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A Study on Dutch Disease: Effect of Financial Flow on Real Exchange Rate

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Abstract

Using panel data for 29 developed countries, this paper studies the relationship between financial flow and trade markets on Dutch diseases for the period 2000-2010 and applying a fixed effects model. In particular, the study shows that an increase in inflows of foreign direct investment (FDI) leads to an appreciation of the real exchange rate. The result also suggests that an inflow of FDI accompanied by exports or government expenditure from tax revenue leads to real exchange rate appreciation. This paper also argued that stock market with FDI does not cause an appreciation of the real exchange rate.

Keywords: Real Exchange Rate, Foreign Direct Investment, Panel Data, Financial Market, Physical Market

JEL Classifications: F18, F21, F31

1. Introduction

After the collapse of the gold standard in 1971, industrial economies were forced to switch from fixed exchange rates to floating systems. This switch brought a large volatility for both the nominal and the real exchange rate (REER) (Stockman, 1983; Mussa, 1986). The importance of exchange-rate variability for domestic and international investment flows has been argued in numerous contexts. In industrialized economies, the presumed effects of exchange-rate variability have influenced the choice of international monetary regimes. The issue arose in the early 1970s when the Smithsonia Agreement was discussed and again at the time of the plaza Accord during the mid-1980s. In the early 1990s the posited negative implications of variable exchange rates was one motivating theme in designing the exchange rate mechanism (ERM) operable over currencies within the European Monetary System (EMS). The currency crises within the ERM in September

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1992 and spring 1993 refocused attention on the rationale for limiting short term nominal exchange rate movements and on the validly of arguments that exchange rate variability is costly and dampens real economic activity.

As such in this paper I would be analyzing the effect of certain types of investments on the real exchange rate. One of the investments that would be analyzed is FDI; FDI is viewed as a safer form of investment because it is tied to real investment in plant and equipment and also results in the transfer of technology and hard currency. This hard currency through FDI has a fundamental effect in the economy by affecting the real exchange rate. Also, FDI is seen as a better form of investments than other form of investment such as portfolio investment, because portfolio investment may go in to financial consumption. (Emmanuel K. K, Lartey, 2007) Moreover, relative to other type of capital inflows, FDI in developing countries generally generate in the tradable sector. It could be argue that, the degree of real appreciation from a given increase in FDI inflows should be smaller than that associated with increases in other form of capital inflow. Lartey (2008), showed within a theoretical framework, that the greater financially open an economy is, the greater is the real exchange rate appreciation following an increase in FDI inflow. The result suggest that the more open an economy is, the greater is the initial productivity boom experienced by the tradable sector following an increase in FDI inflow. This boom eventually drives up real wages, causing greater demand for non-tradable goods and subsequently a higher real exchange rate appreciation via higher prices of non-tradable.

In other to analyses the econometric results with some structural interpretation, we used the OLS, Fixed and the Random effect model, though more emphasis was made on the Fixed effect because it was proven by the Hausman test to produce unbiased results.

The goal of this paper is to test the relationship between REER and foreign direct investment for a panel data. I evaluate whether the data confirms the implications on the relationship between: (a) REER and foreign direct investment, (b) REER and financial market, (c) REER and trade market and (d) REER and tax revenue. From the results it is seen that both Fixed and Random effects model shows that an inflow of FDI causes a real exchange rate appreciation, which is supportive to related studies like, Laura Alfaro (2003), and Saborowski, Christain (2009).

Applying the same reasoning to financial market, I found out that the development of a stock market will have no significant effect on real exchange rate, in other to ensure that the effect is indeed correct and right, I created an interaction term, FDI inflows with Stock market, and the results was not significant, though not consistent with Saborowski, Christain (2009), who showed that FDI will cause an appreciation of the real exchange rate, if an economy dispose of a deep financial sector as well as large and active stock market. Second, I tested whether trade market causes appreciation of real exchange rate in countries that invest in inflow of FDI? Accounting for the composition of the flow will be crucial, especially in the case when the country is export oriented. Thirdly, another important finding is that of tax revenue. This paper finds that tax revenue and FDI inflows are very likely to cause real exchange rate appreciation. Tax revenue (TR) and FDI was found to be positive and significant across all models.

The result of this finding supports the main

hypothesis. The main implication of this hypothesis is that, FDI inflow in developed countries leads to real exchange rate appreciation. By avoiding a substantial appreciation of its currency, the respective economy can take advantage of the inflows' growth enhancing potential without having to make painful policy choice.

