

# *The Macrotheme Review*

*A multidisciplinary journal of global macro trends*

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## Determinants of GDP Growth in F5 Economies: Panel Data Analysis

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### Abstract

*In 2013 the Brazilian real, the Indonesian rupiah, the South African rand, the Indian rupee, and the Turkish lira declared by Morgan Stanley as the "Fragile Five". In other words they are the troubled emerging market currencies under the most pressure against the United States dollar. This definition also draws attention to some common ground: High inflation, weakening growth, large external deficits, and in some cases exposure to the China slowdown, and high dependence on fixed income inflows. The importance of emerging markets has a growing importance for the investors in stock markets. Because of high interest rates they attract foreign indirect investments. Each economy has different dynamics and although differentiation in some ways they have some common features. Fragile five F5 countries are depend on foreign investment to finance the current account deficit, which makes these countries more fragile. On the other hand with FED's reduction of quantitative easing, there is a problem like balance of payments positions, which become more difficult to finance and should be improved. According to Mishkin (2007) exchange rate is the price of one currency in terms of another, which affects an economy in different ways and its standard of living. Exchange rates are important because they affect the relative price of domestic and foreign goods. In order to maintain stable growth, countries should make more industrial production. In this case countries prefer worthless local currency to boost exports. In the study it's aimed to identify the determinants the fragile five economies' GDP Growth rate with panel data analysis. Between the terms of December 2005 –January 2014 the five countries gross domestic product (GDP) growth rate analyzed with eight explanatory variables.*

Keywords: Fragile five, economic growth, panel data

### 1. Introduction

Economic growth can be defined as an increase in the ability of a country or region in providing for the economic needs of the population. High or low economic growth can be measured by calculating the GDP. Especially in the world developing countries attracted the attention with their higher economic growth performances.

This is particularly so since the onset of global crisis in 2008. Volatile capital flows; increasing risk appetite among global investors, and news on the progress of crisis resolution in the advanced countries may give rise to increasing exchange rate volatility beyond the fundamental. A relatively shallow and inefficient domestic foreign exchange market often amplifies exchange rate overshooting. Excessive exchange rate movement has detrimental impact on the domestic

economy as well as on monetary and financial stability, and thus, managing the exchange rate cannot be based solely on manipulating interest rates. (Warjiyo, 178)

It is seen that concerns regarding the financial system increase with the unification in the world economy enabled by globalization. Recent financial crisis have caused changes in the balances of the countries as the developed and developing economies are affected from these crisis. The decisions taken by world's economy USA and USA's central bank Federal Reserve (FED) affect the whole world economies and mostly the economies of developing countries.

According to the results of current analyses, compared with the other Developing Countries (DC), DCs with relatively stronger macroeconomic basis (low budget deficit, low debt level, high reserves and strong economical growth) are more negatively affected by monetary tightening policy of FED (Eichengreen and P. Gupta, 2003). According to Nobel-winner economist Paul Krugman, these are the failure of especially USA and European Union (EU) not the countries called "fragile five" (Krugman, 2014). USA's printing credit money and incompetence to channelize this money to American market is one of the factors effective in spread of financial crisis. On the other hand, EU's weakening the economy with the contractionary monetary policy is also one of the factors affecting the global economy.

Recently 'fragile five' countries is the hottest topic discussed in the agenda of economy. Upon FED's bond tapering announcement on May 2013, India, Indonesia, Brazil, Turkey and South Africa are named as the countries mostly affected by this policy change. The currencies of these five countries, which have emerging market economies, have experienced the highest value loss after FED's policy change. Current deficit, budget deficit, inflation rate and growth performances of the countries may be listed among the other factors causing them to be categorized in this group.

Following these changes, these markets have experienced high capital outflow and the funds targeting these markets have significantly decreased. This has also increased the risk and fragility of fragile five countries which are majorly financing their capital movements. Moreover, quick outflow of hot money from these countries also highlighted the sustainability problem of external financing need. The countries with high external financing need have a significant obstacle in front of their growth and development. Fragile five countries ability to enable quick economical grow in the ongoing process shall be mainly possible with their success of removing their fragility. In this regard, a good analysis of fragility of countries and applying policies targeting to remove these fragilities are important to enable them getting less negatively affected from the current situation.

