplus/Deficit on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Panel Least Squares
Sample (adjusted): 1990 2009
Periods included: 20
Cross-sections included: 3
Total panel (unbalanced) observations: 52
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	20.53382	1.168644	17.57064	0.0000
Emgdp	0.011209	0.010901	1.028225	0.3090
Grol	1.079264	0.275018	3.924340	0.0003
Cash	0.997414	0.350308	2.847244	0.0065

R-squared	0.411965	Mean dependent var	23.57692
Adjusted R-squared	0.375213	S.D. dependent var	6.806416
S.E. of regression	5.380029	Akaike info criterion	6.277068
Sum squared resid	1389.346	Schwarz criterion	6.427164
Log likelihood	-159.2038	Hannan-Quinn criter.	6.334611
F-statistic	11.20925	Durbin-Watson stat	0.771578
Prob(F-statistic)	0.000011		

9.The Effect of Trade Openness as a percentage of GDP, The GDP Growth of Last Year and Real Interest Rate on Gross Capital Formation in GDP

Dependent Variable: GROSS
Method: Panel Least Squares
Sample (adjusted): 1978 2010
Periods included: 33
Cross-sections included: 3
Total panel (unbalanced) observations: 70
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	19.20210	1.771262	10.84091	0.0000
Emgdp	0.016496	0.012664	1.302579	0.1972
Grol	1.043546	0.219964	4.744167	0.0000
Real	-0.092842	0.032800	-2.830533	0.0062

R-squared	0.474279	Mean dependent var	24.65714
Adjusted R-squared	0.450382	S.D. dependent var	7.344298
S.E. of regression	5.444785	Akaike info criterion	6.282639
Sum squared resid	1956.615	Schwarz criterion	6.411124
Log likelihood	-215.8924	Hannan-Quinn criter.	6.333675
F-statistic	19.84726	Durbin-Watson stat	0.828949
Prob(F-statistic)	0.000000		

Appendix D: Data

Brazil

year	im	inf	ex	cash	real	grolastyear	gross	emgdp
1960	7	..	7	..	..		20	14
1961	7	31	7	..	..		21	14
1962	5	79	4	..	..	10	20	9
1963	9	70	9	..	..	5	19	18
1964	6	94	6	..	..	1	19	12
1965	6	51	8	..	..	3	20	14
1966	6	39	7	..	..	3	20	13
1967	6	29	6	..	..	4	17	12
1968	7	27	6	..	..	5	19	13
1969	7	21	7	..	..	11	22	14
1970	7	17	7	..	..	10	21	14
1971	8	20	6	..	..	9	21	14
1972	9	19	7	..	..	11	21	16
1973	10	23	8	..	..	12	23	18
1974	14	35	8	..	..	14	25	22
1975	12	34	8	..	..	9	27	20
1976	9	48	7	..	..	5	23	16
1977	8	46	7	..	..	10	22	15
1978	8	41	7	..	..	5	23	15
1979	9	56	7	..	..	3	23	16
1980	11	87	9	..	..	7	23	20
1981	10	107	9	..	..	9	23	19
1982	8	105	8	..	..	-4	21	16
1983	9	140	11	..	..	1	17	20
1984	8	213	14	..	..	-3	16	22
1985	7	232	12	..	..	5	19	19
1986	6	145	9	..	..	8	19	15
1987	6	204	9	..	..	8	22	15
1988	6	651	11	..	..	4	23	17
1989	5	1,209	9	..	..	0	27	14
1990	7	2,735	8	-3	..	3	20	15
1991	8	414	9	2	..	-4	20	17
1992	8	968	11	-2	..	2	19	19
1993	9	2,001	11	-7	..	0	21	20
1994	9	2,252	10	-3	..	5	22	19
1995	9	94	7	..	..	5	18	16
1996	8	17	7	..	..	4	17	15

1997	9	8	7	0	66	2	17	16
1998	9	4	7	-4	79	3	17	16
1999	11	8	9	-3	66	0	16	20
2000	12	6	10	-2	48	0	18	22
2001	13	9	12	-2	45	4	18	25
2002	13	11	14	-1	47	1	16	27
2003	12	14	15	-4	47	3	16	27
2004	13	8	16	-2	43	1	17	29
2005	12	7	15	-4	45	6	16	27
2006	11	6	14	-3	42	3	17	25
2007	12	6	13	-2	36	4	18	25
2008	13	8	14	-1	36	6	21	27
2009	11	6	11	-4	37	5	17	22
2010	12	7	11	..	30	-1	19	23
2011	..	..	..	..	..	7	..	0

