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Dutch Disease Investigated: Empirical Evidence from Selected South-East Asian Economies

Shahid Hussain Javaid

STATE BANK OF PAKISTAN

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Shahid Hussain Javaid
Research Economist
Research Department
State Bank of Pakistan
Shahid.Hussain1@sbp.org.pk

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Contact for correspondence:

Shahid Hussain Javaid
Research Department,
State Bank of Pakistan,
I. I. Chundrigar Road, Karachi,
Pakistan
Shahid.Hussain1@sbp.org.pk

Abstract

The objective of this paper is to investigate Dutch Disease hypothesis by analyzing foreign inflows power to appreciate real exchange rate as well as calculate the degree of contraction in the tradable sector among selected South East Asian countries over 1981-2007. Using static and dynamic panel data techniques, the study first estimates real exchange rate appreciation due to surge in foreign inflows and then estimates contraction in the tradable and expansion in the non-tradable sector. On the basis of empirical estimation the study confirms the Dutch Disease hypothesis in the countries of analysis.

JEL Codes: F33 C23 E50
Keywords: Foreign Inflows, Real Exchange Rate, Dynamic Panel Data, Dutch Disease

Introduction

The objective of this paper is to investigate Dutch Disease hypothesis by analyzing foreign inflows power to appreciate real exchange rate as well as calculate the degree of contraction in the tradable sector among selected South East Asian countries over 1981-2007. Dutch disease is a phenomenon that tries to explain the relationship between the exploitation of natural resources and a decline in the sector. The theory of Dutch Disease is that an increase in revenues from natural resources will de-industrialize a nation's economy by appreciating the real exchange rate, which makes the tradable sector less competitive and public services entangled with business interests. The idea of "Dutch Disease" is not new and well-known in the literature as one may predict. Corden and Neary (1982) modeled this idea and explained 'Dutch Disease' as "adverse effect on non-booming sector due to booming sector". In his model, there are non-traded (services sector e.g. transport, financial services etc) sector and two traded goods sectors (booming and non-booming sectors). They further documented that booming sector consists of the natural resource e.g. mining sector and non-booming sector is made up of agriculture and manufacturing (lagging) sectors. It is rather hard to say that a country has Dutch Disease because it is difficult to accomplish the relationship between an increase in natural resource revenues, the real-exchange rate and a decline in the manufacturing sector. It is to note that there are a number of different factors that can cause appreciation of the real exchange rate which ultimately result in contracting the tradable sector.

Financial crisis in the last two decades of twentieth century especially the Asian financial and currency crisis[1] questioned the importance of foreign inflows. On the one hand, foreign inflows have been blamed by many economists for this crisis. On the other hand, some postulated that surge in foreign inflows can be important element required to successful process of economic development. This has lead to an increased interest in identifying the contribution of foreign inflows to economic development[2] and the hypothesis of Dutch Disease. The sudden increase in foreign inflows to developing countries is likely to be accompanied by a rise in consumption and investment, an increase in real money balances and foreign exchange reserves, a real exchange rate (RER) appreciation and a widening current account deficit. This provides an opportunity to empirically investigate the phenomenon of "Dutch Disease[3]". The transmission mechanism of Dutch Disease may

[1]See Athukorala and Warr (2002).
[2] Soto (2000)
[3] The term was originally used to explain the troubles faced by manufacturing sector in the Netherlands coming after the development of natural gas on a large scale that resulted in appreciation of the real exchange rate. It has since been used to

clarify the intensity of relation between foreign inflows and real exchange rate. The explanation of this mechanism is twofold: 1) The resource booms (increase in foreign inflows) tend to increase household income and rise in the demand for labor in the booming sector which decreases labor supply in the lagging sector. A decline in the labor supply may cause higher production cost and contraction in the non-booming (lagging) sector and is known as resource movement effect. 2) The spending effect exists as a consequence of the extra revenue (e.g. foreign inflows) brought in by the resource boom. It increases the demand for labor in the booming sector, shifting labor away from the lagging sector. This leads to higher disposable income which signals an expansion in aggregate demand, which for given prices of tradable goods, culminates in higher relative prices of non-tradable that corresponds to a real exchange rate appreciation. The central point of the theory on foreign inflows and the real exchange rate has been the impact on the relative prices of non-tradable goods (e.g., White & Wignaraja 1992). This explains the channel causing increase in the demand for non-tradable goods, thereby raising their price.