## **2. Experiences of the Fragile Five Countries**

Fragility concept has been used in economy to describe sensitivity of developing countries against shocks. As the studies analyzing fragility in economy have focused on fragility of DCs, fragility descriptions have also evolved within this direction (Guillaumont, 1999: 4).

In a report published by Goldman Sachs, an international investment bank, Wilson and Purushothaman (2003) projected that in the year 2050, total domestic incomes of BRIC countries (Brazil, Russia, India and China) would be bigger than total domestic incomes of USA, Japan, UK, France and Italy. After this report, the term BRIC has become a main subject studied frequently both in business world and academic world.

Since the beginning of 2000s, economic reforms have accelerated in many of the BRIC countries above stated. Between the years 2001 and 2007, abundant and cheap liquidity was utilized in global finance markets. Therefore emerging markets have become an attraction center for international capital and attracted serious investments. Starting in USA in 2008 and quickly spreading to Europe, Global Finance Crisis has deeply shaken the Western world although it didn't affect DCs very much at the beginning. It has been often mentioned that DCs considered in groups such as BRIC decoupled from USA and EU and thus were not affected by global crisis very much.

Later new abbreviation search in economy has continued. In the report dated August 1, 2013 issued by another investment bank, Morgan Stanley, Brazil, Indonesia, South Africa, India and Turkey were grouped as "*Fragile Five*". After this report, the abbreviation BIITS symbolizing the first letters of "*Fragile Five*" countries was started to be used in many economy pages. In addition to this common feature instability and uncertainties risk may also increase in these countries. (Eğilmez, 2013)

In addition to be being countries mostly affected by money policies of USA, their features such as high current deficit ratios, inflation ratios, worsening budget balance, increasing foreign debt load and slowing growth performances have played role in their being listed in this group (Stanley, 2013:10). Furthermore, it is projected that external financing need of BIITS countries shall increasingly continue in the following years. Morgan Stanley analyst James Lord projected that the increase of inflation ratios and current deficits of these countries causes a significant pressure on exchange rate and in the following periods, exchange rates shall lose value against foreign currencies (Lord, 2013:16-17). After FED's bond tapering on May, 22 2013, currencies of BIITS countries have lost value against foreign currencies and quick increases have been experienced on bond yields.

According to the April 2015 report of IMF (IMF, 2015) among the emerging economies, especially Brazil, Mexico, Indonesia, South Africa, Nigeria, Russia and Turkey stand out first with liquidity risk and financial risks. Company and household debts cause liquidity risk; financial risks are caused by loan/term ratio increase of banks.

The important factor underlying the inflationist process, emerging in some of the developing market economies and being especially visible in fragile five is the change of understanding of FED's money policy and the pressure created by capital outputs on exchange rates because exchange rate changes play an important role in transmission mechanism of money policy and cause a significant impact on consumer prices. If inflation is expected to realize over the target in the inflation target regime, reel interest ratios should be at least positive.

While central banks of Turkey, Brazil, India, Indonesia and South Africa are busy with increasing the interest ratios in order to cope with currency fluctuations, the governments have started to go through difficult internal reforms in order to attract needed long term investments (Financial Times). Some countries with high budget deficits have activated tightening finance policy. But the non-economical conditions in the fragile five countries (for example holding elections) have imposed the load of tightening on central banks.

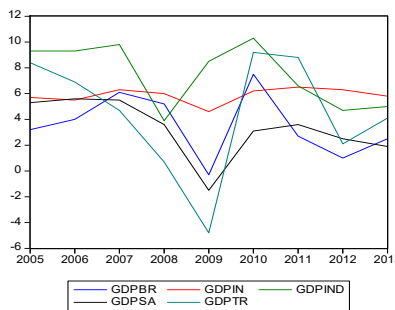
Upon realization of higher inflation than expected, Brazil, India and Indonesia have increased their interest ratios in order to brake the increase in the foreign currency rate, increase reliability of policy and remove the difficulties to enable external financing. On the other hand, some countries like Turkey are experienced high value loss in their currency due to the delays in

tightening policy. Funding current deficit with short term foreign investments instead of direct foreign investments have caused over valuation of national currency of the country so far when the fund inputs have increased. South Africa didn't increase the interest at the beginning in order not to interrupt growth potential but it had to increase the interest ratios upon increasing inflationist pressures although it was a bit delayed.

