Dutch Disease as an impediment to Economic Growth of Pakistan

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ABSTRACT

This paper focuses on assessing the impact of Dutch Disease on economic growth of Pakistan. In the first step, Dutch Disease is detected and then examines its link with economic growth. Annual time series data from 1981 to 2016 is used for analysis from World Development Indicators (2016). Generalized Method of moment (GMM) is used for estimation as it addresses the endogeneity and hetroscadasticity problems in the data. The estimation of Dutch Disease at an aggregate and sector level provide evidence for hindrances to economic growth in Pakistan which is the main objective of the study. The results showed that Dutch disease is harmful for industrial sector which impede output and employment generation process and hence economic growth.

JEL Classification: *F36, F40, F43*

Keywords: *Foreign inflow. Economic growth, Real exchange rate, total factor productivity*

INTRODUCTION

Dutch disease is a phenomena when increase in natural resource abundance or foreign inflows which leads to appreciation in real effective exchange rate (REER) first. In the second step, this appreciation contracts the size of tradable and non-tradable sector expands. Cordon and Neary (1982) explained the idea as "adverse effect of non-booming (natural resources) sector to booming (agriculture & industrial) sector. The booming and non-booming sectors further explained in broader perspective. Booming sector includes existed available resources e.g. mining and non-booming involved agriculture and industrial sectors. These booming and non-booming sectors are called as traded sector. The non-traded sector is services sector, which consists of transport, financial services etc. Real exchange rate appreciation reduces the value of imported goods and domestic goods become expensive. This boosts the import expenditure and exports may be reduced and lead to contraction in the tradable sector. This contraction leads to decrease in output and employment level in the economy. Hence, Dutch Disease becomes harmful for economic growth of the country.

The mechanism of Dutch disease can be elaborated as: A) starting from increase in foreign financial inflows, it raises the income of different households. This improves the demand for goods and services and for labor. It would reduce the supply of labor in the market for other sectors. If the expenditure of household increases means services sector expand and this leads to increase the cost of producing industrial and agricultural goods and contract the tradable sector. Many economists through spending and the resource movement effect explain this channel. This may have positive/negative linkages by improving the productivity in production sector. B) Consumption effect is the other channel in explaining Dutch Disease effects.

Consumption effects can be explained as; Increase in prices of goods & services within the country boost the demand for imports. This raises the demand for more foreign currency,

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hence appreciates the real effective exchange rate of the concerned country. This rout also reduces the tradable portion of the economy. The mainstream economists explained different economic channels. This essay is to highlight the missing link between real exchange rate and economic growth of Pakistan.

The previous studies identified evidence of Dutch Disease in individual country as well as panel of different countries. The economists like White and Wignaraja (1992), Authokorala and Rajapatirana (2003), Rajan and Subramanian (2005) Lartey (2008), using panel and cross section data for different countries found mixed results. A single country analysis includes Oomes and Kalcheva (2007) and Algieri (2011) for Russia, Lartey (2007) for Sub Sahara Africa' found negative Dutch Disease effects. Ogun (1995) for Nigeria, Nyoni (1995) for Tanzania, Sackey (2001) for Ghana found no Dutch Disease effects.

 The main contribution of this study is not only to estimate Dutch Disease at aggregate level but also identifies which economic sector (agriculture, industry and services sector) is more affected through this disease. The highlighting feature of this study is to include the inclusive growth ideology. This led to observe impact of different sectors value added contribution on exchange rate and productivity.

This study is focused on increase in foreign inflows to show Dutch Disease evidence in Pakistan. Foreign inflows are important source of foreign exchange and important channel to enhance the productivity for developing countries. In Pakistan, remittances play pivotal role in the foreign exchange collection. Foreign inflows consist of foreign direct investment, official development assistance and worker remittances. The volume of remittance exceeds that of foreign direct investment and official development assistance. Remittances to Pakistan have seen a sharp and sustained rise in the recent years, increasing from under $1 billion in 1999 to over $19 billion today (State Bank of Pakistan, 2016). This has not gone without leaving its macroeconomic impact. This is then important to observe whether increased foreign inflows have any impact on the economic growth through increase in the productivity of the country concerned. When foreign inflows come in the economy, it increases the productive capacity and changes the consumption pattern of the economy concerned. It has its impact on production, consumption and infrastructure as well.

This study examines the annual time series data about foreign inflows and empirical evidence on the existence of the disease. Identifying the sector of production, which is impediment for economic growth, is another main finding of the paper. Taking proxy for economic growth as total factor productivity (TFP) as dependent variables whereas trade openness, terms of trade, aggregate foreign inflows, government expenditure, real effective exchange rate and broad money as the independent variables, this study seeks existence of Dutch Disease. The study empirically estimates Dutch disease effects in Pakistan between 1981 and 2015 and explore whether Dutch disease is impediment to economic growth or assisting the prosperity process in case of Pakistan.

This study helps businesses and policy makers in boosting exports of goods & services. It also helps the economists in knowing the mechanism behind the increase in prices of imported and exported goods. This study is relevant to the academic researcher in understanding the relationship between foreign inflows, real effective exchange rate and productivity growth. The study helps political government in designing policies with regard to accepting different foreign inflows needed and sectoral allocation for the economic growth.

The research work consists of five sections. The first section deals with the introduction of the study, section two reviews literature. Section three; deal with the research methodology whereas section four presents analysis and estimation. The last section concludes the overall results and suggestions based on the analysis.

LITERATURE REVIEW

Before discussing the gap in literature and justification of this study, following is the literature reviewed. Country wise evidence of Dutch Disease is observed in the literature.

Aghion et al (2009) investigated empirical evidence that real exchange rate volatility can have a significant impact on productivity growth. The study worked on 83 countries using annual data from 1960-2000. The study found that effects of real exchange rate on economic growth are insignificant. This study uses annual data of real exchange rate, government expenditure, terms of trade, trade openness, interactive variable like overvaluation with financial development and dummy variable of currency crisis. The study lacks further analysis on different characteristics of countries, which are different in nature, and terms of governance.

Attah-Obeng (2012) investigated exchange rate and economic growth relation in Ghana using data from1980 to 2012. The focus of this study is purely applying econometric tests on the variable. The presence of autocorrelation, hetroscadasticity and multicollinearity is tested. This study confirms the theory that depreciation encourages economic growth and appreciation is bad for the Ghanaian economy. The study establishes the econometric relationship and not investigated other linking factors and channels, which connect with economic growth. Productivity again would be the possible linking variable in this regard.

Azid et al (2005) investigated the link between exchange rate volatility and economic growth. The objective of the study was to determine the negative, positive or no relationship between these variables. Theory suggests a direct link between exchange rate volatility and economic performance in the presence of open economies. The study found a negative link between exchange rate volatility and economic growth in Pakistan. The study is important which provide evidence of volatile exchange rate have negative impact on the economic growth process. The study lacks to link this with productivity variable.

Brahmbhatt and Canuto (2010) worked on the impact of Dutch Disease on a project in the World Bank. This work on Dutch disease, reflect changes in the structure of production in thewake of a favorable shock (e.g., capital inflows). The annual time series data from 1973-2010 is used. The variables of interest are FDI, REM, ODA, GDPPCI, GEXP etc. This paper identified that manufacturing sector is based on the improvement in the productivities of different sectors. Dutch Disease is bad if productivity is not increased .As for as the policy is concerned they argued only those foreign financial inflows should be welcomed having no impact on the appreciation or depreciation in the real effective exchange rate. The study used model includes total factor productivity as dependent variable and export to import ratio, government expenditure and foreign inflows as the independent variable. Bayesian technique is used to estimate the effects or existence if Dutch Disease in the developing countries.

Botta et al (2015) investigated the economic growth process in Colombia. The study found the evidence of Dutch disease in the economy concerned. The study primarily worked on the

financial viability of the Dutch disease effects. The study found that real exchange rate appreciation and heavy increase in the foreign inflows put pressure on the economy and manages these pressures using productivity channel. The study only investigated the evidence of Dutch disease but not solidly tackle the issue why it occurred and how to resolve the issue if the problem continuously recurring.

Botta (2014) investigated medium term and long term macroeconomic impact of Dutch disease. The study focus on the effects of Dutch disease on financial markets. This study analyses foreign inflows and real exchange appreciation as impediment to economic growth in developing countries. The author laid stress on process of production and exports to control through real exchange rate stability. The results of the study suggest focusing on the stable exchange rate and controlled foreign inflows to achieve macroeconomic stability in the economy. The study recommends removing minimum wage regulation and supporting infrastructural investment raising overall factor productivity.

Cakrani (2013) investigated relationship between real exchange rate misalignment and government spending. The study assesses Albanian govt expenditure causing exchange rate to appreciate or depreciate. The study applied log linear model using quarterly data. The study found that govt expenditure appreciated the real exchange rate in Albanian economy since it has negative implication on employment. This study models the dependent variable (real exchange rate), with government spending, foreign direct investment, openness, remittances and real GDP per capita as independent variables. The results of the study were identifying factors responsible for a slowdown in the growth of TFP during the 90s are the effect of recent vintages of capital characterized by underutilization, fall in real public development expenditure and stagnation of manufactured exports. The paper suggested a package of policies designed to boost the growth in TFP and thereby enhance once again the growth rate of the economy.