2. Literature Review

2.1 Dutch Disease

The term Dutch disease drew the world attention during the late 1950s in Netherlands when natural discoveries of natural resource followed by the appreciation of the Dutch currency (guilder), lead to a fall in the manufacturing and service sector. The term is now commonly used to refer to any situation in which a natural resource boom, large foreign aid or capital inflow causes a real exchange rate appreciation that jeopardizes the prospects of manufacturing sector.

The theory of Dutch disease was firstly described by W. Max Colden and J. Peter Neary in 1982 in the article booming sector and de-industrialization in a small open economy. The basic assumption was that a boom in the natural sector of a small country leads to real exchange rate appreciation which in turn leads to de-industrialization.

The standard model of Dutch disease seek to explain how extra wealth generated by the sale of natural resources on the world markets induces appreciation of the real exchange rate and contraction of the tradable sector Corden and Neary (1980). A natural resource boom can be due either to a discovery of new stocks of factor that is specific to the energy sector, say oil, or to an increase in the price of energy. A central feature of the model is a distinction between the two main effect of a resource boom, namely the resource movement effect and the spending effect. The boom in the energy sector raises the income and wages of labor and so it draws resources out of the adjusted mechanism. This is known as the resource movement effect. The higher income earn from the boom leads to extra spending on non-tradable goods (services) which raises their prices (i.e. causes real appreciation).

Recently they are other factors beside of natural resources that cause Dutch diseases.

The following are empirical studies that are related to this study. Dorantes and Pozo (2004), Raja and Subramanain (2005), and winters and martins (2004) all of whom used the cross country data to show how real exchange rate appreciation follows remittance flows.

There have also been some studies carried out on aid and its effect on Dutch disease. This paper seeks to examine the effects of aid on the growth of manufacturing sector. The author uses a methodology that exploits the variation within countries and across manufacturing sectors, and also correct for possible reverse causality. Using data from 32 countries with 684 observations and with their estimates based on the OLS procedure. They found out that aid inflows have systematic adverse effects on a country's competiveness, as reflected in the lower relative growth rate of exportable industries. They provided evidence suggesting that the channel for the effects is the real exchange appreciation caused by aid inflows. They assumed that this may explain in part the reason why it is hard to find robust evidence that foreign aid helps countries grow (Rajan and Subramanian 2009).

Furthermore they have been several studies on the path of recourse discoveries. This paper further seeks to explain the discovery of oil and movement of the real exchange rate when manufacturing is resource intensive. This paper shows how natural resource boom affects the real exchange rate in a situation where there are input linkages between the manufacturing sector and the natural sector. Using the fixed effect model and an OLS procedure they found out that an increase in revenues from natural resource could de-industrialize an economy by raising the real exchange rate, rendering the manufacturing sector less competitive. They also build a theoretical model showing that a country experiencing discoveries of natural resources, such as oil, is not necessarily bound to experience the Dutch disease. The appreciation of the real exchange rate can be escaped if part of the resources produced is consumed domestically as input in resources intensive manufacturing industries. They also found claims that Dutch disease effect associated with discoveries of natural resources (namely oil) are dampened in countries that specialize in recourse intensive manufacturing industries.

Another factor of concern that brings about real exchange rate appreciation is foreign direct investment (FDI). This paper studied the relationship between the degree of financial openness and real exchange rate appreciation of capital inflows in developing countries. A panel data was used with 109 countries that coved a time period of 1990-2003. Using a GMM estimator, the results shows that an increase in capital inflow eventually causes an increase in the demand for non-tradable, a rise in the relative prices of non-tradable, and an expansion of non-tradable output. Increase in capital account openness leads to an appreciation of the real exchange rate, which implies a loss in international competitiveness that is detrimental to the tradable sector. In particular the study shows that an increase in FDI inflows results in an appreciation of the real exchange rate in more financially open economies only. (Lartey 2011).

3. Data and Descriptive Statistics.

In this section, I outline the basic characteristics of the data, describe how the variables have been measured, and explain the methodology for the estimation of the panel model.