The literature on the subject identifies the difference between the effect of foreign inflows on real exchange rate and Dutch Disease phenomenon. The 'Salter-Swan-Corden-Dornbusch model[4]' is used to analyze the impact of foreign inflows on the real exchange rate (RER) in emerging economy. The mechanism explained by which an increase in foreign capital inflows could cause an appreciation of the real exchange rate. The impact of different foreign inflows on the RER suggests that an increase in foreign direct investment, remittances and official development assistance induces appreciation. Several studies (Athukorala and Rjapatirana 2003; Lartey 2007) were dedicated to assessing the impact of FDI on the RER. Others (White and Wignaraja 1992; Athukorala and Rjapatirana 2003; Berg et al 2007; Adenauer and Vagassky 1998; Lartey 2008) assessed the impact of aid on RER. The impact of remittances on real exchange rate was studied by Chami et al 2005; Jongwanich 2007; Ouattara and Strobl 2003; Bourdet and Falk 2003; Izquierdo and Montero 2006; Dorantes and Pozo 2004 and Rajan and Subramanian 2005. It is important to note that Studies on the effect of foreign inflows on the real exchange rate of the recipient economies are lacking intensity in spite of the crucial role of the real exchange rate in policy discussion and in economic performance of developing countries. The empirical evidence on the "Dutch Disease" effect of foreign aid appears to be rather mixed. There is no broad unanimity in written work on the existence of Dutch Disease.

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refer to any situation in which a natural resource boom, or large foreign aid or capital inflows, cause real appreciation that jeopardizes the prospects of manufacturing (Williamson, 1995).

[4]See Lartey 2008.

However, the standard trade theory models analyzing this phenomenon indicate that a resource boom may lead to a resource movement from tradable to non-tradable sector. This leads to the whole deterioration of the tradable sector (Corden & Neary 1982; Edwards et al 1982; Agenor 1998; Acosta et al 2007; Neary & Winjbergen1986). In a panel study of 62 developing countries by Elbadawi (1999) and in country analysis by Oomes and Kalcheva (2007) for Russia, Lartey (2008) for Philippines found Dutch Disease effects. By contrast, Ogun (1995) for Nigeria, Nyoni (1998) for Tanzania, Sackey (2001) for Ghana and Ouattara and Strobl (2003) for a panel of CFA countries, found that aid flows were associated with real depreciation and found no Dutch Disease effects.

The nexus of real exchange rate and foreign inflows is important to induce resource mobilization. The appreciation in the real exchange rate due to rise in foreign inflows has raised serious concerns among policy makers. It may affect macroeconomic stability, the competitiveness of the export sector and the external viability of the recipient countries. However, it is extremely difficult to definitively say that Dutch disease is the cause of the decreasing manufacturing sector, since there are many other factors at play in the very complex economy. Accordingly reviewing literature, it may be said that the impact of other types of capital flows were not studied, such as the impact of debt and portfolio inflows.

In this paper panel series data is used to explore the evidence for Dutch Disease effects from increased foreign inflows in six small open economies in the South-East Asia. The countries including Pakistan, Bangladesh, India, Indonesia, Philippines and Malaysia, display a substantial degree of economic heterogeneity, and a corresponding level of heterogeneity in their response to foreign inflows can also be seen. It is important to note that aggregate foreign inflows are insignificant in estimating Dutch Disease effects so we disaggregate foreign inflows into three main categories (FDI, REM, and ODA). Before describing the econometric model, we briefly review historical trend of foreign inflows and real exchange rate of selected countries. The paper is organized as follows: section 2 presents some stylized facts, section 3 illustrates methodology and model specification, section 4 discusses empirical results and conclusions are given in section 5.

Some Stylized Facts

The countries of analysis are located in the southern and eastern corner of the continent of Asia. The key economic indicators of these economies show an increase in the GDP, GDP per capita and trade volume in the 1990s and 2000s. The average annual GDP growth is about 5.1% during 1981-2007. These economies are divided into tradable (agriculture, industry) and non-tradable (services) sectors. In terms of foreign inflows, these economies

were relatively low in 1980s. The average yearly receipts were $5.1 billion during the period of analysis. The real exchange rates have also been appreciated in the years of concern. The annual growth rate of tradable sector on average remained at 4.4% whereas non-tradable sector achieved 5.8% during the period of analysis. The employment share in the tradable sector has been reduced from 84% to 55% and employment in the services sector has been increased from 16% to 55%. These facts are discussed in detail below:

A) Historical Trend of Foreign Capital Inflows

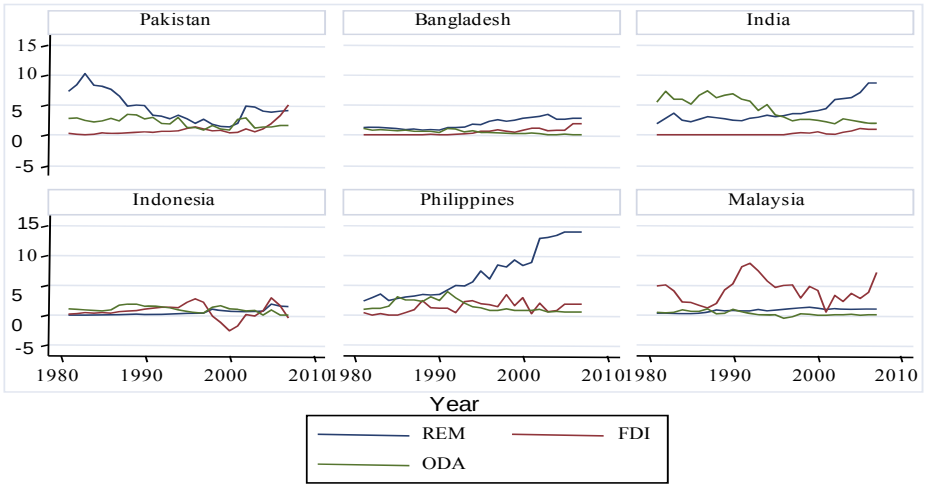
Developing countries have always been welcoming foreign inflows. Foreign direct investment (FDI) has been the most important part of foreign capital[5], since its inception, however the success has not been great as for six selected countries in South-East Asian history. The amount of FDI has been meager, roughly receiving $264.4 billion during last 27 years. In total it has grown but it had never been more than 1% of real GDP during the period of analysis among Pakistan, India, Bangladesh and Indonesia. Needless to say, one of the most important sources of external capital for the countries of analysis is foreign remittances. Figure 1 establishes the importance of remittances as it is compared with other form of foreign inflows, worker remittances have always been more than direct foreign investment and greater than official development assistance during the same time period. The figure 1 captures the trend of three important components of external resources, as it can be seen that all three of them had a growing trend with short run reversals except for the severe downturn of FDI (net inflows) after 1997. Apart from the Asian financial crises which caused a liquidity crunch in global markets, this was the time of sanctions against Pakistan by international community for carrying out atomic tests. The capital controls enacted to control damage of foreign embargoes, had been the main reason behind the sudden dips that can be seen in FDI.

In early 1950s foreign inflows were mainly in the form of foreign official loans and grants; the major providers of official funding included World Bank, USAID, ADB, IMF and several other countries. World Bank has been one of the major sources of funding. Much of this funding was for development and investment in infrastructure. Similarly US aid has been providing funding to these selected countries for different projects; it was one of the first international agencies to help developing countries starting in early 1950s. While IMF is another organization whose funding history is not long but has certainly been one of the most important contributors of financial capital. During 1981-2007, Pakistan in total has received around $118.8 billion, India $351.2 billion, Bangladesh $87.8 billion, Indonesia $94 billion,

[5] For details Agenor (1998).

Philippine $188.6 billion and Malaysia received $108.1billion from different sources including remittances, foreign direct investment and official development assistance & grants (World Development Indicators 2008). India ($351.2 billion) stood first amongst rest of the countries in receiving foreign inflows whereas Bangladesh ($87.8 billion) remained at the bottom during 1981-2007. It is important to note that the volume of remittances was highest during the same period.

Figure1:Different Foreign Inflows



The selected countries have been receiving foreign inflows from the last so many years in different forms. In last 27 years[6] (starting from 1981) they have received a total of $948.4 billion foreign inflows in different forms and shape, figure displays foreign inflow receipts as a percent of GDP. The average yearly receipts have been $5.9 billion. While during the same period real GDP grew at an average annual rate of 5.1% (GDP per capita was only at US$581million on average except Malaysia). The figure 1 shows trend of foreign inflows coming into Pakistan, Bangladesh, India, Indonesia, Philippine and Malaysia over the years. Foreign capital inflows have been volatile during the length of the time in which it is analyzed, the standard deviation ($6.3 billion) of this series is 108% that of the mean, while Real GDP on the other hand has also been very volatile, and its standard deviation has been 110% of the mean value.

[6] The reason for using these years is to avoid different exchange rate regimes. In early 1980s, countries of analysis almost followed managed floating system except Malaysia.

B) Historical Trend of Real Exchange Rate

The determinants of real exchange rate (Edwards, 1987) can be categorized into two parts, as internal (import tariff, export tax, exchange controls, taxes and subsidies composition of government expenditure, technological progress) and external (terms of trade, foreign inflows, world real interest rate). The appreciation in real exchange rate means increase in domestic cost of producing tradable goods which causes competitiveness of export problem. The real exchange rate measured[7] here as the ratio of price index of trading partner countries expressed in US $ to the domestic price index multiplied by the period average nominal exchange rate in domestic currency per US $ (Sackey, 2001). The real exchange rate changed over time depending on whether inflation was more or less rapid in South-East Asian countries than in the economies of selected countries major trading partners. Keeping the base year value (2000=100), on average real exchange rate indexes declined from 1981 to 2007 (i.e., appreciated), and generally followed a downward trend. The appreciations of the real exchange rate also lead to adverse effect on export competitiveness and current account balance. Movements in the real exchange rate index are the result of changes in the nominal exchange rate index and the difference between domestic and foreign inflation rates. In terms of annual changes, the real exchange rate falls or rises whenever there is a change in the nominal exchange rate that is lower or higher than the difference between inflation rates across trading partners. The extent of fluctuations in the real exchange rate for the domestic currency accentuates its unstable nature. This in turn could be explained by government's continued inability to bring inflation under control. It is worth noting to say that Pakistan, India Indonesia and Philippine showed continuous appreciation in the real exchange rate during the period of analysis.