Farid and Mazhar (2013) looked for symptoms of Dutch disease in the Pakistani economy taking into account. The methodology used by them captured endogeneity due to the managed float of Pakistani Rupee over the econometric issues in model suggested. The viewpoint is to address whether Remittances cause an appreciation of the real exchange rate or not. In addition, loss of competitiveness rises in tradable sector and improvement in the share of the non-tradable sector in the economy. The study did not cover the foreign domestic investment and official development assistance variables in this case. The study found that remittances and the remittances from Persian Gulf contribute to the Dutch disease in Pakistan. This paper confirmed the existence of Dutch disease in the Pakistan economy. They further argued that this appreciation in real effective exchange rate cause loss of competitiveness in the export of Pakistan.

Gala (2008) identified channels by which real exchange rate impact economic development and growth of different economies. The author argued investment and technological movement are two routes to develop. As a first step wages in the domestic economy is changed then it improved the saving and investment behavior. In the second step that increased consumption is financed by increasing external debt and hence declining trend in the economic growth. This study highlighted the causes of negative effect in developing economies on the balance of payment. GMM technique is used to estimate the real exchange rate and economic growth relation in Latin American countries. The variables used were GDP per capita, public

expenditure, real exchange rate overvaluation and lag variables.

The study considers foreign direct investment as component of total factor productivity. The results of study suggest that to benefit fully from the spillover effects of FDI, there should be greater emphasis placed on the type and quality of FDI. Higher FDI flows per se do not necessarily lead to better productivity. Human capital is assumed to bec important for getting benefits at optimum level.

Khan et al (2012) examined the effectiveness of exchange rate on macroeconomic variables of Pakistan. The study was conducted with objective that whether exchange rate is influencing the economic growth variables or not. The independent variables like trade, inflation, FDI and GDP is used for the years 1980-2009. Using co integration technique, the study found long-run equilibrium relationship between exchange rate and trade and FDI. The study also investigated the GDP and exchange rate relationship. The study ignores the role of tradable sector and productivity with real exchange rate.

Mughal and Makhlouf (2013) investigated the symptoms of Dutch disease for Pakistan using Bayesian analysis and found evidence for the disease using data from 1973-2010. The variables used were real effective exchange rate, foreign inflows including official development assistance, foreign direct investment and worker remittances, public spending, population growth, money growth, trade openness, terms of trade and gross domestic product per capita. The results confirmed the resource movement effects and consumption effects of Dutch disease.

The study by Munthali et al (2010) observed positive effects of exchange rate appreciation on the economic growth of Malawi. This research looked at relationship between real exchange rate, savings rate and economic growth. The author explained savings transmission mechanism and established a link in the country. They found that that real effective exchange rate (REER) volatility has adverse effects on economic performance. This means to say that an appreciated REER is significantly and positively correlated with economic growth. It is important to note that in case of Malawi; in the currency has negative impact on the saving and investment. Malawi is different economy as for as the comparison of economic features of the economy is concerned. The study used saving growth, investment growth and export growth as the variable under consideration.

Nicolas and Sosa (2013) examined the real exchange rate misalignment due to overvaluation and that led to lower growth. Regarding the effect of undervaluation of the exchange rate on economic growth, the study found mixed and inconclusive evidence. This study explained Dutch Disease using foreign inflows as main source.

Rajan and Subramanian (2011) observed the Dutch Disease effects on manufacturing growth. The study explained that real exchange rate appreciation slowed down the growth of manufacturing sector and economic growth in general. He took growth as dependent variable whereas country macroeconomic indicators, industry indicators, and aid related data as independent variable. The author used annual frequency and different data sources utilized. He further identified the channel by which appreciation lead to reduce the growth level. The cross-country data was used to analyze the economic situation. The study found that aid inflows caused loss of competitiveness. This paper estimated the function by using rajan and

Zingales methodology. The author also found that trade deficit and terms of trade caused problem in the economic growth process.

The above mentioned literature clearly showed that previous work is about Dutch disease evidence at an aggregate level and lesser is discussed on becoming impediment to economic growth. This study is the first for Pakistan which estimated three sector based evidence of Dutch disease and clearly states that industrial sector is more impacted through this disease.

STYLIZED FACTS

This study is about observing the relationship between Dutch Disease effects and factor productivity and other economic growth sectors contribution, which can be proxy for economic growth. Before exploring any relation, the study briefly explains some of economic facts about the Pakistan. This is all about importance of the study and relevance with economic growth. Figure 1 is about the trend of economic growth (GDPGR). The graph clearly shows the declining trend over a period during early and mid-nineteen's (90s) and then after 2007. In the first phase from 1980-1992, GDPGR is increasing and during 1993, 1997 and 2001, record decline in the economic growth. It starts increasing up to some extent after 2001 and decreased again in 2008. This leads to explore the causes behind that decrease. One of the factor may be decreasing trend in productivity lead to decrease the economic growth. During 2002-2006, there was no political government and foreign inflows especially workers' remittances were coming in the country. This may be due to increase in the level of government expenditure on the development projects, which increased the productivity as well. Nevertheless, the trend is again decreasing excluding the year before. One of the causes may be Dutch Disease effects.

Figure 1: Trend of Economic Growth
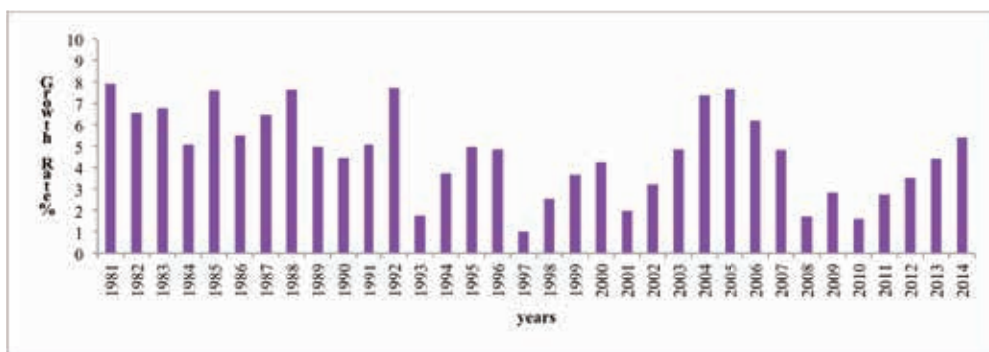
Economic growth is the annual growth rate of gross domestic product. Pakistan's economic growth was about 4.72 percent during 1981-2016. Eighties is the ideal period for economic growth (6.3%) whereas nineties and twenties remained below average growth. The decade from 1991-2000 is the worst period in Pakistan economic growth averaging at 3.9 percent. Currently GDP growth is increasing after reaching its minimum level (1.6%). The economic growth is continuously decreasing since mid-eighties. This was the period of structural adjustment in Pakistan and movement from fixed exchange rate to flexible exchange rate. One can ask a question by looking at the historical picture, what is the potential rate of growth for Pakistan? Although there is no consensus on it but I could say that this economy has the potential of at least 7-8% rate of growth as its maximum level. This potential is not utilized. This caused to explore the reasons or impediments to economic growth in Pakistan.

Figure 2: Trend of Foreign Financial Inflows
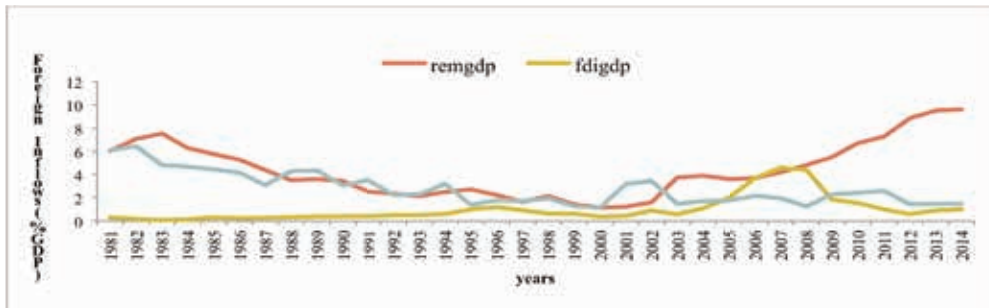
Foreign financial inflows play very important role in boosting the economic growth of developing as well as developed countries. The study considers three main types of inflows for Pakistan economy, workers' remittances, foreign direct investment and net official development assistance coming abroad. On average, remittances were about 4 percent of GDP, foreign direct investment i.0 percent and official development assistance about 2.8 percent of GDP during 1981-2016. Current decade shows that remittances (REM) growth is tremendous at 8.8 percent of GDP. Similarly, during 2000s, official development assistance (ODA) and foreign direct investment (FDI) was about 2 percent of GDP. As for as the volatility is concerned, remittances showed higher variation compared to FDI and ODA during the same period. It is interesting to note that FDI, ODA and REM showed increasing trend during early eighties and now in second decade of the twentieth century. The early nineties period was not good for foreign inflows. Further to this it is to observe that when remittances are high the ODA and FDI showed decreasing trend during the same period of analysis.