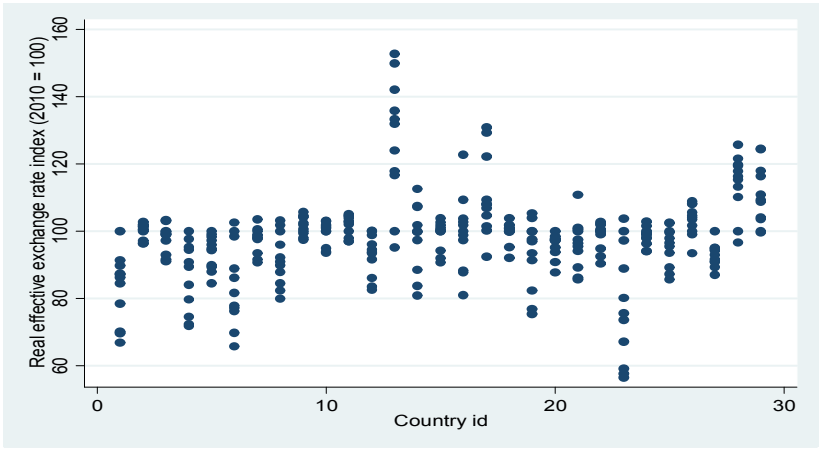
The dataset consist of 29 high-income OECD countries, which cover a period of 11 years 2000-2010. The dependent variable in this study is real effective exchange rate, REER. We are interested in the effect of capital inflows on the real exchange rate given the financial market in the respective countries

The real effective exchange rate index is used as a measure of real exchange rate. The real effective exchange rate (REER) index is given by the normal effective exchange rate index adjusted for relative changes in consumer prices, a proxy of cost indicators of the home country. Since it is defined as the relative price of domestic to foreign goods, an increase in REER implies a real exchange rate appreciation. The REER data comes from the World Bank and Federal Reserve Bank of Saint Louis.

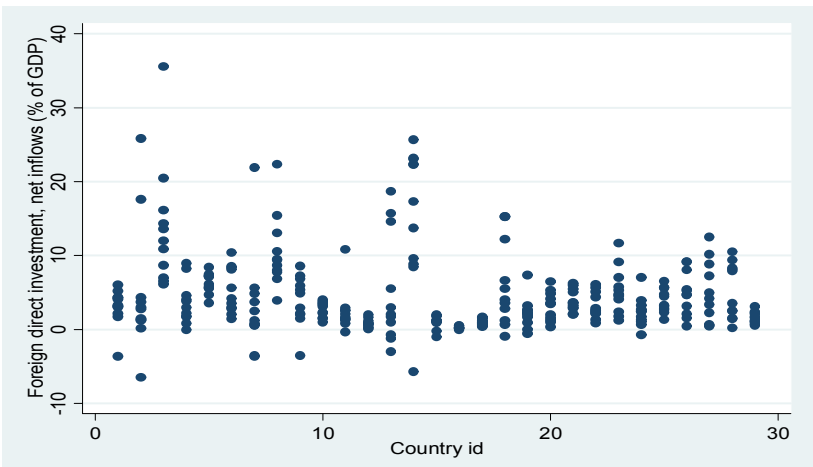
The explanatory variables of interest are foreign direct investment (FDI), which is controlling ownership enterprise in one country by an entity based in another country. Stock

market (STKMKT), this is a market in which shares of publicly held companies are issued and traded either through exchanges or over the counter markets. Trade openness is defined as the outward or inward orientation of a given country's economy. Outward orientation refers to economies that take significant advantage of the opportunities to trade with other countries. Inward orientation refers to economies that overlook taking or trade with other countries. The other explainable variables include non-FDI private inflows (NON-FDI). This refers to other flows into the economy which are not considered as direct investment but can affect the exchange rate. These type of flows include; remittance,

Fig. 1. Two Way Scattered Diagram between Variables and Country ID



Real effective exchange rate (2010)



Foreign direct investment

official development assistance. It is assumed that such flows are used in the purchase of non-tradable goods which might lead to Dutch disease. The rest of the explanatory variables are, Growth rate of money supply (M2GDP), General government final consumption expenditure (Ggexp), terms of trade (TOT), Subsidies and other transfers (SUBT), Tax revenue (TR), Trade (Openness to trade), Export value index (EXP), and Market capitalization of listed companies (MKTCAP).