In terms of inflation rate, Turkey is observed as the second bad economy after India. Lowest growth and highest budget deficit has been experienced in South Africa, e highest current deficit has been observed on the economy of Turkey.

In the Graph 1 GDP growth rates of the F5 countries can be seen. As already mentioned the break in the growth rate can be seen in all of the countries. Also it can be said that countries still not able to capture the growth rates before the crisis. Also the most stable country with the between % 5-6 growth rate seen as India.

**Graph 1: GDP Growth of the F5 Countries**



Besides the economic crisis years of fragile five countries due to both their internal shocks and external shocks, current transactions balance has generally resulted with deficit. However, it is seen that as of mid 2010s, current transactions balance deficit's GDP ratio approached to the theoretical threshold (5%) in Brazil, Indonesia and India and exceeded threshold level in South Africa and Turkey.

As a common feature, fragile five countries have both budget deficits and current deficits, it may be also said that they have "double deficit". Having consumption based structure; economy of Turkey is fragile against current deficit, as do all economies with this feature. Funding current deficit with short-term foreign investments instead of direct foreign investments have caused over valuation of Turkish Lira so far when the fund inputs have increased.

***Brazil***

Brazilian economy has shrunk in the first quarter of 2015 as the inflation was high, public finance indicators continued to deteriorate and investments were low. While the growth has compared to the previous quarter shrank 0,2% in the first quarter of 2015 in Brazil due to slowing of internal demand and investments, Brazilian Central Bank has projected that due to the recent events, the economy will shrink 0,5% in the year 2015.

In Brazil where growth has lost acceleration in the recent months, Brazilian Central Bank, in spite of the concerns regarding the recession of the economy, increased the interest 6<sup>th</sup> time on June 3,2015 with the projection of increase in inflation and deteriorating risk perception. Policy

interest ratio was increased 50 basis point and risen to 13,75% level and reached to highest level of last 6 years. It was explained that the interest was increased due to the inflation rise concerns arising from tax increase and basis price checks and in order to ease the currency pressure on national currency quickly losing value recently. In May, the annual inflation of Brazil realized 8,5% which was the highest level since May 2005. The reason of Brazil's having lower inflation rate than Indonesia, South Africa, India and Turkey is because of its high reel interest policy application (IFF, 2014).

Simulation analysis based on the empirical results of the previous section suggests that fiscal policy in Brazil could help reduce real appreciation pressures over the long term. In particular, a 1 percent of GDP increase in public investment in Brazil would lead to a 1.7 percent real depreciation. However, this is roughly the same effect but with an opposite sign as a corresponding 1 percent of GDP deterioration of the structural balance. Thus, if both investment and the structural deficit were to increase by similar amounts, the REER would not change. In other words, increasing public investment could only help if accompanied by offsetting measures to generate savings (Badia and Ubiergo, 2014:5).

### ***South Africa***

Republic of South Africa has applied a prospective, comprehensive economical reform and development program after 1994. Many progresses have been experienced in many industries and the development is still in process.

Foreign investment transactions have been freed and simplified, except some exemptions, all industries of economy have been opened for foreign investment and incentive policies have been developed. Due to all of these developments, a big increase was observed both on portfolio and direct investments.

South African monetary policy authorities have in several occasions managed to bring the inflation rate within the target band of 3-6% after adopting inflation targeting framework in February 2000. Economic growth in these periods was not significant enough to reduce unemployment rate. In February 2010, the mandate of the South African Central bank was clarified with emphasis on taking a balanced approach, which considers economic growth when monetary policy authorities set interest rates. In the inflation-targeting era, the Central Bank has left the exchange rate to be determined by the market forces making it more volatile.