This graph showed that gap between tradable and non-tradable sector is increasing. It is important to note that, agriculture and manufacturing are included in tradable goods sectors whereas construction, electricity, gas, water, and all types of services are under the category of non-tradable goods sector. Figure 3 shown shares of tradable goods and non-tradable goods to total output between 1981 and 2014. There is an obvious declining trend in tradable sector where it dropped from 45.93% in 1981 to 39.0% in 2014. Non-tradable goods sector, on the other side, shows an inclining trend from 1981(46.5%) to 2014(53.5%). Expansion of non-tradable goods sector and contraction of tradable good sectors lead us to investigate Dutch disease. In 2006, tradable sector was 36.2% and the services sector was at its peak about 56.3% of GDP.

Figure 3: Trend of Tradable and Non-Tradable Sector
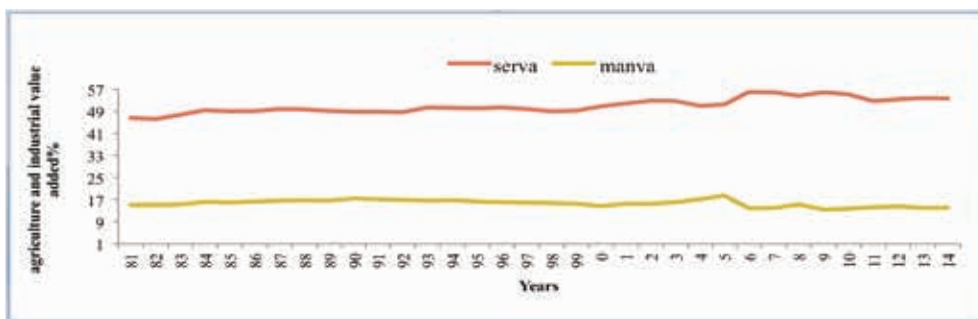
Figure 3: Trend of Tradable and Non-Tradable Sector

Figure 4: Trend of Real Effective Exchange Rate
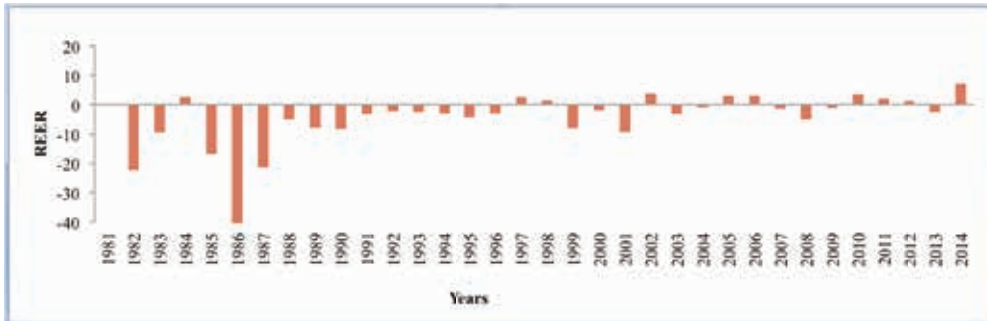
Real effective exchange rate (REER) is the price ratio of domestic to foreign currency. It can be bilateral or multilateral. Bilateral is the price ratio of two trading countries whereas multilateral is the sum of price ratios of different countries. The study estimated the REER using internal and external determinants and collected the actual series from Haver software. After comparing both series, it can be deducted that reer is mix of appreciation and depreciation in Pakistan. Government expenditure, money spending, terms of trade, trade openness and foreign inflows is taken as the determinants of REER. The difference between the estimated or equilibrium exchange rate and the actual REER gives the misaligned REER, which is shown in figure 4. The figure explains during eighties, more episodes of devaluation and same pattern is observed in nineties. Since2000s and onwards, Pakistani REER appreciated. This signifies the role of increase in foreign financial inflows and the appreciation in REER (Dutch Disease).

Figure 5: Trend of Sectoral Employment share
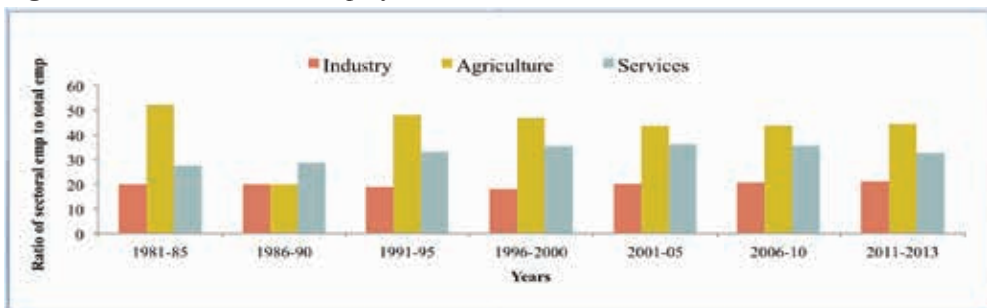
Sectoral employment explains the resource movement effect in Pakistan economic. It can easily be seen from figure 5 that agricultural sector employment decreased continuously whereas industrial employment level remained more or less the same and services sector employment increased significantly during the period of analysis. Agricultural sector employment was highest during eighties and services sector employment maximum is the current decade. Industrial sector employment that play key role in output growth remained stagnant. Industrial employment is below average and agriculture sector still show above average labor force.

Figure 6: Trend of Total Factor Productivity Growth (TFPG)
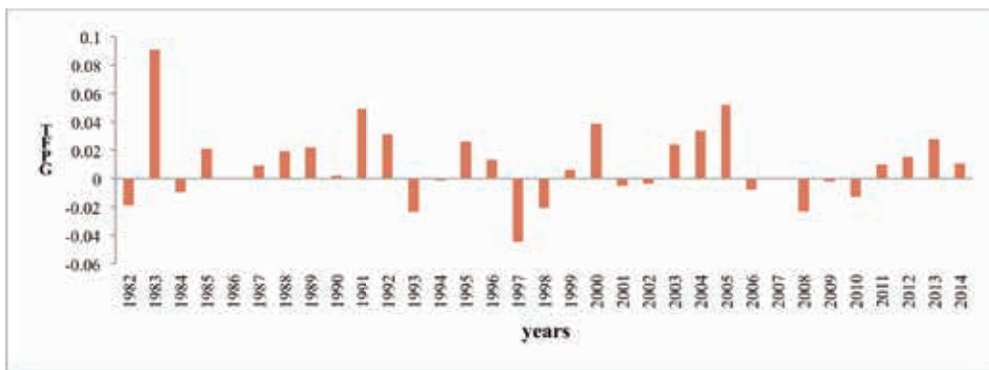
Total factor productivity is estimated using cob Douglas production function technique. The study assumed 40 percent share of capital and 60percent labor share. Depreciation is assumed 6% as according to literature. The growth in total factor productivity is calculated. The growth series gives an idea about decreasing trend during the whole period of analysis. The decade-wise analysis illustrates that TfP was relatively better in eighties than in rest of the periods. This fact also motivated to explore the reasons of low TFP in Pakistan. The study use TFP as proxy of economic growth that is again as per literature. The study would explore the relationship between TFP and REER misalignment. This would determine whether overvaluation lead to slow the economic growth or not.

Figure 7: Trend of Terms of Trade in Pakistan
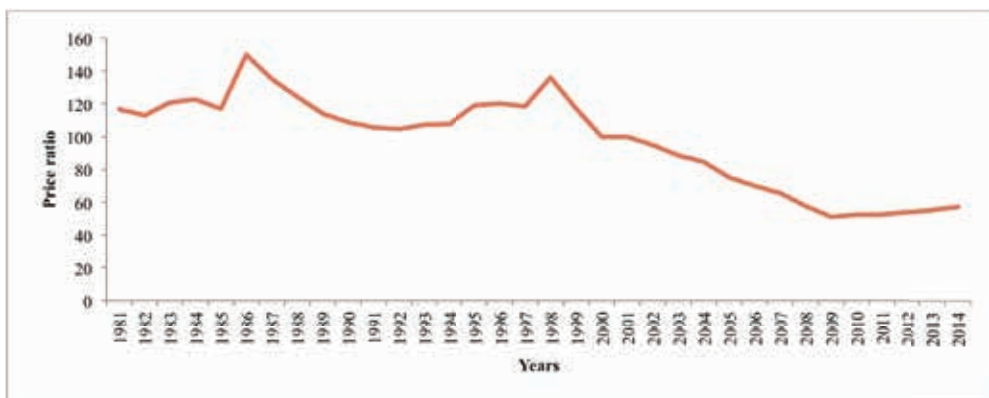
Figure 7 is about the trend of price ratio (price of exports to price of imports) in Pakistan. It can be easily seen that terms of trade are on declining trend. This means that export prices decreasing as compared to imports. This ratio actually directly affects the tradable and non-tradable sector. If the prices of exports are up to mark, domestic investor discouraged and contracts the output in the country of analysis and vice versa.