Table1 shows the correlation matrix for all the variables and table 2 shows descriptive statistics. Table 1 reveals a negative correlation between government expenditure and foreign direct investment. TOT has a positive sign, which explains how countries with a favorable TOT will encourage the inflow of FDI. Also there is a negative relationship between REER and FDI. There is also a positive correlation between openness and FDI. That is the more open an economy is to trade the more inflow of FDI that economy is going to receive.. The correlation between NONFDI and REER is positive, meaning that an increase an increase in NONFDI flow leads to an appreciation of the real exchange rate, while there is a negative relationship between openness and REER, the relationship between these two pair of variables over the years have had a mix result where it's either smoothing out or amplifying the impact of shocks to real effective exchange rates. The correlation between TR and REER is positive. This can be explained by government spending tax revenue through a fiscal expansionary policy which leads to appreciation of the real exchange rate. The relationship between stock market and REER is positive; this seeks to explain that; countries with a well developed stock market are likely to have a real exchange rate appreciation.

From figure 1, the greater amount of FDI inflow in country ID 3 (Belgium) can be explained by its strategic geographical position at the crossroads of the main European markets.

Its high quality transportation infrastructure, logistics and telecommunications;

Its businesses specialized in the supply of intermediate and semi finished goods;

It has a multilingual, qualified workforce and a strong purchasing power. Also country ID (Ireland) has a high REER which can be cause by an increase in investment. An increase demand of its currency by foreign investor will cause the price to go up there by causing an appreciation of its currency.

4. Model

4.1 Methodology.

Emmanuel K. K Lartey., (2011), used the GMM to study the relationship between financial openness and Dutch disease in developing countries. The result reveals that increase in financial openness lead to an appreciation of the real exchange rate. In particular, the study shows that an increase in inflow of foreign direct investment (FDI) results in an appreciation of the real exchange rate in more financially open countries only

To assess the relationship between foreign direct investment and stock market in a panel data, I use the ordinary least square, fixed effect model and random effect model. Fixed and random effects work to remove omitted variable bias by measuring change within a group. By measuring within a group (across time) you control for a number of potential omitted variables unique to the group.

$$y_{it} = \alpha_0 + \alpha_i + \beta x_{it} + \vee i + \mu_{it} \quad (1)$$

Where

y_{it} is the dependent variable observed for individual in time

x_{it} is the time variance regressor.

α_i is the unobserved individual effect.

α_0 is the intercept coefficient.

v_i is random effect parameter

μ_{it} is the error term.

Equation (1), represent the fixed effects and the random effect model respectively. In the study, the two panel data model fixed and random effect model will be use interchangeable to see the difference in their results.

In other to control for those omitted variables which might be correlated with the other variables in the model, the fixed effect model is use. The idea is that whatever effects the omitted variables have on the subject at one time, they will also have the same effect at a later time; hence their effects will be constant, or "fixed". However the omitted variables must have time-invariant values with time-invariant effects.

Also, when using fixed effect model we assume that something within the individual may impact or bias the predictor or outcome variables and we need to control for this. This is the rationale behind the assumption of the correlation between entity's error terms and predictor variables. Fixed effect removes the effect of those time invariant characteristics so we can assess the net effect of the predators on the outcome variable.

Due to the various theoretical and practical considerations, the model choice may seem a daunting task. As a consequence, to decide between a random effects and fixed effects model, a Hausman test is used.

5. Results and Conclusion.

Our starting point was a consideration of OLS, fixed and random effects models from table 3. I estimated a balanced fixed effects panel, and a balanced random effect panel. The random effect performed poorly with a low explanatory power ($\overline{R^2} = 0.4542$). In comparison, the fixed effect has a much higher explanatory power ($\overline{R^2} = 0.5009$). Moreover the fixed effects specification is preferable theoretically to the random effects specification, this is also supported by the Hausman test (P = 0.0000) which show that the fixed effects results are not only efficient but are also consistent and significant with key variable like foreign direct investment (FDI). The chief advantage is that by controlling for the fixed effect the problem of omitted variable or model specification is also controlled. The dependent variable is real exchange rate. Net inflow of foreign direct investment (FDI) is positive and significant for fixed and random effects respectively, but it is more significant with the fixed effect model with a five percent confident interval as oppose to ten percent confident interval with the random effect model, Which support the hypothesis that an increase in capital inflow via foreign direct investment leads to an appreciate of the real exchange rate. The coefficient of export is seen to have a positive value and is also highly significant among the two models. This means that an inflow of revenue through export of goods and services will lead to real exchange rate appreciation. The coefficient of trade

(openness to trade) is negative and significant with the fixed and random effect model. This suggest that a country which is open to trade will experience a depreciation in its currency that those country which are not open to trade.