C) Historical Trend of Tradable and Non-tradable Sectors

The Industrial output and Services sector of the countries expressed as a percent share of GDP to capture the resource movement effects. This sectoral share changed over time in South-East Asian countries; share of Industrial sector declined from 1981 to 2007, and share of service sector followed an upward trend. Actually, there was an expansion in the services sector and a decline in the production of industrial goods as a share of GDP among the countries of analysis during the peak inflow period after 2001.

[7] See Maxwell Opoku-Afari (2004)

Figure 2:Trends of Real Exchange Rate

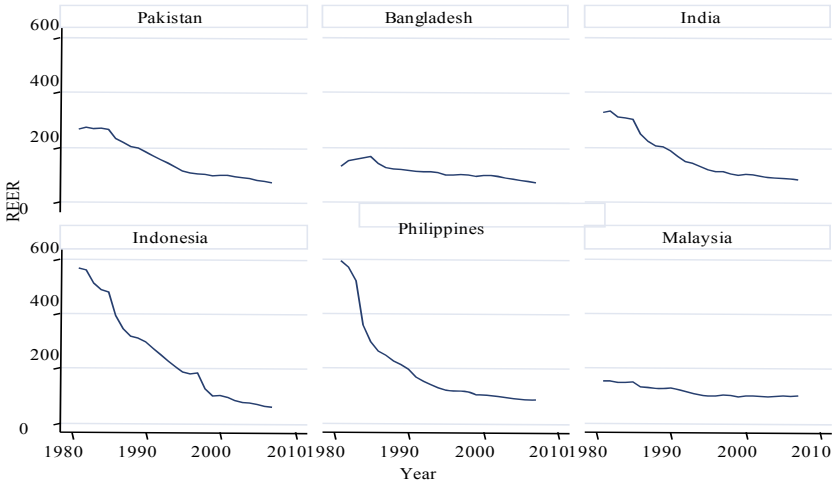


Figure 3: Percentage Share of Tradable and Non-Tradable

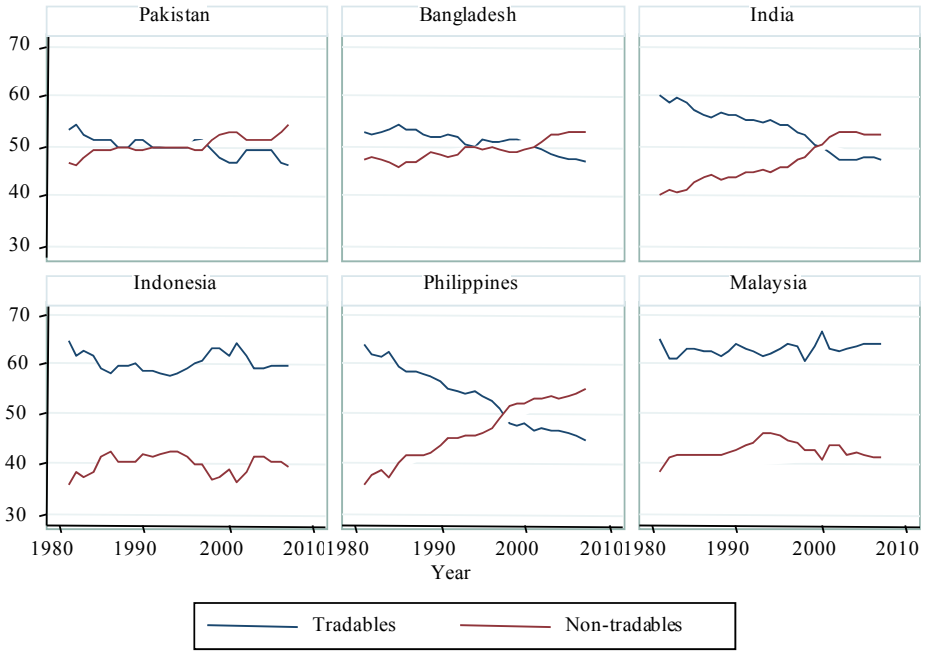
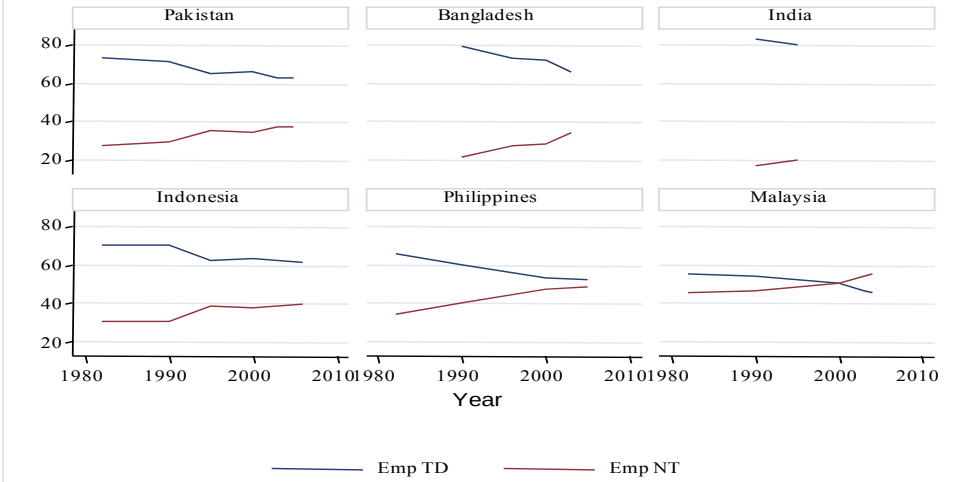


Figure 4: Percentage Change in Employment



D) Employment Trend of Tradable and Non-Tradable Sectors

The sectoral share of employment also changed over time in the countries of analysis. The employment share in the non-tradable sector increased significantly whereas the employment in the tradable sector decreased during the period of analysis.