Figure 8: Trend of Investment Growth in Pakistan
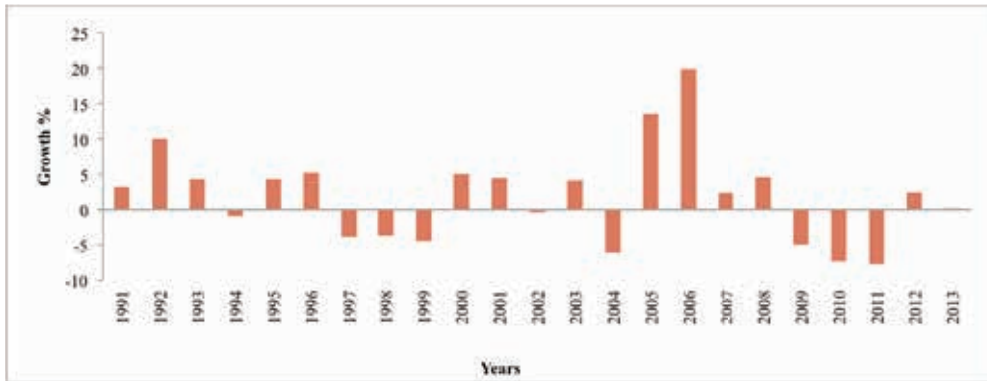
Trend of investment growth is shown in fig. This trend shows that during 1997-1999 and then from 2009-2011, investment growth was negative. This trend signified the financial crisis in the region. This means that investment domestic and/or foreign is restricted towards the country like Pakistan. The declining direction led to economic deprivation and lesser economic growth. It is also interesting to note that average annual growth during the period of analysis is about 2 percent with high volatility of about 6 percent during the same period. In 2005 and 2006 investment growth was excellent due to new political government because of the Shaukat Aziz. As far as the worst growth period is concerned, 2009-2011period, which was democratic political party regime. This may be due to the domestic scenarios. One can broadly say that investment behavior mostly depends on the domestic political and foreign regions environment.

DATA AND METHODOLOGY

Model Specification

As the study is divided into two parts, first detecting appreciation in REER and then observe the appreciated REER role in assessing the hurdle in economic growth. The impact of Dutch Disease on economic growth in Pakistan can be examined using a model. The model is specified thus:

$$REER = f\,(FDI, REM, ODA, M2\ GCE, TROP)\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..\ldots\ldots1$$
$$TFP\,(economic\ growth) = f\,(FI, EXR, GCE, TROP, TOT)\ \ldots\ldots\ldots\ldots\ldots.\ldots\ldots2$$

$$TFP = \alpha_0 + \beta_1 FI + \beta_2 REER + \beta_3 GCE + \beta_4 TROP + \beta_4 TOT + \mu\ldots\ldots\ldots\ldots\ldots3$$

Equation 1 is the functional relation between total factor productivity as dependent variable and FI as foreign inflows that is the sum of the three different financial inflows. i.e., Remittances (REM), foreign direct investment (FDI), and Official development assistance (ODA). Equation 2 is the estimated relationship where βs are the coefficients. These

elaborate the behavior of the productivity due to independent variables, which provide guidelines in designing the policy for the economy like Pakistan.

Total Factor Productivity (TFP)

To arrive at estimating the total factor productivity for the economy as a whole, aggregate TFP is estimated using capital share of 40% and depreciation at 6%. The different sector wise TFP is also calculated using the agricultural, industrial, services sector value added, assuming capital share, and rate of depreciation as taken together case.

Foreign Inflows (FI)

The study took annual time series for three kinds of foreign inflows. This data is collected using the Have Analytic software. The reason for estimating different foreign inflows for tin the regression is to capture the different impact. Since there is also connotation among the economist about the usefulness of the foreign inflows. Some economist is of the view that foreign inflows play key role and rest of the economist denied this claim. The expected sign for the foreign inflows with TFP is positive.

Exchange Rate (REER)

The annual time series for the real effective exchange rate and the nominal exchange rate is collected from the same source (Haver analytic). The increase in it is the depreciation and increase in REER is the appreciation. Appreciation in REER is causing the tradable sector to shrink, de-industrialization, and low per capita and hence low level of economic growth. The expected sign for the REER is negative.

Terms of Trade (TOT)

Annual time series for the terms of trade is collected from the same source. It is the ratio of price of exports to price of imports. Increase in this ratio improvement in the TOT and vice versa. This has a positive expected relation with the TFP. Some economist argued that TOT has negative relation with TFP.

Government Expenditure

This measure the amount government expends yearly on necessities and important socio-economic infrastructures such as roads, housing, electricity, water, etc. It has the impact in economic growth and productivity of the country concerned. It has theoretically positive relation with the TFP.

Trade Openness (TROP)

Trade openness is the ratio of sum of exports and imports to gross domestic product. This ratio expected relation with TFP would be positive. Since increase in the TROP may lead to increase in the output and productivity. The developed countries and developing countries have different experiences on this argument.

Misaligned REER (MISAL)

This variable is constructed to using actual series for real effective exchange rate and the estimated for equilibrium exchange rate series. The difference between equilibrium and actual REER is the misalignment. The positive values or more increase in the actual series reduces the difference and showing decrease in reer hence the depreciation and vice versa. Appreciation in reer is the sign of Dutch disease effect. If it is causing TFP to decease hence, is impediment to economic growth and vice versa.

Methodology

In this essay, time-series analysis is done to analyze the effects of real effective exchange rate (REER) and other control variables on total factor productivity (TFP) in Pakistan. The econometric methodology will be separated into two parts, where the first part is to examine the effect of foreign financial inflows on REER (spending effect) and the resources reallocation effect of Dutch disease by using sectoral analysis on the output of tradable and non-tradable sectors whereas the second part is to observe the aggregative as well as the sectoral impact of productivity (proxy for economic growth) with REER appreciation.

In the first part, Real Effective Exchange Rate (REER) will be used as the dependent variable. Then, observe how different foreign inflows and other variables (inflation rate (M2), Trade openness (TROP), terms of trade (TOT), government expenditure (GEXP) and foreign inflows (FI)) affect the dependent variable. The REER index is directly collected from the World Bank with the base year of year 2005. We then convert its base year into year 2000 for data consistency purpose.

For computing foreign inflows contribution in gross domestic product (GDP), foreign direct investment, official development assistance and remittances as a share of GDP is collected by dividing all the independent variables with the nominal GDP in constant USD. Both of the data are also adopted from world development indicators (WDI) of the World Bank. The data of labor and capital is collected from the handbook statistics for fifty years of Pakistan published by state bank to calculate the productivity of concerned period. For the sectoral estimations, this paper use value added data as a share of GDP for the agriculture, manufacturing and services sectors as the dependent variables (WDI database). Other variables are the trade openness (Trop), terms of trade (TOT), GDP per capita (GDPPC), GDP growth, money and quasi money (M2) and general government expenditure (GEXP).

ESTIMATION AND RESULTS

Table 1a: Summary Statistics

	Observations	Mean	Std. Dev.	Minimum	Maximum
LREER	34	4.84	0.30	4.57	5.57
LTOT	34	4.53	0.33	3.93	5.01
LTROP	34	3.53	0.07	3.34	3.66
M2	34	3.75	0.08	3.62	3.90
REMGDP	34	4.36	2.42	1.16	9.65
LODAGDP	34	0.91	0.49	0.13	1.86
LFDIGDP	34	-0.44	0.93	-2.58	1.52
LGEXP	34	2.41	0.19	2.05	2.82

This table 1a explained the descriptive statistics among different variables. Summary statistics help in understanding the problem discussed and finding trends of the variables of interest. The data set consists of 34 observations (column 1). Column 2 is about the average values of the variables. REER, TOT and REM have the largest mean value and ODA & FDI have smallest mean value. Similarly, standard deviation of of TOT, TROP and Government expenditure is lowest during the same period. The standard deviation explains the distance from target value. FDI and REM obtain the maximum distance in terms of standard deviation. Column 3 and column 4 are about the range of the variables movements. It is interesting to note that foreign financial inflows contain largest ranges whereas M2 and TROP have smallest ranges over the same period of analysis. The summary statistics gives an overview about the raw data, the direction and the magnitude of their variations. This helps in identify which variable is to transform and up to what extent its transformation worked.