Total flow (NONFDI) which comprises of those flows which are not direct, that is portfolio investment has a negative sign and is 5% significant with both fixed and random effect model. Emmanuel K.K Lartey., (2011), having used GMM estimator found NONFDI to be positive and significant suggesting that NONFDI lead to a real exchange rate appreciation. This result is in line with the theory which explains that portfolio investments are much volatile, that is to say, for a country on the rise, NONFDI can bring rapid development, helping an emerging economy move quickly to take advantages of economic opportunity, creating many new jobs and significant wealth. However, when a country's situation takes a down turn large flow of NONFDI can move away from the country.

Another important finding is stock market; it is assume that a boom in the stock market will lead to an inflow of currency which will lead to an appreciation of the real exchange rate. Beck and Levine (2002) found out that stock market causes an appreciation in real exchange rate. From the results the coefficient of stock market is positive but not significant in both fixed and random effects model. The coefficient of stock market turnover, that is value traded over capitalization is negative and significant (five percent significant) under fixed effect model but not significant under the random effect model.

The coefficient for government spending is seen to be positive in both fixed and random model, while it is ten percent significant under random effect model and not significant under fixed effect. Therefore an increase in government spending under random effect will lead to an appreciation of the real exchange rate. Market capitalization (MKTCPT) has a positive sign and its 10 percent significant under the random effect model, where as it is not significant under the fixed effect model. Therefore company with a higher market capitalization will tend to encourage investors to buy shares in such companies leading to inflow of currency which will cause appreciation of the home currency, as such a positive and significant sign of MKTCAP under the random effects suggest that increase in MKTCAP leads to real exchange rate appreciation.

Another important finding is openness to trade; the coefficient of openness to trade is negative and statically significant. The impact of openness to trade over the years has been that of a mix result were it either smoothing out or amplifying the impact of shocks to real effective exchange rates. Calderon and Kubota (2009) found out that trade openness may have a potential of mitigating or amplifying real and nominal shocks to real exchange rates. Christain Saborowski (2009) used a GMM estimator found out that openness to trade was negative and significant

Furthermore using the OLS method gives us a similar but different regression from both the fixed and random effect. The coefficient for FDI is positive but not significant as oppose to fixed effect and random effect model. Also the coefficient for NONFDI flow is positive and not significant, suggesting that an inflow of NONFDI will lead to real exchange rate appreciation, this result is far from similar with those of Fixed and random effect. The OLS method performs poorly and can be explain by the R-square 0.3393.

5.1 Financial market

The following discusses the results of interacting FDI inflows with our indicator of stock market. Table 4 shows results for the interaction effect of FDI and STKMKT on the real exchange rate. The coefficient of the interaction term (FDI*STK) is positive but not statistically significant across all three models. This suggest that though FDI by itself causes an appreciation of real exchange rate, countries with an inflow of FDI, and which also have a boom in financial market are likely not to experience real exchange rate appreciation. From table 4 STKMKT was not significant while FDI was significant. This tells us that countries were an inflow of FDI causes appreciation of the real exchange rate will certainly not experience an appreciation if such countries invest in stock markets. Christian Saboranski (2009) found a positive and significant relationship between the interaction terms of FDI and capital market with real exchange rate.

5.2 Physical markets

Next we analyze the impact of physical market on the effect of FDI inflows on the real exchange rate. We first include an interaction term between export and FDI inflows. This yields the result presented on table 5. We observed that the interaction term is positive and significant with the OLS and fixed effect model but no with the random effect model, and also the coefficient for EXP is positive and significant. Considering the fixed effect model, the results suggest that inflows of FDI to countries that are export oriented are most likely to have an appreciation in the real exchange rate. From table 4 it is seen that both coefficient of FDI and export were significant and positive across OLS, fixed effect and random effect model, which leads us to believe that export oriented countries that engage in FDI will experience a real exchange rate appreciation.