Data & Methodology

1) Data Sources

Balanced panel data set comprising six countries is applied for the period 1981-2007. The data come from various sources; International Financial Statistics (IFS) 2007, the World Development Indicators (WDI) 2007. The real exchange rate (RER) is the price of traded goods relative to the price of non-traded goods. Due to non-existence of indices of tradable and non-tradable prices, the real exchange rate has been proxied by available domestic and world price indices and nominal exchange rates. RER is defined as the measure of nominal exchange rates adjusted for price differentials between the home country and its trading partners. This is also referred to, in the literature, as the multilateral real exchange rate. This is different from the bilateral real exchange rate between a home country and a specific

trading partner. The RER index has been calculated using geometric mean and total trade share of trading partners as weights. It is important to note that Nominal exchange rate index is defined as the index of nominal exchange rate (period average rates) in units of domestic currency per unit of foreign currency (US$) for home country. An increase (decrease) in the value of RER represents depreciation (appreciation). Remittances (REM), foreign direct investment (net inflows) and official development assistance & grants (ODA) obtained from the World Development Indicators, trade openness (TROP) of the economy (2000=100), calculated as 100*(imports plus exports)/GDP. Imports and exports data come from the IFS 2008. Government final consumption expenditure (FCE) as percentage of GDP and terms of trade (TOT) obtained from World Development Indicators (online version 2008). The series for excess money growth (EXMGR) is constructed as the difference between growth rate of M2 and GDP, both of which are derived from WDI database. The variable excess money growth is used for future inflation to observe the macroeconomic consistency among the countries of analysis.

2) Methodology and Model Specification

The static as well as dynamic panel models for fixed effects of the real exchange rate using panel data for six selected Asian countries are examined. The static analysis refers to some kind of movement in which speed is constantly maintained i.e. studies focused on particular period of time. It is similar to taking a photo when you press the button for a shot then the photo is just at a particular point of time. Does the equilibrium point will remain there for long? Is there any force that can push the equilibrium move to new one or disequilibrium one? Or simply before arriving at the equilibrium what is the path that demand and supply have to change? This question cannot be answer by static analysis. In dynamic economic the study of time path of variable is to see whether the variable will converge to a point which we call stable or steady state or will it diverge. Dynamic analysis allows us to see the path of variable how the variables change with time. It helps us to see whether the equilibrium will be reached or not.

Different techniques have been used to estimate equation that state explicitly different forms of foreign inflows which influence the real exchange rate. The objective is to analyze how foreign inflows affect the real exchange rate. A Static panel model using fixed effects (within) estimator and dynamic panel using generalized method of moments (GMM) estimator is used to analyze the impact of foreign inflows on real exchange rate. Efficient GMM brings with it the advantage of consistency in the presence of arbitrary hetroskedasticity, but at a cost of possibly poor finite sample performance. It is more worthy to mention that GMM and Two stages least squares (TSLS) are better techniques in the

presence of endogeneity. The problem of endogeneity occurs when the independent variable is correlated with the error term in a regression model. This implies that the regression coefficient in an OLS regression is biased. There are many methods of overcoming this, including instrumental variable regression and Heckman selection correction. If hetroskedasticity is in fact not present, then standard IV may be preferable (Baum et al 2002). An identification problem may arise if some of the explanatory variables are correlated with the error term. For example, in the presence of risk-sharing strategies among distant family members, a drought will affect agriculture output while at the same time increase remittances from international migrants.

The static panel model is given by

$$Y_{it} = \propto + \beta\, x_{it} + \eta_{it} + \varepsilon_{it} \qquad (1)$$

Where x_{it} a vector of explanatory variables is, η_{it} is a country specific effect which is unobserved, and $\varepsilon_{it}$is an error term. The dependent variable is the real exchange rate, and the explanatory variables are remittances, foreign direct investment (FDI, net inflows), official development assistance (ODA), final government expenditure (FCE), excess money growth (EXMG), terms of trade (TOT) and trade openness (TROP).