Table 1b: Correlations

	LREER	**LM2**	**LGEXP**	**LREMGDP**	**LTOT**	**LTROP**	**LFDIGDP**	**LODAGDP**
LREER								
LM2	-0.25							
LGEXP	0.38	-0.20						
LREMGDP	0.31	-0.28	0.10					
LTOT	0.60	0.18	0.42	-0.45				
LTROP	0.19	0.23	0.64	-0.03	0.30			
LFDIGDP	-0.76	0.34	-0.36	-0.06	-0.66	0.01		
LODAGDP	0.79	-0.35	0.36	0.24	0.45	0.14	-0.63	

Table 1b, is the cross correlations, illustrates the strength of relationship among different variables. This gives an idea whether regressions and co integration workable or not. If the strength of correlations is more than 60 percent then may cause multicollinearity and endogeneity problem in the analysis. Since the main objective of the study is to establish the Dutch disease and prove it as impediment to economic growth. REER worked as dependent variable and rest of the variables as explanatory. TROP shows low correlation with the REER and rest of the variables has very strong relationship. Foreign inflow and M2 showed negative cross correlation. Again, this negative relationship gives a clue to investigate the Dutch disease effects on economic growth.

Table 2: Unit Root Tests

	ADF- Level (Prob)				**ADF-Ist Difference (Prob)**	
	Constant		**Constant & trend**		**Constant**	
	T-stat	Prob	T-stat	Prob	T-stat	Prob
FDI	-1.44	0.55	-3.66	0.04	-4.81	0.00
REM	-0.63	0.85	-0.72	0.96	-4.24	0.00
ODA	-2.66	0.09	-3.79	0.03	-6.92	0.00
REER	-4.01	0.00	-1.14	0.91	-3.46	0.02
TOT	-0.14	0.94	-2.41	0.37	-5.05	0.00
TROP	-2.79	0.07	-3.05	0.13	-8.61	0.00
GEXP	-1.37	0.59	-1.66	0.75	-4.76	0.00
M2	-2.72	0.08	-2.61	0.28	-5.21	0.00

Table 3a: Dutch Disease through Spending Effect

	Model 1		Model 2	
	Coef	Prob	Coef	Prob
Constant	2.99	0.07	3.27	0.08
REM	0.30	0.00		
FDI	-0.01	0.82		
ODA	0.16	0.01		
FI			0.52	0.00
M2	-0.79	0.08	-1.04	0.01
TROP	0.52	0.19	0.32	0.39
TOT	0.75	0.00	0.90	0.00
GEXP	-0.40	0.03	-0.32	0.12

Augmented Dickey Fuller (ADF) test for unit root is applied to observe the stationarity of variables in table 2. While analyzing the variables in time series unit root test is important to apply suitable technique of estimation. The study indicate that ODA and REER are integrated of order zero i.e., I (0) and remaining variables are integrated of order one i.e., I (1). This means simple OLS would not estimate unbiased coefficients. Then using Geometric method of moments, (GMM) is applied. Furthermore, there is no series integrated of order 2 i.e. I (2). This means that variables are not explosive. Table 2 depicts the unit root testing among the mentioned variables. All the variables are stationary at ist difference.

Table 3(a) is to illustrate the Dutch disease effects through spending. It is important to note that real exchange rate appreciation lead to increase the spending of household. This show the way forward to let the imports cheaper and consumer find domestic product expensive. Ultimately tradable sector discouraged and contraction in tradable sector occur. Table 3(a) shows that REER is appreciated due to increase in different foreign inflows aggregative and separately as well. Model 1 is estimated for separate impact of FI and model 2 is for aggregative FI. In both cases foreign inflows appreciates the REER. It is to keep in mind that REER appreciation means increase and depreciation means decrease in REER. Terms of trade (TOT) explain positive role with REER whereas government expenditure (GEXP) negative role with REER. This can be explained as increase in GEXP lead to depreciate the REER and vice versa. GMM estimation captures the endogeneity and heroscadasticity in the model. Haussmann test also justifies the identification problem. The errors are in normal range i.e. jarque Berra is 0.23.

Table 3b: Dutch Disease through Resource Movement Effect

	Model 1							Model 2					
	Agriculture sector		Industrial sector		Services sector			Agriculture sector		Industrial sector		Services sector	
	coef	Prob	coef	Prob	coef	Prob		coef	Prob	coef	Prob	coef	Prob
constant	4.68	0.00	4.31	0.00	2.74	0.00	constant	6.15	0.00	1.97	0.03	2.68	0.00
REM	0.03	0.01	-0.04	0.02	0.01	0.29	FI	0.02	0.52	-0.06	0.01	0.03	0.01
ODA	-0.03	0.32	-0.04	0.20	0.03	0.02	TROP	-0.03	0.80	0.28	0.09	-0.02	0.76
FDI	-0.03	0.01	0.01	0.77	0.01	0.05	GDP	-0.16	0.00	-0.08	0.00	0.10	0.00
GDP	-0.13	0.00	-0.13	0.00	0.10	0.00	M2	-0.29	0.06	0.23	0.28	0.03	0.69

Table 3b is about estimating the Dutch disease effect through resource movements. GMM technique is used to estimate the equation. The need for using this technique is to cover the endogeneity and heroscadasticity issues. The equation contains REER as dependent variable

and the explanatory variables like foreign financial inflows, GDP, TROP and M2. Model 1 is about sector impact of different foreign inflows and GDP variables. The negative coefficient of REM on industrial sector shows contracting the tradable sector and positive coefficient for services and agriculture depicts expansion in the non-tradable sector. Model 2 is about estimating the sectoral impact taking foreign inflows as aggregate (FI). Again, FI shows negative coefficient for industrial sector and positive for the other two sectors. Since it has already been established that REER is appreciated in Pakistan during the period of analysis, as a second step it is easily comprehended that its impact in the industrial which is the important part of tradable sector. Another important policy variable is to be noticed that GDP increase is going to decrease the industrial output and provide little jump to services sector output. Money supply on the other hand illustrate insignificant role in real sectors. The estimates consider the impact of foreign inflows on REER and then REER misalignment series. This can be observed that REER appreciation empirically showing negative relationship with TFP. This verifies the main hypothesis of the study as impediment to economic growth in Pakistan. The alternative methodology is also used to estimate the relationship for robustness check[3].

Table 4: From Overvaluation to TFP Growth.

	Model 1		Model 2	
	coef	Prob	coef	Prob
Constant	0.30	0.00	0.319	0.000
REM	-0.01	0.01		
FDI	0.00	0.41		
ODA	-0.01	0.00		
FI			-0.002	0.656
M2	0.05	0.03	-1.042	0.011
TROP	0.00	0.99	0.055	0.065
TOT	-0.05	0.00	-0.032	0.002
REER	-0.03	0.00	-0.037	0.001
GEXP	0.02	0.13	-0.013	0.282

After detecting the Dutch Disease in Pakistan, the study focus is on explaining the channel of total factor productivity (TFP) in economic growth. The series for total factor productivity has been estimated and its graph is explained in the stylized facts. The study investigates the link between real exchange rate overvaluation and TFP. The determinants of TFP are TROP, M2, human capital, financial inflows proxies as REM, ODA, FDI, and foreign prices (Edwards, 1998). Since the variables of the study create endogeneity among variables so, the GMM estimation technique proposed by Blundell and Bond (1998) is used to endogeneity and identification of causal relation from overvaluation to TFP.

Table 4, present the results of equation of factor productivity considering TROP, TOT, REER, and foreign inflows as independent variables. Real effective exchange rate coefficient is negative and significant with TFP. Remittances and official development assistance coefficient is significant and negative, showing increase in inflows decrease the TFP of Pakistan economy. Hence, it is justified that Dutch disease may be considered as an impediment to economic growth.

3- See appendix for VAR analysis and tables. In addition, estimations by taking Growth rate as dependent variable using VAR model technique.

Table 5: Correlation between REER and Economic Growth Proxy (Sector-wiseTFP)

	MISAL	TFPA	TFPI	TFPS
MISAL	1.00			
TFPA	0.09	1.00		
TFPI	-0.40	-0.41	1.00	
TFPS	0.10	-0.35	-0.34	1.00

To check for robustness, the paper estimated TFP for three sectors of the economy, agriculture, industrial and services. TFPA stands for total factor productivity of agriculture sector, TFPI is the productivity of industrial sector and TFPS is the productivity of the services sector. Table 5 explained the correlation between the TFP of different sectors with the misaligned index estimated. It can be seen from this table that TFPI is negatively related to REER. This proved that appreciation in REER causing employment shift from agriculture or industrial sector to services sector. So the link between TFP and REER is established.

Figure 6: Overvaluation and Growth Relationship
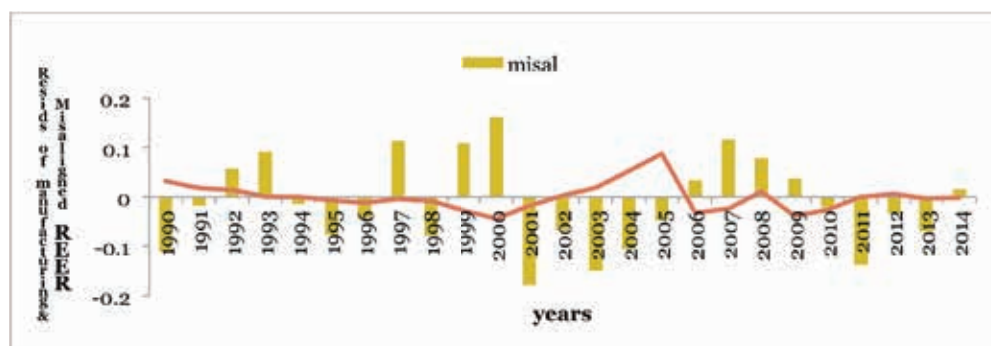
Figure 6 depicts the graph for the relationship between the concerned variables. This can be observed that when undervaluation the TFP is positive during early nineties. During the mid-nineties appreciation episode combines the decreasing effect on TFP. In 2003-05, episodes of currency devaluation, leading TFP to grow positively and 2006-09 appreciation leading to declining trend in productivity. Hence, the study established that there is strong negative relationship between overvaluation and economic growth.