### ***India***

While many developing economies are struggling with low economic growth problem, India, on contrary to this countries continue growing. Growing 2,1% in the first quarter of the year, India's growth ratio in the same quarter has reached to 8,7% on the annual basis. Moreover, due to increasing market reliability in Indian economy, Moody's has raised India's loan view to "positive" from "constant". India is graded with low investment point and at the same level with Indonesia, Iceland and Turkey. This has increased the expectations in the biggest third economy of Asia which is experiencing a turnaround.

Exchange rates play a vital role in a country's level of trade, which is critical to almost every free market economy in the world. Therefore, exchange rates are among the most monitored, analyzed and governmentally manipulated economic measures. Exchange rate matters on a smaller scale as well: it impacts the real return of an investor's portfolio, profitability of firms, growth of specific sectors amongst various other determinants of the economy (Mirchandani 2013:172).

### ***Indonesia***

Since reasons for a crisis were different in several countries, it is natural that recovery processes were also different. It is well recognized that the crisis was most severe and the recovery took much longer in Indonesia than others. By several measures, Indonesia suffered most damages in the financial crisis of 1997-98. The value of Asian currencies other than the Indonesian rupiah recovered from January to mid-1998, and then they were stabilized at around 60 to 70% of the pre-crisis level by the mid-1998.

It was not only the exchange rate but also the inflation rate in Indonesia that was different from other countries. The inflation rate of Indonesia became very high for any country in 1998 and 1999 and remained higher than most Asian countries in the period from 2000 to 2003. Although the Indonesian exchange rate depreciated much more than other countries, inflation cancelled out some of price competitiveness that came from depreciation. By 2004, the real exchange rate of Indonesia became similar to that of Thailand, the Philippines, and Malaysia. The export advantage of Indonesia was completely offset by 2004. (Ito Kiyotaka Sato, 2006:5)

### ***Turkey***

Turkey is named among the fragile five countries due to the fragilities in its economy. Due to high inflation and current deficit problem of Turkish economy, it is thought that instead of sensitivity to external financing, money policy of the last five years and macro prudential measures targeting financial stability have created a positive economy environment. The dependency of growth ratios on short-term capital flow is emphasized and current transactions deficit and external financing dependent structure become visible. (IMF, 2014)

While a sudden decrease was experienced in the 2008 world economy crisis, it was later seen that a quick turnaround process followed in 2010.

Furthermore, after 2001, it was started to be discussed if the sources of growth in Turkey have created employment in addition to the growth. Although Turkey has had a quick increase in its growth ratio after 2001 crisis, the unemployment ratio hasn't shown a decrease trend and approached to 10% as of 2014.

Increase in its growth ratio of Turkey is also in parallel with the growth ratio of "emerging markets and developing countries". Moreover, during some periods, it has been observed over the market ratio. However, it is seen that the decrease in growth ratio of Turkey in 2012-2014 is lower than the ratio of "emerging markets and developing countries".

Short-term capital flows targeting economies classified under "emerging markets" including Turkey are claimed to be the main reason of increase in growth ratios. On the other hand, fragilities such as increase of current transactions deficit depending on short-term capital flows etc. accompany the aforementioned growth period.

### **3. Literature Review**

In the literature there are several studies analyzing the GDP growth rate but there are not much about the F5 countries' economic growth. Determinants or the types of GDP growth may vary from country to country. But especially for the F5 group, which has similar macroeconomic variables determining GDP growth, has importance because of the fragility of this countries.

Filho found that, given a Balance of Payment constraint on growth, an additional 1% of GDP growth requires a substantial increase of the real-exchange-rate in order for Brazil to keep its trade balance stable in relation to GDP. Even if Brazil had a higher trade surplus the situation would not be substantially different. In fact, the roots of the problem lay deeper, namely: on the price and income elasticity of Brazilian exports and imports. (Filho, 2004:77)

Onder and others (2014) analyzed the economic performance of F5 countries in their research. The research aimed to apply integrated ANP and TOPSIS to evaluate economic performance of F5 Countries to identify the fragility of them in economic recession period and beyond. Their model shows that although Turkey has the most fragile economy during great recession period, the performance of Turkish economy is relatively high than the other F5 countries. India has stable economy and generally it has a rank of 1 and 2. Indonesia is the best performing country in 2013.