Table 6 shows the interaction between FDI*TR. The coefficient of the interaction term (FDI*TR) is positive and significant with the OLS, fixed and random effect. The coefficient for TR under table 4 was positive and significant under OLS, but not with fixed effect and random effect. A possible reason for this finding is that countries whose government uses revenues from taxes for expansionary policies like buying of Treasury bill, or issuing rebates, or buying bonds are likely to cause an appreciation in the real exchange rate most especially when those countries encourage an inflow of FDI. From the table it is noticed that the coefficient of FDI is negative and significant under OLS and RE effect model, while that of TR is negative under OLS and positive under fixed and random effect, but not significant under any of the model. These suggest that either FDI or TR by its self cannot lead to appreciation of the real exchange rate. Therefore a country who uses revenues from taxes in expanding the economy will realize an appreciation when such country also invests in an inflow of foreign investment.

5.3 Conclusion and Policy recommendation

According to Hausman test, the fixed effect model is supposed to be use in the regression. Nevertheless, results from OLS, Fixed effects and random effects model were also use. Using dynamic panel data techniques of 29 developed economies for a period 2000-2010, sug-

Table 1. Correlation Matrix

	FDI	Ggexp	M2	TOT	REER	STKMKT	STKMKTU	SUBT	TR	Opennes	EXP
FDI	1										
Ggexp	-0.0274	1									
	(0.6262)										
M2	0.0151	-0.0244	1								
	(0.7877)	(0.6648)									
TOT	0.0612	-0.1408	-0.2595	1							
	(0.276)	(0.0118)	(0)								
REER	-0.0145	0.1527	0.164	-0.1217	1						
	(0.7967)	(0.0063)	(0.0033)	(0.0297)							
STKMKT	-0.0141	-0.1926	0.1882	-0.1408	0.3088	1					
	(0.8018)	(0.0005)	(0.0007)	(0.0118)	(0)						
STKMKTU	-0.1448	-0.0808	0.2436	-0.1827	0.2883	0.7765	1				
	(0.0096)	(0.1501)	(0)	(0.001)	(0)	(0)					
SUBT	-0.0534	-0.0965	0.2043	-0.0363	-0.1969	0.2109	0.198	1			
	(0.3419)	(0.0853)	(0.0002)	(0.5188)	(0.0004)	(0.0001)	(0.0004)				
TR	0.142	0.4866	-0.2613	0.2224	0.1049	-0.2279	-0.1952	-0.4368	1		
	(0.0111)	(0)	(0)	(0.0001)	(0.0612)	(0)	(0.0005)	(0)			
Openness	0.499	0.0834	-0.0648	-0.1258	-0.1765	-0.3143	-0.3811	0.029	0.1066	1	
	(0)	(0.1373)	(0.2483)	(0.0246)	(0.0015)	(0)	(0)	(0.6059)	(0.0571)		
EXP	0.0292	-0.0331	-0.1361	0.1823	0.0872	-0.1819	-0.1885	0.1306	-0.1167	0.3607	1
	(0.603)	(0.5555)	(0.015)	(0.0011)	(0.1199)	(0.0011)	(0.0007)	(0.0196)	(0.0372)	(0)	
MKTCAP	0.087	-0.2728	0.1346	0.0905	0.1992	0.7123	0.2805	0.1675	-0.1216	-0.2318	-0.2132
	(0.121)	(0)	(0.0162)	(0.1066)	(0.0003)	(0)	(0)	(0.0027)	(0.0298)	(0)	(0.0001)
NONFDI	-0.1722	0.0066	0.3244	-0.0817	0.2494	0.5301	0.52	0.159	-0.2953	-0.4441	-0.1508
	(0.002)	(0.9062)	(0)	(0.1454)	(0)	(0)	(0)	(0.0044)	(0)	(0)	(0.007)

gest there is an adverse impact of financial flow (FDI) on appreciating the real exchange rate, thus causing Dutch disease. The results reveal that the real appreciation of the exchange rate is significantly attenuated if an economy disposes of a deep physical market (EXP). Therefore countries with an inflow of FDI and which are also involved with physical market are likely to have real appreciation of exchange rate.

In addition, inflows of FDI in countries with perhaps a booming stock market are less likely to cause an appreciation of real exchange rate. Christian Saborowski (2009) found out that, the appreciation of exchange rate is significant if an economy is expose to a deep large and active sector. It must be noted that the influence of stock market depends on how well the stock market is developed. Well developed stock markets like that of the U.S are less likely to cause an appreciation, were as most stock market institution like those of some developing countries are likely to cause an appreciation Soenen and Hennigar (1988).