Further to test the long run relationship and identifying the direction of causality among variables, Granger causality test[4] is applied. The Granger (1969) approach helped the researcher to observe the direction of the current explained by past values by adding lagged values. If the t-statistics is significant at 5 percent or 10 percent may then the prediction the variables are expected to be related with in specific direction. The two-way causation would exist when we accept both the null hypothesis, it is important to note that variables having significant granger relationship may not have the causation.

Table in appendix shows that TFP has one direction causality that is TFP does granger cause the economic growth. Similarly, exchange rate has two-way causation with TFP. This means that increase in TFP is based on past values. The other variables TROP Govt expenditure and credit to private sector have also have rejected the null hypothesis and two way causation exists among these variables.

4- For details see the appendix

CONCLUDING REMARKS

The study was carried out to examine the impact of Dutch Disease effects on the total factor productivity and economic growth of Pakistan. TFP is taken as dependent variable and proxy for the economic growth. The method of analysis adopted is GMM estimation technique in the E-Views software. The estimated results reveal a negative long run relationship between REER and productivity.This goes against the belief about the positive relationship between the two variables. Hence worked as the violation of the expectation between REER and TFP occurs because of appreciation in exchange rate.

The study is to first detect the Dutch disease effects in Pakistan. Secondly, explore the missing link of this misaligned REER causing Dutch Disease with economic growth and total factor productivity. The study confirms the evidence of Dutch disease effects and existence of low productivity as a link for hindrance economic growth. This productivity channel verifies the growth-reducing effect of overvaluation is in industrial sector. The study highlighted sectoral growth impact on employment due to increase in foreign financial inflows. In light of the conclusions, policy makers need to receive ODA, FDI, and REM with a caution of utilizing for production purposes instead consumption. If the economy is in appreciation state then foreign inflows need to be controlled or otherwise enhance foreign inflows in case of depreciation.
It is suggested that mechanism should be developed to stabilize the appreciation depreciation in real effective exchange rate. The Pakistan government and the central bank has an important role to play in providing essential framework for controlling the exchange rate fluctuations. The following are important suggestions:

a. The study identified that role of remittances in agriculture sector, and ODA & FDI in the industrial sector is important to address.

b. To improve the depressing growth rate and productivity, there must be stable, economic friendly environment in the country.

c. To stabilize the exchange rate in order to improve the productivity in industrial sector and economic growth, moderate monetary policy, control on sudden stops in foreign inflows, targeting inflation at bearable level, control on budget deficit and current account deficit are the major actions.
d Also, government expenditures must be directed towards productive economic activities such as building of power infrastructure, constructing economic corridors, and ensuring sufficient oil and water to reduce the cost of production.

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Appendix

Table A1:
Correlation Coefficient

	TFP	SERVA	AGRVA	INDVA	LGEXP	LM2	LODAGDP	LTROP	REMGDP	ODAGDP
TFP	1.00	0.84	-0.83	-0.33	-0.38	0.19	-0.77	-0.14	0.08	-0.83
SERVA	0.84	1.00	-0.78	-0.60	-0.40	0.07	-0.54	-0.28	0.20	-0.60
AGRVA	-0.83	-0.78	1.00	0.01	0.40	-0.35	0.62	0.13	0.22	0.71
INDVA	-0.33	-0.60	0.01	1.00	0.29	0.33	0.18	0.45	-0.49	0.14
LGEXP	-0.38	-0.40	0.40	0.29	1.00	-0.20	0.36	0.64	0.01	0.30
LM2	0.19	0.07	-0.35	0.33	-0.20	1.00	-0.35	0.23	-0.37	-0.38
LODAGDP	-0.77	-0.54	0.62	0.18	0.36	-0.35	1.00	0.14	0.15	0.97
LTROP	-0.14	-0.28	0.13	0.45	0.64	0.23	0.14	1.00	-0.17	0.08
REMGDP	0.08	0.20	0.22	-0.49	0.01	-0.37	0.15	-0.17	1.00	0.20
ODAGDP	-0.83	-0.60	0.71	0.14	0.30	-0.38	0.97	0.08	0.20	1.00

Table A2:
Descriptive Statistics

	TFP1	**MISAL1**	**ODAGDP**	**REMGDP**	**FDIGDP**	**LTROP**	**LM2**
Mean	1.65	0.08	2.79	4.36	1.00	3.53	3.75
Median	1.41	0.09	2.30	3.72	0.61	3.53	3.76
Maximum	3.11	0.34	6.45	9.65	4.59	3.66	3.90
Minimum	0.76	-0.15	1.14	1.16	0.08	3.34	3.62
Std. Dev.	0.78	0.12	1.42	2.42	1.12	0.07	0.08
Skewness	0.50	-0.13	0.94	0.65	2.20	-0.26	0.18
Kurtosis	1.81	2.28	3.04	2.47	7.01	2.89	1.81
	TFP1	**MISAL1**	**ODAGDP**	**REMGDP**	**FDIGDP**	**LTROP**	**LM2**
Jarque-Bera	3.42	0.82	4.98	2.76	50.22	0.41	2.20
Probability	0.18	0.66	0.08	0.25	0.00	0.82	0.33
Sum	56.14	2.64	94.88	148.36	34.01	119.90	127.64
Sum Sq. Dev.	19.83	0.51	66.52	192.62	41.40	0.19	0.19
Observations	34	34	34	34	34	34	34

Table A3:
Pairwise Granger Causality Tests

Null Hypothesis	**Obs**	**F-Statistic**	**Prob.**
SERVA does not Granger Cause TFP	32	0.92	0.41
TFP does not Granger Cause SERVA		4.62	0.02
AGRVA does not Granger Cause TFP	32	0.55	0.59
TFP does not Granger Cause AGRVA		2.51	0.10
INDVA does not Granger Cause TFP	32	0.35	0.71
TFP does not Granger Cause INDVA		2.97	0.07
LGEXP does not Granger Cause TFP	32	0.78	0.47
TFP does not Granger Cause LGEXP		0.99	0.38
LM2 does not Granger Cause TFP	32	0.31	0.74

Null Hypothesis	Obs	F-Statistic	Prob.
TFP does not Granger Cause LM2		0.20	0.82
LODAGDP does not Granger Cause TFP	32	0.63	0.54
TFP does not Granger Cause LODAGDP		2.58	0.09
LTROP does not Granger Cause TFP	32	1.82	0.18
TFP does not Granger Cause LTROP		3.34	0.05
REMGDP does not Granger Cause TFP	32	2.29	0.12
TFP does not Granger Cause REMGDP		5.92	0.01
ODAGDP does not Granger Cause TFP	32	0.27	0.77
Null Hypothesis	**Obs**	**F-Statistic**	**Prob.**
TFP does not Granger Cause ODAGDP		1.97	0.16
AGRVA does not Granger Cause SERVA	32	1.31	0.29
SERVA does not Granger Cause AGRVA		0.02	0.98
INDVA does not Granger Cause SERVA	32	1.38	0.27
SERVA does not Granger Cause INDVA		2.01	0.15
LGEXP does not Granger Cause SERVA	32	5.60	0.01
SERVA does not Granger Cause LGEXP		1.10	0.35
LM2 does not Granger Cause SERVA	32	0.53	0.59
SERVA does not Granger Cause LM2		0.34	0.71
LODAGDP does not Granger Cause SERVA	32	1.15	0.33
SERVA does not Granger Cause LODAGDP		1.87	0.17
LTROP does not Granger Cause SERVA	32	2.95	0.07
SERVA does not Granger Cause LTROP		1.18	0.32
REMGDP does not Granger Cause SERVA	32	0.04	0.96
SERVA does not Granger Cause REMGDP		6.30	0.01
ODAGDP does not Granger Cause SERVA	32	0.67	0.52
SERVA does not Granger Cause ODAGDP		1.71	0.20
INDVA does not Granger Cause AGRVA	32	0.15	0.86
AGRVA does not Granger Cause INDVA		1.28	0.29
LGEXP does not Granger Cause AGRVA	32	3.14	0.06
AGRVA does not Granger Cause LGEXP		0.31	0.74
LM2 does not Granger Cause AGRVA	32	0.16	0.85
AGRVA does not Granger Cause LM2		0.73	0.49
LODAGDP does not Granger Cause AGRVA	32	0.79	0.47
AGRVA does not Granger Cause LODAGDP		3.32	0.05
Null Hypothesis	**Obs**	**F-Statistic**	**Prob.**
LTROP does not Granger Cause AGRVA	32	4.99	0.01
AGRVA does not Granger Cause LTROP		0.03	0.97
REMGDP does not Granger Cause AGRVA	32	1.84	0.18
AGRVA does not Granger Cause REMGDP		4.20	0.03
ODAGDP does not Granger Cause AGRVA	32	1.40	0.26
AGRVA does not Granger Cause ODAGDP		3.88	0.03
LGEXP does not Granger Cause INDVA	32	1.34	0.28
INDVA does not Granger Cause LGEXP		4.61	0.02
LM2 does not Granger Cause INDVA	32	1.86	0.18
INDVA does not Granger Cause LM2		3.43	0.05
LODAGDP does not Granger Cause INDVA	32	1.84	0.18
INDVA does not Granger Cause LODAGDP		0.10	0.91