The dynamic equation is given by

$$Y_{it} = \alpha\, Y_{it-1} + \beta\,(L)\, x_{it} + \eta_i + \varepsilon_{it} \qquad (2)$$

The dynamic model for the level of Y_{it}, where Y_{it-1} is the one lag period of Y_{it}, x_{it} is a vector of other explanatory variables, and β (L) is a vector of associated polynomial in the lag operator. Estimating the fixed effect estimator to equation (2) produce biased and inconsistent estimate of the coefficient on the lagged dependent variable, country specific transformation is eliminated and it destroys the correlation between the lagged dependent variable with the error term. To eliminate the country specific effect; the first difference of equation is as

$$Y_{it} - Y_{it-1} = \alpha\,(Y_{it-1} - Y_{i\,t-2}) + \beta\,(x_{it} - X_{i\,t-1}) + (\varepsilon_{it} - \varepsilon_{i\,t-1}) \qquad (3)$$

This shows the lagged difference in the real exchange rate that may be correlated with the error term. This necessitates the use of instruments to deal with second order serial correlation and the endogeneity. The GMM difference estimator uses the lagged level of explanatory variable as instruments. Blundell and Bond (1998) show that persistence in the

explanatory variables may have adverse effects on small sample. The GMM system estimator combines the difference estimator with an estimator in levels, to minimize the potential bias. The equation in levels uses the lagged differences of explanatory variables as instruments under two conditions: (a) there is no serial correlation in the error term, (b) the differences of explanatory variables and the errors are uncorrelated. The validity of the instruments determines whether the GMM estimator is consistent or not. Hall-Rudebusch-Wilcox (HRW), test is applied to check for validity of instruments[8]. Instrumental variable (2SLS) is not used since Breusch Pagan test identifies problem of hetroskedasticity[9]. This confirms the joint significance of independent variables and justifies application of GMM technique in estimating dynamic panel data.

The variables used in the study account for different foreign inflows, trade openness as external factors and excess money growth and government final consumption expenditure as internal factors in determining the real exchange rate. It is important to note that the expected theoretical impacts of the respective variables are as follows:

- Foreign inflows bear negative sign tends to cause real appreciation by changing the composition of the demand for traded and non-traded goods, according to the "Dutch disease" theory of foreign inflows.
- The sign of Government expenditure depends on the composition of expenditure. Consumption expenditure of non-tradable tends to appreciate the REER, while that of tradable leads to real depreciation.
- The sign of trade openness would cause real depreciation (appreciation) if it reduces (increases) the demand for non-tradable.
- Excess money growth captures negative sign, since changes in the money supply would tend to raise the general price level and hence leading to appreciation of the REER.
- Terms of trade sign depends on whether income (substitution) effect dominates then deterioration of TOT leads to real depreciation (appreciation).

Justification of including these variables can be explained by analyzing internal and external determinants of real exchange rate. The main focus of the study is to measure the impact of appreciating real exchange rate in contracting the tradable sector.

[8] The eigen value is 0.18 which is greater than the critical value i.e. 0.13
[9] The F-stat is 4.5

Estimation and Results

A) Descriptive statistics

Conventionally, real exchange rate model connects the real exchange rate to foreign inflow variables (remittances, foreign direct investment and official development assistance), trade openness and policy variables like government expenditure. In this study, the real exchange rate index has been taken as dependent variable and remittances, foreign direct investment, official development assistance, trade openness, final consumption expenditure and excess money growth as explanatory variables.

Table 1. Correlation Matrix

Variables	ODA	REM	FDI	EXMGR	FCE	TROP	TOT	REER
ODA	1							
REM	0.20	1						
FDI	-0.21	-0.10	1					
EXMGR	0.10	-0.09	-0.11	1				
FCE	0.34	0.60	-0.50	0.07	1			
TROP	-0.25	-0.09	0.73	-0.17	-0.68	1		
TOT	-0.61	-0.24	0.16	-0.07	-0.56	0.34	1	
REER	0.31	-0.21	-0.26	0.26	-0.01	-0.24	-0.11	1

Table 2. Descriptive Statistics

Variables (ratio of GDP)	Obs	Mean	Std.Dev	Min	Max
FCE	162	77.64	10.02	51	94
TROP	162	64.01	5434.38	12	229
TOT	160	0.7	0.34	0.01	1.19
EXMGR	162	11.68	11.62	-53	76
REER(2000=100)	162	165.86	110.58	58.68	592.12
ODA	162	0.92	0.93	-0.45	3.76
REM	162	3.05	3.07	0.01	13.74
FDI	162	1.34	1.81	-2.76	8.76

Note: estimates are based on annual data for the six countries over the period 1981-2007

Table1 presents the correlation matrix for the variables. Two categories of foreign inflows are negatively correlated with the real exchange rate, whereas official development assistance (ODA) is positively correlated with the real exchange rate in contrast to expectation. Trade openness is negatively correlated with the real exchange rate, while the coefficient representing the correlation between the real exchange rate and excess money growth rate

bears a sign that is contrary to expectation. Government final consumption expenditure is negatively correlated with the real exchange rate. Table 2 introduces some descriptive statistics on the variables.