Furthermore, the interaction between FDI and TR is positive and significant. A possible explanation is that, countries with inflow of FDI and whose government uses revenue from taxes on expansionary policies like buying of bonds, issuing subsidies, issuing rebates are most likely to experience real exchange rate appreciation.

The main policy implication of this study is that most country should control the inflow of FDI particularly when the country is involve in physical market such as the exportation of goods and services which causes real exchange rate appreciation and which might go a long way in causing Dutch disease. Also the government should also pay particular attention on its expenditure. The government should be able to know when to deploy an expansionary policy or a contractionary policy, for if precaution is not taking this might lead to a real exchange rate appreciation.

Table 2. Descriptive Statistics

Variables	Obs	Mean	Std. Dev	Min	Max
Country Id	319	15	8.379745	1	29
year	319	2005	3.167246	2000	2010
FDI	319	4.474977	5.3083	-6.49398	35.53898
Ggexp	319	19.1401	3.554741	9.951304	28.06423
M2	319	104.9543	47.6737	27.93984	240.5606
TOT	319	101.4284	16.69965	61.99713	204.0148
REER	319	97.9178	12.4403	56.47667	152.7842
STKMKT	319	72.57855	73.64852	0.022511	434.9207
STKMKTU	319	89.09672	64.87875	0.372985	404.0674
SUBT	319	59.73031	14.81243	14.5583	81.3182
TR	319	19.12388	6.018946	8.213639	34.87636
Openness	319	81.56269	35.0653	20.25789	178.2538
EXP	319	176.3745	88.06781	84.18514	601.2749
MKTCAP	319	72.04238	50.64023	4.180684	291.6575
NONFDI	319	3161.043	4846.132	0.49	30353.16

Table 3. Regression Result with OLS, Fixed and Random Effect

Regressor	OLS	FE	RE
FDI	0.193 (0.135)	0.206** (0.093)	0.185* (0.100)
Ggexp	0.556*** (0.213)	0.130 (0.428)	0.613* (0.338)
M2	0.037*** (0.014)	-0.007 (0.025)	0.027 (0.021)
TOT	-0.134*** (0.044))	-0.027 (0.036)	0.001 (0.037)
STKMKT	-0.001 (0.024)	0.022 (0.019)	0.014 (0.019)
STKMKTU	0.040** (0.020)	-0.043** (0.018)	-0.024 (0.019)
SUBT	-0.249*** (0.046)	0.066 (0.063)	0.020 (0.061)
TR	0.256* (0.144)	0.176 (0.325)	0.210 (0.237)
Openness	-0.075*** (0.025)	-0.598*** (0.067)	-0.301*** (0.045)
EXP	0.053*** (0.008)	0.107*** (0.008)	0.078*** (0.007)
MKTCAP	0.062*** (0.024)	0.020 (0.020)	0.035* (0.020)
NONFDI	0.000 (0.000)	-0.001** (0.000)	-0.001** (0.000)
_cons	94.297*** (6.810)	123.069*** (14.183)	88.145*** (10.107)
R-sqaure	0.3393	0.5009	0.4552
Hausman test Prob>Chi^2 = 0.000			

Notes: dependent variable: real exchange rate ratio p-values are in parenthesis.
***, **,* denote significant at 1%, 5%, and 10% level, respectively.

Table 4. Regression with FDI*STK

	OLS	FE	RE
FDI	0.090 (0.171)	0.100 (0.119)	0.086 (0.131)
Ggexp	0.504** (0.219)	0.155 (0.427)	0.625* (0.324)
M2	0.035** (0.014)	-0.009 (0.025)	0.033 (0.021)
TOT	-0.136*** (0.044)	-0.027 (0.036)	-0.004 (0.038)
STKMKT	-0.016 (0.029)	0.004 (0.022)	-0.000 (0.024)
STKMKTU	0.044** (0.020)	-0.037** (0.019)	-0.015 (0.020)
SUBT	-0.250*** (0.046)	0.070 (0.063)	-0.004 (0.061)
TR	0.247* (0.145)	0.200 (0.325)	0.195 (0.223)
Openness	-0.072*** (0.025)	-0.590*** (0.067)	-0.254*** (0.041)
EXP	0.052*** (0.008)	0.107*** (0.008)	0.073*** (0.007)
MKTCAP	0.062*** (0.024)	0.017 (0.020)	0.038* (0.020)
NONFDI	0.000 (0.000)	-0.001** (0.000)	-0.000** (0.000)
FDI*STK	0.002 (0.002)	0.002 (0.001)	0.002 (0.001)
_cons	96.060*** (7.044)	122.366*** (14.163)	86.324*** (9.583)
R square	0.3414	0.4967	0.4396

Notes: dependent variable: real exchange rate ratio p-values are in parenthesis.
***, **,* denote significant at 1%, 5%, and 10% level, respectively.