Null Hypothesis	Obs	F-Statistic	Prob.
LTROP does not Granger Cause INDVA	32	1.46	0.25
INDVA does not Granger Cause LTROP		2.70	0.09
REMGDP does not Granger Cause INDVA	32	0.18	0.84
INDVA does not Granger Cause REMGDP		3.37	0.05
ODAGDP does not Granger Cause INDVA	32	1.69	0.20
INDVA does not Granger Cause ODAGDP		0.07	0.94
LM2 does not Granger Cause LGEXP	32	0.50	0.61
LGEXP does not Granger Cause LM2		0.64	0.53
LODAGDP does not Granger Cause LGEXP	32	1.73	0.20
LGEXP does not Granger Cause LODAGDP		0.08	0.92
LTROP does not Granger Cause LGEXP	32	3.73	0.04
LGEXP does not Granger Cause LTROP		0.70	0.51
REMGDP does not Granger Cause LGEXP	32	3.91	0.03
Null Hypothesis	**Obs**	**F-Statistic**	**Prob.**
LGEXP does not Granger Cause REMGDP		2.42	0.11
ODAGDP does not Granger Cause LGEXP	32	1.57	0.23
LGEXP does not Granger Cause ODAGDP		0.09	0.92
LODAGDP does not Granger Cause LM2	32	0.47	0.63
LM2 does not Granger Cause LODAGDP		1.21	0.31
LTROP does not Granger Cause LM2	32	0.19	0.83
LM2 does not Granger Cause LTROP		1.31	0.29
REMGDP does not Granger Cause LM2	32	1.77	0.19
LM2 does not Granger Cause REMGDP		1.04	0.37
ODAGDP does not Granger Cause LM2	32	0.55	0.58
LM2 does not Granger Cause ODAGDP		1.23	0.31
LTROP does not Granger Cause LODAGDP	32	0.76	0.48
LODAGDP does not Granger Cause LTROP		2.41	0.11
REMGDP does not Granger Cause LODAGDP	32	1.33	0.28
LODAGDP does not Granger Cause REMGDP		3.05	0.06
ODAGDP does not Granger Cause LODAGDP	32	3.61	0.04
LODAGDP does not Granger Cause ODAGDP		2.64	0.09
REMGDP does not Granger Cause LTROP	32	0.13	0.88
LTROP does not Granger Cause REMGDP		1.20	0.32
ODAGDP does not Granger Cause LTROP	32	1.99	0.16
LTROP does not Granger Cause ODAGDP		0.64	0.54
ODAGDP does not Granger Cause REMGDP	32	5.84	0.01
REMGDP does not Granger Cause ODAGDP		1.83	0.18

Table A4:
Data for Original Estimation

Years	EXR	INF	M2	LREER	REMGDP	ODAGDP	TFP	TROP	GDP	GDPGR
1980	9.90	11.94	41.08	2.31	5.57	5.24	0.19	36.59	32568.59	10.22
1981	9.90	11.88	36.07	2.36	6.04	6.12	0.21	35.33	34217.98	7.92
1982	11.85	5.90	37.68	2.32	7.10	6.45	0.20	31.71	36454.97	6.54
1983	13.12	6.36	41.05	2.31	7.55	4.84	0.22	34.90	38926.03	6.78
1984	14.05	6.09	44.12	2.32	6.31	4.69	0.22	33.70	40897.71	5.07
1985	15.93	5.62	43.03	2.29	5.77	4.48	0.22	33.24	44002.71	7.59

Years	EXR	INF	M2	LREER	REMGDP	ODAGDP	TFP	TROP	GDP	GDPGR
1986	16.65	3.51	47.43	2.20	5.27	4.15	0.22	34.57	46423.59	5.50
1987	17.40	4.68	42.78	2.15	4.41	3.08	0.22	34.24	49419.00	6.45
1988	18.00	8.84	44.02	2.14	3.52	4.31	0.23	35.26	53187.33	7.63
1989	20.54	7.84	45.20	2.11	3.61	4.37	0.23	35.63	55825.30	4.96
1990	21.71	9.05	43.46	2.08	3.44	3.06	0.23	38.91	58314.32	4.46
1991	23.80	11.79	46.76	2.07	2.53	3.56	0.25	35.56	61265.94	5.06
1992	25.08	9.51	51.31	2.07	2.39	2.26	0.25	37.89	65987.03	7.71
1993	28.11	9.97	47.20	2.06	2.15	2.30	0.25	38.75	67146.92	1.76
1994	30.57	12.37	35.90	2.06	2.51	3.17	0.25	35.33	69656.48	3.74
1995	31.64	12.34	33.67	2.06	2.74	1.38	0.25	36.13	73113.25	4.96
1996	36.08	10.37	37.84	2.04	2.23	1.77	0.26	38.33	76656.75	4.85
1997	41.11	11.38	39.36	2.05	1.66	1.71	0.25	36.85	77434.35	1.01
1998	45.05	6.23	40.03	2.06	2.15	1.94	0.24	34.01	79409.11	2.55
1999	49.50	4.14	43.11	2.02	1.42	1.26	0.24	32.32	82315.59	3.66
2000	53.65	4.37	41.50	2.01	1.16	1.14	0.25	28.13	85822.30	4.26
2001	61.93	3.15	39.02	1.97	1.23	3.19	0.25	30.37	87523.72	1.98
2002	59.72	3.29	40.79	1.99	1.62	3.44	0.25	30.54	90345.86	3.22
2003	57.75	2.91	43.88	1.97	3.75	1.49	0.25	32.84	94724.31	4.85
Years	**EXR**	**INF**	**M2**	**LREER**	**REMGDP**	**ODAGDP**	**TFP**	**TROP**	**GDP**	**GDPGR**
2004	58.26	7.45	39.85	1.97	3.90	1.72	0.26	30.30	101704.14	7.37
2005	59.51	9.06	40.66	1.99	3.60	1.78	0.28	35.25	109502.10	7.67
2006	60.27	7.92	43.31	2.00	3.68	2.18	0.27	35.68	116266.64	6.18
2007	60.74	7.60	45.31	1.99	4.20	1.98	0.28	32.99	121885.60	4.83
2008	70.41	20.29	41.37	1.98	4.84	1.27	0.27	35.59	123959.36	1.70
2009	81.71	13.65	38.98	1.98	5.52	2.30	0.27	32.07	127469.47	2.83
2010	85.19	13.88	39.14	2.00	6.73	2.43	0.26	32.87	129517.50	1.61
2011	86.34	11.92	39.19	2.01	7.28	2.62	0.27	32.94	133125.78	2.75
2012	93.40	9.69	42.75	2.02	8.86	1.46	0.27	32.81	138471.99	3.51
2013	101.63	7.69	45.66	2.01	9.54	1.49	0.28	33.34	146876.62	4.37
2014	101.10	7.19	45.76	2.04	9.65	1.50	0.28	31.00	151600.10	4.74
2015	102.77	2.54	43.57	2.08	9.53	0.94	0.30	28.05	157293.21	5.54

Source: World Development Indicators (WDI) World Bank (2015)

Table A5:
Data on Sector-wise Value-Added Statistics

Years	AGRVA	INDVA	SERVA	TROP	GEXP
1980	29.52	24.92	45.56	36.59	10.04
1981	30.83	22.60	46.57	35.33	10.16
1982	31.56	22.26	46.18	31.71	10.34
1983	30.26	22.07	47.67	34.90	11.42
1984	27.92	22.71	49.38	33.70	12.09
1985	28.54	22.47	49.00	33.24	12.10
1986	27.62	23.35	49.03	34.57	12.76
1987	26.25	24.02	49.73	34.24	13.53
Years	**AGRVA**	**INDVA**	**SERVA**	**TROP**	**GEXP**
1988	26.02	24.38	49.60	35.26	15.51
1989	26.95	23.89	49.16	35.63	16.79