Malaysia

year	im	inf	ex	cash	real	grolastyear	gross	emgdp
1960	38	..	51	..	..		14	89
1961	41	-8	46	..	..		16	87
1962	42	-1	44	..	..	8	19	86
1963	41	-1	43	..	..	6	18	84
1964	39	2	41	..	..	7	18	80
1965	38	2	42	..	..	5	18	80
1966	36	-1	40	..	..	8	18	76
1967	35	0	37	..	..	8	18	72
1968	36	-3	39	..	..	4	18	75
1969	34	5	43	..	..	8	16	77
1970	37	0	41	..	..	5	20	78
1971	37	0	38	..	..	6	20	75
1972	35	0	34	..	..	6	21	69
1973	34	18	39	..	..	9	23	73
1974	45	13	46	..	..	12	28	91
1975	43	-3	43	..	..	8	23	86
1976	39	13	49	..	..	1	21	88
1977	40	7	47	..	..	12	23	87
1978	43	5	48	..	..	8	24	91
1979	46	12	55	..	..	7	26	101
1980	54	7	57	..	..	9	27	111
1981	58	1	52	..	..	7	32	110

1982	59	3	50	..	..	7	34	109
1983	56	5	50	..	..	6	34	106
1984	52	6	53	..	..	6	30	105
1985	49	-2	54	..	..	8	25	103
1986	49	-9	55	..	..	-1	23	104
1987	49	6	63	..	5	1	21	112
1988	56	4	66	..	5	5	24	122
1989	65	4	71	..	4	10	28	136
1990	72	4	75	..	5	9	32	147
1991	81	4	78	..	6	9	38	159
1992	75	2	76	..	8	10	35	151
1993	79	4	79	..	6	9	39	158
1994	91	4	89	..	5	10	41	180
1995	98	4	94	..	5	9	44	192
1996	90	4	92	1	6	10	41	182
1997	92	3	93	3	7	10	43	185
1998	94	8	116	-1	3	7	27	210
1999	96	0	121	-4	9	-7	22	217
2000	101	9	120	-4	-1	6	27	221
2001	93	-2	110	-4	9	9	24	203
2002	91	3	108	-5	3	1	25	199
2003	87	3	107	-5	3	5	23	194
2004	95	6	115	-4	0	6	23	210
2005	95	5	117	-4	1	7	20	212
2006	94	4	117	-3	3	5	20	211
2007	89	5	110	-3	1	6	22	199
2008	80	10	103	-5	-4	6	19	183
2009	75	-7	96	-6	13	5	14	171
2010	79	5	97	..	0	-2	21	176
2011	..	..	..	..	..	7	..	

India

year	im	Inf	ex	cash	real	grolastyear	gross	emgdp
1960	7	..	5	..	..		15	12
1961	6	2	4	..	..		15	10
1962	6	4	4	..	..	4	16	10
1963	6	8	4	..	..	3	16	10
1964	6	9	4	..	..	6	16	10
1965	5	-13	3	..	..	7	16	8
1966	7	13	4	..	..	22	16	11
1967	6	9	4	..	..	0	15	10

1968	5	2	4	..	..	8	14	9
1969	4	3	4	..	..	3	15	8
1970	4	2	4	..	..	7	16	8
1971	4	5	4	..	..	5	17	8
1972	4	11	4	..	..	2	16	8
1973	5	18	4	..	..	-1	16	9
1974	6	17	5	..	..	3	18	11
1975	7	-2	6	..	..	1	19	13
1976	6	6	7	..	..	9	19	13
1977	6	6	6	..	..	2	18	12
1978	7	2	6	..	11	7	21	13
1979	8	16	7	..	-1	6	21	15
1980	9	11	6	..	4	-5	19	15
1981	9	11	6	..	5	7	22	15
1982	8	8	6	..	8	6	21	14
1983	8	9	6	..	7	3	19	14
1984	8	8	6	..	8	7	21	14
1985	8	7	5	..	9	4	23	13
1986	7	7	5	..	9	5	23	12
1987	7	9	6	..	7	5	22	13
1988	8	8	6	..	8	4	24	14
1989	8	8	7	..	7	10	24	15
1990	9	11	7	-3	5	6	24	16
1991	9	14	9	-2	4	6	22	18
1992	10	9	9	-2	9	1	24	19
1993	10	10	10	-4	6	5	21	20
1994	10	10	10	-2	4	5	24	20
1995	12	9	11	-2	6	7	27	23
1996	12	8	11	-2	8	8	22	23
1997	12	6	11	-3	7	8	24	23
1998	13	8	11	-3	5	4	23	24
1999	14	4	12	-3	8	6	26	26
2000	14	4	13	-4	8	7	24	27
2001	14	3	13	-4	9	4	24	27
2002	15	4	14	-5	8	5	25	29
2003	16	4	15	-3	8	4	27	31
2004	19	9	18	-3	2	8	33	37
2005	22	4	19	-3	6	8	35	41
2006	24	6	21	-2	4	9	36	45
2007	24	6	20	0	7	9	38	44
2008	29	7	24	-5	6	10	35	53
2009	25	8	20	-5	4	5	36	45

2010	25	11	22	..	..	9	35	47
2011	..	..	..	..	..	9	..	..