Table 5. Regression with FDI*EXP

	OLS	FE	RE
FDI	-0.672* (0.372)	-0.353 (0.247)	-0.033 (0.232)
Ggexp	0.563*** (0.211)	0.170 (0.424)	0.590* (0.340)
M2	0.038*** (0.014)	-0.014 (0.025)	0.016 (0.024)
TOT	-0.137*** (0.043)	-0.038 (0.036)	0.001 (0.037)
STKMKT	0.003 (0.024)	0.028 (0.019)	0.013 (0.019)
STKMKTU	0.038* (0.020)	-0.049*** (0.018)	-0.023 (0.019)
SUBT	-0.264*** (0.046)	0.052 (0.063)	0.017 (0.062)
TR	0.257* (0.143)	0.144 (0.323)	0.206 (0.239)
Openness	-0.064** (0.025)	-0.607*** (0.067)	-0.305*** (0.045)
EXP	0.033*** (0.011)	0.095*** (0.009)	0.079*** (0.007)
MKTCAP	0.060** (0.024)	0.019 (0.019)	0.038* (0.020)
NONFDI	0.000 (0.000)	-0.000** (0.000)	-0.000** (0.000)
FDI*EXP	0.005** (0.002)	0.003** (0.001)	0.002 (0.002)
_cons	98.012*** (6.916)	128.559*** (14.236)	90.205*** (10.298)
R square	0.3525	0.5036	0.4629

Notes: dependent variable: real exchange rate ratio p-values are in parenthesis.
***, **,* denote significant at 1%, 5%, and 10% level, respectively.

Table 6. Regression with FDI*TR

	OLS	FE	RE
FDI	-1.721***	-0.424	-0.764*
	(0.549)	(0.383)	(0.408)
Ggexp	0.536**	0.197	0.656*
	(0.209)	(0.428)	(0.335)
M2	0.028**	-0.007	0.026
	(0.014)	(0.024)	(0.021)
TOT	-0.120***	-0.024	0.004
	(0.043)	(0.036)	(0.037)
STKMKT	0.008	0.024	0.018
	(0.024)	(0.019)	(0.019)
STKMKTU	0.032	-0.044**	-0.026
	(0.019)	(0.018)	(0.019)
SUBT	-0.236***	0.073	0.028
	(0.046)	(0.063)	(0.061)
TR	-0.060	0.091	0.061
	(0.167)	(0.328)	(0.242)
Openness	-0.067***	-0.584***	-0.290***
	(0.025)	(0.067)	(0.044)
EXP	0.052***	0.105***	0.076***
	(0.008)	(0.008)	(0.007)
MKTCAP	0.057**	0.019	0.034*
	(0.023)	(0.020)	(0.020)
NONFDI	0.000	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)
FDI*TR	0.086***	0.028*	0.043**
	(0.024)	(0.017)	(0.018)
_cons	100.662***	122.201***	89.440***
	(6.912)	(14.144)	(10.019)
R-square	0.3662	0.5158	0.4597

Notes: dependent variable: real exchange rate ratio p-values are in parenthesis.
***, **,* denote significant at 1%, 5%, and 10% level, respectively.

Appendix I

Variables	
Foreign direct investment, net inflows (% of GDP)	FDI
General government final consumption expenditure (% of GDP)	Ggexp
Money and quasi money (M2) as % of GDP	M2
Net barter terms of trade index (2000 = 100)	TOT
Real effective exchange rate index (2010 = 100)	REER
Stocks traded, total value (% of GDP)	STKMKT
Stocks traded, turnover ratio (%)	STKMKTTU
Subsidies and other transfers (% of expense)	SUBT
Tax revenue (% of GDP)	TR
Trade (% of GDP)	Openness to trade
Export value index (2000 = 100)	EXP
Market capitalization of listed companies (% of GDP)	MKTCAP
Non-FDI flows	NONFDI

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