Samuel and Nurina (2015) investigated the determinants of GDP in India. The study uses inflation, interest rates, and exchange rates as a explanatory variable of GDP. As a result there is a significant negative relationship of interest rates on GDP and a significant positive relationship of the exchange rates on the GDP, while inflation is not a significant influence on GDP.

Alfaro and his friends examined the various links among foreign direct investment (FDI), financial markets, and economic growth. They explored whether countries with better financial systems can exploit FDI more efficiently. The results between 1975 and 1995, shows that FDI alone plays an ambiguous role in contributing to economic growth. However, countries with well-developed financial markets gain significantly from FDI.

Grier and Tullock by using pooled cross-section/time-series data on 113 countries investigated empirical regularities in post-war economic growth. They found that coefficient values vary widely across identifiable groups of countries, with evidence supporting the convergence hypothesis apparent only in the OECD country sample. Another result of the study was the growth of government consumption is significantly negatively correlated with the economic growth in three of four subsamples, including the OECD, and that political repression is negatively correlated with growth in Africa and Central and South America.

#### 4. Methodology and Data

In this study we aimed to discover the determinant of GDP Growth. The study used the fixed effect model to explain the dependent variable. In this study, level values of the series were tested by unit root tested. In this study we used the monthly (December 2005 –January 2014) data set of F5 (Brazil, India, Indonesia, Turkey and South Africa). All data retrieved from World Bank.

To estimate Fixed Effect Model and variables are as follows;

*gdp<sub>it</sub>*; Gross domestic product and main components

*gs<sub>it</sub>*; Gross savings (% of GDP)

*ir<sub>it</sub>*; Interest rates

*fir<sub>it</sub>*; Imports of goods and services (% of GDP)/ Exports of goods and services (% of GDP)

*emp<sub>it</sub>*; Unemployment, total (% of total labor force)

$er_{it}$ ; Exchange rate

$inf_{it}$ ; Inflation rate- Consumer price index

$fdi_{it}$ ; Foreign direct investment, net inflows (BoP, current US\$)

$gge_{it}$ ; General government final consumption expenditure (% of GDP)

Before the estimation of panel model stationary of the variables tested. The variables, which are insignificant in the fixed effect model, haven't shown in the stationary table (exchange rate, inflation rate, foreign direct investment, general government final consumption expenditure). We use panel unit root tests to analyze whether the variables in the model are stationary or not. Table 1 shows the test results.

**Table 1** Unit Root Test

	gdp		gs		ir		ftr		emp	
	Int. Statistics	None	Int. Statistics	None	Int. Statistics	None	Int. Statistics	None	Int. Statistics	None
<b>Metot</b>	<b>Prob.</b>		<b>Prob.</b>		<b>Prob.</b>		<b>Prob.</b>		<b>Prob.</b>	
<b>Levin, Lin &amp; Chu</b>	-4.65 (0.00***)	-0.94 (0.17)	-1.62 (0.05**)	-1.15 (0.13)	-0.89 (0.19)	-3.42 (0.00***)	-2.09 (0.01***)	1.33 (0.91)	-4.33 (0.00***)	0.62 (0.73)
<b>Im, Pesaran and Shin W-stat</b>	-1.20 (0.12)		0.07 (0.53)		0.92 (0.82)		-0.33 (0.37)		-0.75 (0.23)	
<b>ADF - Fisher Chi-square</b>	16.47 (0.09*)	13.82 (0.18)	7.89 (0.64)	8.00 (0.63)	4.23 (0.94)	18.81 (0.05**)	11.41 (0.33)	2.68 (0.99)	14.36 (0.16)	11.60 (0.31)
<b>PP - Fisher Chi-square</b>	22.19 (0.01***)	16.37 (0.09)	9.96 (0.44)	8.88 (0.54)	2.98 (0.98)	23.87 (0.00***)	8.94 (0.54)	1.94 (1.00)	17.11 (0.07*)	40.21 (0.00***)