1990	25.98	25.19	48.83	38.91	15.14
1991	25.78	25.45	48.78	35.56	14.32
1992	26.35	25.02	48.64	37.89	12.91
1993	24.99	24.72	50.29	38.75	13.10
1994	25.55	24.27	50.19	35.33	12.11
1995	26.14	23.80	50.07	36.13	11.74
1996	25.48	24.16	50.35	38.33	12.65
1997	26.70	23.51	49.79	36.85	11.89
1998	27.31	23.80	48.89	34.01	11.26
1999	27.03	23.74	49.23	32.32	10.36
2000	25.93	23.33	50.75	28.13	8.64
2001	24.10	24.02	51.89	30.37	7.78
2002	23.35	23.86	52.78	30.54	8.72
2003	23.36	23.91	52.73	32.84	8.79
2004	22.18	26.99	50.83	30.30	8.20
2005	21.47	27.10	51.43	35.25	7.84
2006	23.01	20.95	56.05	35.68	10.44
2007	23.06	21.13	55.81	32.99	9.87
2008	23.11	22.33	54.56	35.59	9.75
2009	23.91	20.20	55.89	32.07	10.52
2010	24.29	20.58	55.13	32.87	10.32
2011	26.03	21.23	52.74	32.94	9.74
2012	24.55	22.05	53.40	32.81	10.49
Years	**AGRVA**	**INDVA**	**SERVA**	**TROP**	**GEXP**
2013	24.82	21.02	54.16	33.34	11.01
2014	25.03	20.90	54.07	31.00	10.81
2015	25.46	18.99	55.54	28.05	11.84

Source: World Development Indicators (WDI) World Bank (2015)

Table A6:
Data for Alternative Estimations

	TFP2	**MISAL1**	**ODAGDP**	**REMGDP**	**FDIGDP**	**LTROP**	**LM2**
1981	2.083	0.202	6.117	6.041	0.316	3.565	3.664
1982	2.357	0.258	6.448	7.099	0.175	3.457	3.708
1983	2.154	0.125	4.839	7.553	0.076	3.552	3.781
1984	2.303	0.185	4.691	6.311	0.136	3.517	3.685
1985	2.201	0.231	4.480	5.766	0.299	3.504	3.705
1986	2.300	-0.148	4.155	5.269	0.228	3.543	3.768
1987	1.896	-0.019	3.083	4.413	0.262	3.533	3.814
1988	1.498	0.081	4.313	3.520	0.351	3.563	3.722
1989	1.413	0.078	4.371	3.613	0.377	3.573	3.663
1990	1.132	-0.075	3.063	3.440	0.421	3.661	3.667
1991	0.906	0.140	3.558	2.528	0.422	3.571	3.668
1992	0.896	0.098	2.255	2.385	0.510	3.635	3.755
1993	0.960	0.134	2.301	2.153	0.519	3.657	3.821
1994	0.922	0.113	3.174	2.511	0.604	3.565	3.823
1995	0.766	-0.146	1.377	2.744	0.988	3.587	3.774

	TFP2	MISAL1	ODAGDP	REMGDP	FDIGDP	LTROP	LM2
1996	0.743	-0.078	1.774	2.233	1.203	3.646	3.830
1997	0.742	0.137	1.715	1.658	0.925	3.607	3.875
1998	0.737	-0.046	1.936	2.150	0.637	3.527	3.853
1999	0.838	0.176	1.261	1.424	0.646	3.476	3.803
2000	0.529	0.341	1.138	1.161	0.359	3.337	3.653
2001	0.340	0.090	3.186	1.228	0.438	3.413	3.667
2002	0.008	0.204	3.438	1.617	0.911	3.419	3.767
2003	0.084	-0.139	1.485	3.752	0.564	3.492	3.838
2004	0.059	-0.021	1.717	3.898	1.099	3.411	3.879
2005	0.082	-0.037	1.782	3.603	2.010	3.562	3.896
2006	0.273	0.107	2.181	3.681	3.675	3.575	3.797
2007	0.595	0.224	1.980	4.201	4.586	3.496	3.859
2008	0.559	0.065	1.273	4.839	4.387	3.572	3.774
2009	0.756	0.219	2.301	5.522	1.834	3.468	3.696
2010	0.294	0.122	2.428	6.730	1.558	3.493	3.717
2011	0.360	-0.004	2.616	7.279	0.983	3.495	3.624
2012	0.204	-0.002	1.458	8.856	0.620	3.491	3.689
2013	0.342	-0.052	1.489	9.536	0.890	3.501	3.711
2014	0.192	0.077	1.500	9.648	1.007	3.439	3.690

Source: WDI & SBP

Pairwise Granger Causality Tests
Date: 10/25/16   Time: 11:09
Sample: 1980 2015
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
ODAGDP does not Granger Cause TFP01	34	3.04015	0.0633
TFP01 does not Granger Cause ODAGDP		2.89217	0.0716

Pairwise Granger Causality Tests
Date: 10/25/16   Time: 11:11
Sample: 1980 2015
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LREER does not Granger Cause TFP11	34	3.92789	0.0309
TFP11 does not Granger Cause LREER		2.20072	0.1289

Pairwise Granger Causality Tests
Date: 10/25/16   Time: 11:11
Sample: 1980 2015
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
FIGDP does not Granger Cause TFP11	34	1.05289	0.3619
TFP11 does not Granger Cause FIGDP		2.93092	0.0693

Pairwise Granger Causality Tests
Date: 10/25/16   Time: 11:13
Sample: 1980 2015
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GDPGR does not Granger Cause TFP01	34	8.14976	0.0016
TFP01 does not Granger Cause GDPGR		1.57218	0.2248

Pairwise Granger Causality Tests
Date: 10/25/16   Time: 11:14
Sample: 1980 2015
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
GDPGR does not Granger Cause TFP01	33	9.80570	0.0002
TFP01 does not Granger Cause GDPGR		2.37266	0.0934

Pairwise Granger Causality Tests
Date: 10/25/16   Time: 11:18
Sample: 1980 2015
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GDPGR does not Granger Cause TFP01	34	8.14976	0.0016
TFP01 does not Granger Cause GDPGR		1.57218	0.2248

REMGDP does not Granger Cause TFP01	34	0.31019	0.7357
TFP01 does not Granger Cause REMGDP		1.13717	0.3346
ODAGDP does not Granger Cause TFP01	34	3.04015	0.0633
TFP01 does not Granger Cause ODAGDP		2.89217	0.0716
BD does not Granger Cause TFP01	34	1.92133	0.1646
TFP01 does not Granger Cause BD		1.48724	0.2427
GCEGDP does not Granger Cause TFP01	34	1.51062	0.2376
TFP01 does not Granger Cause GCEGDP		1.97483	0.1570
LCPRS does not Granger Cause TFP01	34	0.37061	0.6935
TFP01 does not Granger Cause LCPRS		1.22498	0.3085
REMGDP does not Granger Cause GDPGR	34	0.61409	0.5480
GDPGR does not Granger Cause REMGDP		1.36816	0.2705
ODAGDP does not Granger Cause GDPGR	34	1.87474	0.1715
GDPGR does not Granger Cause ODAGDP		3.30102	0.0511
BD does not Granger Cause GDPGR	34	0.14081	0.8692
GDPGR does not Granger Cause BD		0.08937	0.9148
GCEGDP does not Granger Cause GDPGR	34	0.05892	0.9429
GDPGR does not Granger Cause GCEGDP		2.72129	0.0826
LCPRS does not Granger Cause GDPGR	34	0.33791	0.7160
GDPGR does not Granger Cause LCPRS		1.14918	0.3309
ODAGDP does not Granger Cause REMGDP	34	6.46218	0.0048
REMGDP does not Granger Cause ODAGDP		0.74790	0.4823
BD does not Granger Cause REMGDP	34	0.16190	0.8513
REMGDP does not Granger Cause BD		2.18940	0.1302
GCEGDP does not Granger Cause REMGDP	34	2.41117	0.1075
REMGDP does not Granger Cause GCEGDP		3.28556	0.0517
LCPRS does not Granger Cause REMGDP	34	4.02853	0.0286
REMGDP does not Granger Cause LCPRS		0.93464	0.4042
BD does not Granger Cause ODAGDP	34	0.15649	0.8559
ODAGDP does not Granger Cause BD		1.01733	0.3741
GCEGDP does not Granger Cause ODAGDP	34	0.04978	0.9515
ODAGDP does not Granger Cause GCEGDP		1.35156	0.2747

Null Hypothesis:	Obs	F-Statistic	Prob.
LCPRS does not Granger Cause ODAGDP	34	1.40375	0.2619
ODAGDP does not Granger Cause LCPRS		1.32136	0.2824
GCEGDP does not Granger Cause BD	34	1.38818	0.2656
BD does not Granger Cause GCEGDP		0.48546	0.6203
LCPRS does not Granger Cause BD	34	1.85507	0.1745
BD does not Granger Cause LCPRS		2.00756	0.1526
LCPRS does not Granger Cause GCEGDP	34	0.10324	0.9022
GCEGDP does not Granger Cause LCPRS		0.23453	0.7924
Null Hypothesis:	**Obs**	**F-Statistic**	**Prob.**
LREER does not Granger Cause TFP01	34	0.57342	0.5699
TFP01 does not Granger Cause LREER		0.01526	0.9849