B) ***Empirical Estimations***

The results obtained from estimating equations (1) and (2) are analyzed. Table 3 represents results from the static panel regressions using panel least square method (OLS). The coefficient estimates show that excess money growth, remittances, government expenditure and foreign direct investment are significant with a negative sign but ODA is significant with opposite sign. OLS country fixed-effects could be biased if any explanatory variable is correlated with other determinants of real exchange rate. Durbin Watson stat is very low in the specification effects. So dynamic panel is estimated using generalized method of moments (GMM). GMM-Difference estimator is applied. In table 4, ODA, REM, FCE, TROP, TOT have both statistically significant coefficients with expected signs but FDI and EXMGR are statistically significant with unexpected signs. The results reveal that increase in ODA, REM and TROP lead to real exchange rate appreciation. Since the real exchange rate acts as a summary indicator of the outcome of macroeconomic adjustments that occur following an increase in foreign inflows, the results are implicative of the existence of Dutch Disease effects caused by increase in ODA, REM and TROP inflows.

Table 3. Static Panel Regressions: Fixed Effects

Dependent Variable: REER

Variables	Coefficient	Std. Error	T-stat	Prob
C	13.2	2.28	5.78	0
Log(TROP)	-0.17	0.15	-1.11	0.27
Log(EXMGR)	-0.4	0.09	-4.42	0
Log(FCE)	-1.5	0.46	-3.23	0
Log(TOT)	-0.04	0.09	-0.38	0.71
Log(FDI)	-0.12	0.02	-5.98	0
Log(REM)	-0.21	0.04	-5.38	0
Log(ODA)	0.11	0.04	2.38	0.02
R-squared: 0.73				
Durbin-Watson stat: 0.51				
JB: 3.8				0.15

Table 4. Dynamic Panel Regressions: Using GMM/DPD

Dependent Variable: REER

Variables	Coefficient	Std. Error	T-stat	Prob
Log(REER(-1)	0.78	0.01	75.68	0
Log(TROP)	-0.05	0.02	1.89	0.06
Log(EXMGR)	0.02	0.01	2.85	0.01
Log(FCE)	-0.58	0.05	11.81	0
Log(TOT)	-0.07	0.02	-4.18	0
Log(FDI)	0.004	0.002	1.99	0.05
Log(REM)	0.03	0.01	2.07	0.04
Log(ODA)	0.003	0.002	1.75	0.08
S.E.of Regression: 0.06				
J-stat: 92.01				

The results further show that the substitution effect of trade liberalization does not dominate the income effect; therefore, as the degree of openness of a country increases, the real exchange rate tends towards appreciation. The estimates also indicate that a fiscal expansion leads to appreciation of the real exchange rate, consistent with the claim that government expenditure are generally allocated towards non-tradable goods. The statistically significant EXMGR suggest that excess credit creation due to foreign exchange market interventions have no repercussions in terms of fuelling inflation in face of high foreign inflows. It confirms the fact that lagged impact of changes in the explanatory variables on the real exchange rate is significant. The terms of trade explains that positive shock to the price of exports relative to imports results in REER appreciation.

The robustness of the results can be analyzed by deleting single country one by one. It is interesting to note that FDI are significant with expected signs causing real exchange rate to appreciate except Philippines. As for as the official development assistance is concerned, without Indonesia, Pakistan and Philippines, real exchange rate appreciated significantly. Whereas without India and Bangladesh ODA is significant but not with expected sign, causing real exchange rate to depreciate. Needless to say, ODA is not significant in Malaysia. Without Malaysia, Pakistan and Indonesia, the Remittances are insignificant with unexpected sign but excluding Philippine, Bangladesh and India provide significant results.

Table 5. Dutch Disease Effects: Using GMM/DPD

Effects on Tradable

Variable	Coefficient	Std. Error	T-stat	Prob
Log(TD(-1))	-1.1	0.02	45.09	0
Log(FDI)	0.13	0.03	4.48	0
Log(REM)	-0.63	0.22	2.86	0.01
Log(ODA)	-0.1	0.05	-1.9	0.06
LogREER)	0.31	0.19	1.62	0.1
Log(TROP)	1.96	0.34	5.78	0
S.E.Regression: 0.87				
J-stat: 39.56				

Effects on Non-Tradable

Variable	Coefficient	Std. Error	T-stat	Prob
C	1.31	0.59	2.24	0.03
Log(NTD(-1))	0.38	0.07	5.62	0
Log(FDI)	0.02	0.02	0.8	0.4
Log(REM)	0.08	0.04	2.03	0.04
Log(ODA)	0.05	0.04	1.09	0.27
Log(TROP)	0.04	0.15	0.26	0.79
Log(FCE)	-0.18	0.16	1.09	0.28
S.E.Regression: 0.26				

In the second crucial step for investigating Dutch Disease we have to see the effects of foreign inflows over the tradable and non-tradable sectors. The results in table 5 show that due to foreign inflows tradable sector contracts because the coefficients of different inflows are statistically and positively significant except FDI which may not be used for services sector activities. On the other side, our non-tradable sector going to expand due to inflows as shown in the results, the coefficients of REM and ODA are positively significant. However, FDI expands our tradable sector which may be the cause of its concentration in productive sector.