*The values in parentheses are the probabilities of the relevant test statistics. Test statistics indicate the variables are stationary at various levels; \*= $p < 0.10$ , \*\*  $p < 0.05$  and \*\*\*  $p < 0.01$ . The lag length is taken as (1) for "individual intercept test equation".*

The stationary of the variables in the model analyzed with panel unit root tests. The test results are given in Table 1. Null hypothesis that 'gross domestic product' 'gross savings' 'interest rate' 'foreign trade rate' and 'unemployment' include a unit root is accepted with a 5% level of significance. In relation to Lin ve Chu (LLC), Breitung, Im, Pesaran and Shin (IPS), Fischer-ADF and Fischer-PP tests it's seen that there are conflicted results and it's obtained that the series are not stationary in their level values.



Even the time series not stationary in level values, the difference of the series are taken to analyze the stationary and the results are listed in Table 2.

**Table 2** Unit Root Test of Difference of the Series

	dgdp		dgs		dir		dftr		demp	
	Int. Statistics	None	Int. Statistics	None	Int. Statistics	None	Int. Statistics	None	Int. Statistics	None
<b>Metot</b>	<b>Prob.</b>		<b>Prob.</b>		<b>Prob.</b>		<b>Prob.</b>		<b>Prob.</b>	
<b>Levin, Lin &amp; Chu</b>	-6.73 (0.00***)	-7.95 (0.00***)	-3.83 (0.00***)	-4.63 (0.00***)	-6.68 (0.00***)	-5.12 (0.00***)	-1.14 (0.13)	-3.87 (0.00***)	-3.20 (0.00***)	-4.00 (0.00***)
<b>Im, Pesaran and Shin W-stat</b>	-1.97 (0.02**)		-0.85 (0.20)		-2.33 (0.00***)		-0.67 (0.25)		-0.66 (0.26)	
<b>ADF - Fisher Chi-square</b>	22.99 (0.01***)	46.94 (0.00***)	15.24 (0.12)	30.26 (0.00***)	25.59 (0.00***)	29.10 (0.00***)	13.44 (0.20)	27.34 (0.00***)	14.35 (0.16)	31.45 (0.00***)
<b>PP - Fisher Chi-square</b>	49.21 (0.00***)	72.12 (0.00***)	33.42 (0.00***)	49.87 (0.00***)	33.64 (0.00***)	36.38 (0.00***)	26.77 (0.00***)	41.41 (0.00***)	23.24 (0.01***)	35.62 (0.00***)

*The values in parentheses are the probabilities of the relevant test statistics. Test statistics indicate the variables are stationary at various levels; \*= $p < 0.10$ , \*\*  $p < 0.05$  and \*\*\*  $p < 0.01$ . The lag length is taken as (1) for “individual intercept test equation”.*

Null hypothesis that ‘gross domestic product’ ‘gross savings’ ‘interest rate’ ‘foreign trade rate’ and ‘unemployment’ include a unit root is rejected with a 5 % level of significance in relation to Lin ve Chu (LLC), Breitung, Im, Pesaran and Shin (IPS), Fischer-ADF and Fischer-PP tests. All the variables that will be used in the model are stationary in their first differences due to this difference of the series are used in the panel model.

### 5. Findings

Panel date estimation allows us to use fixed effects to reveal the differences amongst units. Therefore we assume slope coefficients are fixed whereas intercepts of each country are different. The term fixed here means that parameter changes according to units but remain constant with respect to time. Unobservable individual effects arise as a result of explanatory variables in the model. Therefore; the differences among units present a regression equation modeled on the basis of parametric variation.

FE removes the effect of those time-invariant characteristics so we can assess the net effect of the predictors on the outcome variable.

Another important assumption of the FE model is that those time-invariant characteristics are unique to the individual and should not be correlated with other individual characteristics.

**Table 3** Redundant Fixed Effect Test

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	1.19611
Cross-section F	(0.338)
	7.271248
Cross-section Chi-square	(0.1222)
	3.596899
Period F	(0.00720) ***
	28.695938
Period Chi-square	(0.00100) ***
	3.421547
Cross-Section/Period F	(0.00000) ***
	37.728355
Cross-Section/Period Chi-square	(0.00000) ***

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*Values in parentheses under statistics are probability values of the statistics.*

*\*= $p < 0.10$ , \*\*  $p < 0.05$  and \*\*\*  $p < 0.01$ . To distinguish which fixed effect is significant, we subject the cross-section fixed effect and common intercept fixed effect models to redundant fixed effect test.*

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The results in Table 3 indicate that period fixed effects and common intercept and cross section fixed effects are significant. Therefore we accept the null hypothesis that fixed effects exist. So hereby we estimate fixed effect model.

**Table 4** Fixed Effect Model

<i>Dependent Variable; dgdp</i>			
<i>Fixed Effect Model</i>			
	<b>MODEL 1</b>	<b>MODEL 2</b>	<b>MODEL 3</b>
	<b>Period Fixed- Cross Section Fixed</b>	<b>Period Fixed</b>	<b>Cross Section Fixed</b>
	<b>(t-Statistic)</b>	<b>(t-Statistic)</b>	<b>(t-Statistic)</b>
<b>Independent Variables</b>	<b>[Prob.]</b>	<b>[Prob.]</b>	<b>[Prob.]</b>
<b>dgs</b>	0.555197 (-2.516913) [0.0189] ***	0.482889 -2.211762 [0.0353] ***	0.787974 -3.256494 [0.0027] ***
<b>dir</b>	-0.280208 (-1.846326) [0.0772] ***	-0.11628 (-0.885027) [0.3837]	-0.61985 (-3.728996) [0.0008] ***
<b>dftr</b>	20.59084 (-3.85532) [0.0008] ***	20.02742 -3.740649 [0.0008] ***	20.30296 -3.119917 [0.0039] ***
<b>demp</b>	-1.453215 (-2.534351) [0.0182] **	-0.98496 (-1.868312) [0.0722]	-1.811418 (-2.956406) [0.0059] ***
<b>c</b>	-1.290959 (-3.216079) [0.0037] ***	-1.000297 (-2.607208) [0.0145] ***	-1.734418 (-3.575152) [0.0012] ***
<b>R<sup>2</sup></b>	0.814632	0.777678	0.523207
<b>Akaike Info Criterion</b>	4.582142	4.563923	2.301147
<b>Schwarz Criterion</b>	5.257694	5.070587	2.551333
<b>F statistics</b>	7.031468	8.903965	12.39999
<b>N</b>	5	5	5

*Values in parentheses under coefficients are t statistics whereas; the values in square brackets*

*are probability values in relation to statistics. \*= $p < 0.10$ , \*\*  $p < 0.05$  and \*\*\*  $p < 0.01$*

With three fixed effect model results are listed in Table 4. Model 1 present's period and cross section fixed effects this effect varies by country and time. As the Model 2 indicates only the cross sections fixed and the term fixed here means that parameter changes according to units but remains constant with respect to time. Model 3 indicates one with only period fixed effect this effect constant by country but changes by time.

As can be seen in Table 4 among the three model results the highest R2 and the significant variables belong to Model 1.

Even all the coefficients of Model 1 are significant except “exchange rate” “foreign direct investment” and “general government final consumption expenditure” they omitted from the model.

**Table 5** Period Effect

<i>Period</i>	<b>Effect</b>
2006	-0.721141
2007	0.064445
2008	-2.037480
2009	0.184020
2010	3.998111
2011	-1.840866
2012	-1.292074
2013	1.644985

*The coefficients of Period Fixed Effect Model between 2006-2013 for 5 Fragile Five Countries.*

As can be seen in Table 5 according to the Model 1 the parameters of the Model show that the largest variation on GDP occurs in the year 2008. The degree of variation in descending order follows the years 2008, 2011, 2012, 2006, 2007, 2009, 2013 and 2010.