Concluding Remarks

The paper investigates the link between foreign inflows and the real exchange rate in six selected South-East Asian countries with a focus on Dutch Disease. The main objective is to find whether an increase in foreign inflows, particularly REM, FDI (net inflows) and ODA,

follows as a consequence in real appreciation (symptomatic of Dutch disease). The estimated real exchange rate model specifying three different kinds of foreign inflows, i.e. FDI, REM, and ODA show that an increase in ODA, Remittances and FDI net inflows lead to a real appreciation. Secondly FDI and REM are causing spending effect whereas REM and ODA showing resource movement effect. On the basis of these results study may conclude that increase in the inflow of ODA, FDI and REM cause Dutch disease effects in the region. The main policy recommendation can be drawn from this study is that as ODA, REM and FDI are associated with appreciation of the real exchange rate; these economies may continue to receive aid with focus on increase in tradable sector. This suggests that foreign inflows may be used to supply sides improvements which would maintain higher export volumes. According to the empirical analysis different kinds of foreign inflows seem to locate Dutch Disease. The study paves to measure RER misalignment and explore relationship between misalignment and economic growth among these countries. Needless to say small sample size is for such analysis may create normality of residual problem using GMM.

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APPENDEX: Variables defined

Measurement of real exchange rate

The real exchange rate (*RER*) is the price of traded goods relative to the price of non-traded (domestic) goods. In the absence of readily available indices of tradable and non-tradable prices, the real exchange rate has to be proxied by available domestic and world price indices and nominal exchange rates. There is no unique way of constructing a proxy measure, but all commonly used measures compute the ratio,

$$\frac{(NER)P^w}{p^D}$$

Where *NER* denotes the nominal exchange rate (measured as domestic currency per foreign currency), *PW* is an index of foreign prices and *PD* is an index of domestic prices. *NER* and *PW* are weighted averages computed across trading partner countries. The country weights are based on export shares, import shares or, most commonly, shares based on the sum of exports and imports taken from IMF original weights[10]. The countries included are Canada, Japan, United Kingdom, United States, Belgium, France, Germany, Italy, Netherlands, India, Korea, Singapore and Malaysia. The ratio of an index of a country's period average exchange rate to a weighted geometric average of exchange rates for the currencies of selected countries, weighted by each country's trade, and adjusted for relative changes in consumer prices. Base year = 2000. It is important to note that the selected trading partner of concerned countries account for almost 70% of total trade.

The particular measure used differs according to the measures used for *PW* and *PD*. Preferred proxy measure makes use of foreign producer (wholesale) prices for *PW* and domestic CPI for *PD.* Country weights based on export shares are used in the construction of *NER* and *PW* series The index may thus serve as a rough proxy for the theoretical concept of the real exchange rate – the relative prices of tradable to non-tradable goods. A convenient alternative to GDP deflator as the domestic price measure in constructing the index is the consumer price index (CPI) (Edwards 1989, Athukorala and Warr 2002). Most of the previous studies have typically used either of two other indicators, although the theoretical reasoning behind the particular measurement choice is seldom made explicit. One, which is perhaps the most widely used, particularly in publications of the IMF and the World Bank, uses a trade-weighted index of consumer prices in trading partner countries for *PW* and an

[10] IMF

index of consumer prices in the given country for *PD* . The use of this indicator as a proxy for the theoretical concept of a real exchange rate for developing countries is usually justified on the premise that under the low inflation conditions that prevail in developed countries (which are generally the major trading partners), producer prices and consumer prices tend to move together (Edwards1989).

Industry (value added % of GDP) comprises value added in mining, manufacturing, construction, electricity, water and gas.

Agriculture (value added % of GDP) consists of forestry, hunting, fishing, cultivation of crop livestock production.

Services (value added % of GDP) include hotels and restaurants, transport, financial professional, personal services such as health, education and real estate services.

ODA is the net disbursement of loans and grants on concessional terms by official agencies of Development Assistance Committee (DAC) and centre Arab countries to promote economic development and welfare.

Workers' remittances (REM) are current transfers by migrants who are employed or intend to remain employed for more than a year in another economy in which they are considered residents. Some developing countries classify workers' remittances as a factor income receipt (and thus as a component of GNP). The World Bank adheres to international guidelines in defining GNP, and its classification of workers' remittances may therefore differ from national practices. This item shows receipts by the reporting country. Data are in current U.S. dollars.

Foreign direct investment (FDI) is net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments.

Money and Quasi Money Growth is the average annual growth rate in money and quasi money. Money and quasi money comprise the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government. The change in the money supply is measured as the difference in end of year totals relative to the level of M2 in the preceding year.

GDP Growth is the annual percentage growth rate of GDP at market prices based on constant 1987 local currency. Aggregates are based on constant 1987 U.S. dollars. GDP measures the total output of goods and services for final use occurring within the domestic territory of a given country, regardless of the allocation to domestic and foreign claims. Gross domestic product at purchaser values (market prices) is the sum of gross value added by all resident and nonresident producers in the economy plus any 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.

Excess Money Growth (EXMGR) is estimated as the difference between money growth and GDP growth.

Trade openness (TROP) is calculated as the ratio, sum of exports and imports to GDP.

Government final consumption expenditure (FCE) is the sum of household final consumption expenditure and general government expenditure.