**Table 6** Cross Section Effect

<i>Country</i>	<b>Effect</b>
IND	0.782894
BR	-1.449328
IN	-0.393954
SA	0.996858
TR	0.063531

*The coefficients of Cross Section Fixed Effect Model between 2006-2013 for 5 Fragile Five Countries.*

As can be seen in Table 6 according to the Model 1 the constant term of the Model show that the largest variation on GDP occurs in South Africa and negative largest effect occurs in Brazil.

## 6. Conclusion

The main aim of this paper is to investigate the effect of macroeconomic indicators on Fragile Five Country's growth. The study includes five country between the terms of 2005-2013. In the study ‘gross domestic product’ is used as dependent variable and the ‘gross savings’, ‘inflation rate’, ‘foreign trade rate’, ‘unemployment’, ‘foreign direct investment’, ‘interest rate’, ‘general

government final consumption expenditure' and 'real effective exchange rate' as explanatory variable in order to estimate panel data regression.

The stationarity of the variables in the model analyzed with panel unit root tests. We noticed that variables are not stationary by 5% level of significance in relation to Lin and Chu (LLC), Breitung, Im, Pesaran and Shin (IPS), Fischer-ADF and Fischer-PP tests. It's obtained that the series are not stationary in their level values. Even the variables are not stationary in their level values; the difference of the series is taken into the analysis.

According to the Redundant Fixed Effect Test period fixed effects and common intercept and cross section fixed effects are significant. Therefore we accept that fixed effects exist. Even 'gross savings', 'interest rates', 'foreign trade rate' and 'unemployment' are significant but 'inflation rate', 'foreign direct investment', 'general government final consumption expenditure' and 'real effective exchange rate' are not significant according to fixed effect model on determining GDP. The most volatile variable is the 'foreign trade rate' according to the "period fixed" and "cross section fixed "(Model 1) by the (20.59084) coefficient. We estimated as a most proper model Fixed Effect Model (Model 1) with 0.81 coefficient of determination. According to the Model 1 the parameters of the model shows that the largest variation on GDP occurs in the year 2008. Also in accordance with the Model 1 the largest variation on GDP occurs in Brazil and negative largest effect occurs in South Africa.

As a result it can be said that including variables used in this paper to determine the GDP growth in fragile five countries the most effective variable is foreign trade rate. As expected foreign trade rate has a positive effect on GDP growth. Contrarily unemployment rate has negative effect on GDP growth. Variables, which are omitted in the model due to insignificance foreign trade rate, don't have a significant effect on GDP growth. This may be based on the lack of direct foreign trade in these countries. In developing countries exchange rate has a negative effect in the financial markets and also in economic development. As can be result of the model exchange rate is not significant.

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## **Appendix A.**

### Variable Definitions and Data Sources

#### **Gross savings (% of GDP)**

Gross savings are calculated as gross national income less total consumption, plus net transfers.

#### **GDP Growth (annual %)**

Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2005 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.

#### **Inflation, consumer prices (annual %)**

Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.

#### **Official Exchange Rate (LCU per US dolar, period)**

Official exchange rate refers to the exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to the U.S. dollar).

#### **Lending interest rate (%)**

Lending rate is the bank rate that usually meets the short- and medium-term financing needs of the private sector. This rate is normally differentiated according to creditworthiness of borrowers and objectives of financing. The terms and conditions attached to these rates differ by country, however, limiting their comparability.

**Imports of goods and services (% of GDP)**

Imports of goods and services represent the value of all goods and other market services received from the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments.

**Exports of goods and services (% of GDP)**

Exports of goods and services represent the value of all goods and other market services provided to the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments.

**Unemployment, total (% of total labor force)**

Unemployment refers to the share of the labor force that is without work but available for and seeking employment.

**Foreign direct investment, net inflows (BoP, current US\$)**

Foreign direct investment refers to direct investment equity flows in the reporting economy. It is the sum of equity capital, reinvestment of earnings, and other capital. Direct investment is a category of cross-border investment associated with a resident in one economy having control or a significant degree of influence on the management of an enterprise that is resident in another economy. Ownership of 10 percent or more of the ordinary shares of voting stock is the criterion for determining the existence of a direct investment relationship. Data are in current U.S. dollars.

**General government final consumption expenditure (% of GDP)**

General government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation