

Testing Dutch disease syndrome via foreign direct investment: A case for Mauritius

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Abstract

The primary linkage of Dutch Disease is based on large influx FDI leading to the appreciation of the real effective exchange rate, together affecting a country's export competitiveness. The existence of a Dutch Disease syndrome is tested in the Mauritian economy by using annual time series data sourced from official foundations from 1980 to 2019. We captured the Dutch Disease syndrome through 2 main effects namely through i) the REER appreciation due to FDI and ii) a decline in export's competitiveness. After investigation, using a Vector Error Correction Model, it is observed that Mauritius has not experienced such a disease with respect to the arrival of FDI because the government and local firms were successful in implementing right and stable policies.

1. introduction

This piece of research work seeks to examine whether Mauritius has been able to make the most of the opportunities presented as being one of the chief beneficiaries of FDI in the African region. The possibility for FDI to generate a go-slow in the competitiveness of a country via the Dutch Disease has been much quoted in many academic papers. The word Dutch Disease was initially cast-off in the *Economist* in 1977 to describe a rare economic phenomenon that on one hand causes a positive reaction in one sector of an economy but on the other hand the same reaction causes a negative response in another sector. In fact, the Dutch Disease gave its birth in the late 1950s when Netherlands exports volume escalated because of the discovery of natural gas but at the same time transmitting harmful effects to its manufacturing sectors. Over the years, FDI has been the main channel connecting many countries on an international platform. This global sync though has flustered the economic pulse of many countries, such that the influence of FDI on different sectors and its sustainability are now being put through the wringer. Soto (2000) blames FDI for crisis while others suggested that it is the most relevant element underwriting development. Several countries in the African region such as the Nigeria and Angola have shown the symptoms of Dutch Disease through the presence of FDI (Olusi and Olagunju, 2005). This brings us to increased interest in recognising the involvement of FDI to economic development and to wonder the Dutch Disease syndrome.

Against the above backdrop, the inclination of this research is to test concretely the existence of the Dutch Disease symptoms through FDI in the Mauritian economy. A few years after Mauritius gained its independence in 1968, negotiated quotas and pledged rates for international and regionalism allowed the island to breathe the air of diversification. Mauritius had an agronomic economy that was heavily focused on sugar plantation, which accounted for nearly 20% of GDP and over 60% of export. The cultivation of sugar cane activated the take-off of economic growth. This sector benefited from an exceptionally favourable market position, created by international agreements that seem to have played a key role in the external charisma of Mauritius. Mauritius seems to have greatly been spared from resource curse phenomenon because the country was timely swift to enlarge its economic pillars. However, exporting an abundant natural resource can lead to the of Dutch Disease. Recent literatures forwarded that Dutch Disease can be adapted to a massive influx of FDI. The Dutch Disease problem can also be referred to a contraction in the volume of international marketed products owing to the large receipts of FDI. Being a well-diversified economy, Mauritius has experienced fast and gigantic growth in

its manufacturing and tertiary sector and FDI was the common lead front of all sectors. Given that the main reason for receiving the capital inflows is to enhance economic development, it is interesting to investigate the offsetting effects of its envisaged potential positive impacts under the Dutch Disease framework.

The major research question for this study is to test whether Mauritius has experienced any kind of Dutch Disease symptoms. However, to assess the Dutch Disease syndrome, we shall segment our analysis into the following phrased research questions:

- There is a significant relationship between FDI and REER
- There is a significant relationship between REER and the % of manufacturing exports
- The casual relationship between FDI, REER and % of manufacturing exports

To determine if an economy has experienced Dutch Disease syndromes, it necessitates one to prove the connection between 2 variables, an appreciation in REER and a decay in exportation, with the existence of many factors that affect economic performance such as FDI and any other foreign inflows. Coincidental strengths of FDI should not be a sign of Dutch Disease, as this overlooks the element that the REER is determined by a varied set of factors.

The rest of the paper is organised as follows, section 2 dwells into a brief discussion on the theoretical and empirical literature related to the Dutch Disease, section 3 discusses the methodology, data collection process and the results while section 4 concludes.

2. Theoretical and empirical literature review

Dutch Disease is an alarming concern for small economies residing in Africa and Asia. In a simplistic manner, Dutch Disease can be defined as when foreign currency enters a country and is converted into local currency, the money supply of that country increases. Further, domestic demand for local currencies grades in an appreciation of exchange rate which creates a situation where a unit of foreign currency buys less goods and services in the local economy than previously. Consequently, the country loses its competitiveness vis-à-vis other countries. As per the original definition of Corden and Neary in 1982, the Dutch Disease refers to the structural penalties of a change in the sectoral composition of an economy due to a large influx of foreign wealth.

Traditional theory of Dutch Disease

The Core Model

In the rouse of this new Disease, Max Corden and Peter Neary first established the Dutch Disease theory. The framework, popularly known as the Core Model, assume a small open economy that manufactures three categories of goods. The two are traded goods given at international prices and the third one is a non-traded goods whose price is set by the forces of local supply and demand. The traded goods sector comprises a booming sector and the other was a non-booming one. The non-traded good is believed to be formed by the service sector. Interactions between these sectors would happen through the: "resource movement effect" and the "spending effect". The table1 describes the 2 mentioned channels.

A two-sector economy model was also originally used by Corden (1984) to demonstrate the so called "manufacturing squeeze". By using the two-sector economy model, he showed how the exploitation of natural resources, through exports, activates huge capital inflows which in turn rises the domestic currency. The model has mainly been used for analysing the impact on the economy from a large unearthing of natural resources, such as oil, petrol and gas. As reported by Ebrahim-Zadeh (2003), the Core Model and the two-sector economy model can also be used for analysing the effects of any increase in foreign capital such as remittances, FDI and ODA.

Table 1: Channels of Dutch Disease

CHANNELS	DESCRIPTIONS
The resource movement	On the supply-side, an increase in the value of the booming sector's output will shift all the factors of production from the non-booming sector, popularly taken away from the manufacturing sector.
The spending effect	On the demand side, the boom will cause world prices traded at an international level to rise. This extra spending raises the comparative price of non-tradable, resulting in a further appreciation of the REER. In reply, this leads to a contraction of the non-booming tradable sector.

Modern literature review of the Dutch Disease

Accordingly, the basic Dutch Disease model was subsequently augmented in various ways to introduce new conduits that could generate negative effects. Modern literature relating to the Dutch Disease has geared their focus from booming natural resource economy to booming FDI. Classic literature has since been altered for them to be functional in developing economies to explain the recurrently pragmatic economic slowdown in such countries following to a large influx of FDI, foreign aid and remittances (Acosta, Lartey, and Mandelman, 2004). The study by Nkusu (2004) has shown that the Core model can be adapted to understand the impact of large inflows of FDI instead of just a natural resource boom. As explained by Magud and Sosa (2010) in their research, most of the modern Dutch Disease literature stresses the impact of FDI on REER.

FDI and Dutch Disease

Modern literatures have stressed the impact FDI on the REER. A large real increase of a country's currency because of excessive FDI will inflict export competitiveness and will lead to the current account to worsen and an increasing the feebleness to crisis. If the arrival of the FDI increases the demand for non-tradable in the addressee country, then it leads to appreciation. Hence, *ceteris paribus*, a rise in FDI strengthens the REER.

Dutch Disease is dedicated to as the co-existence within the traded goods sector of booming and lagging subsectors. Rodrik (2007) detected that REER overvaluation weakens long-term economic performance, particularly for developing countries where the manufacturing industry production suffers excessively from weak institutions. Fat inflows of FDI standardly augment consumption spending, appreciate the REER and may thus have damaging effects on the exterior attractiveness of the recipient economies (Lartey, 2008). REER appreciation in turn harms the development of non-booming sectors by making them less lucrative and competitive. A de-industrialisation process eventually takes place, possibly cutting potential long-run growth (Ros, 2008). Under the framework of Dutch Disease, the manufacturing sector is usually taken to assess the negative impact. They explained their conclusions by the suggestion that FDI tends to be more prejudiced toward tradable goods than with the other forms of capital flows.

Ang (2008) argued that if the financial system of a country is well developed, stable and robust then the capacity to attract FDI in this sector will be more efficient. However, she also said that FDI will not only continue to promote economic growth, but also will acts as a catalyst for many other sectors such as the manufacturing sector. Frenkel and Rapetti (2009) have contended that massive FDI led to stout exchange rate appreciation and causes rapid downfalls in several developing economies. Within the Dutch Disease context, foreign reserves turn out to be the exogenous policy tool in the hands of local monetary authorities, through which they may attempt to pull or even converse pressures on exchange rate appreciation or control exchange rate devaluations and circumvent downfalls in occurrence of increasing capital outflows. Additionally, Stijns (2009) pointed that FDI may lead to the creation of a dual economy triggering similar effect under the Dutch Disease framework. It consists of one developed sector, habitually owned by foreign investors and an underdeveloped sector owned by domestic owners. The

developed sector is usually capital-intensive, while underdeveloped manufacturing sectors are labour-intensive. Thus, this adverse fallout of FDI could be harmful for local firms.

As quoted from the work of Rajan and Subramanian (2009): "many studies found that the traded goods sector is a network through which an economy engrosses best practices from foreign economies. But the absence of these learning-by-doing spill overs can experiment to be critical to long run productivity growth and could be one constraint on growth.....". Their findings indicated that FDI have systematic aggressive effects on a country's competitiveness as evidenced by the lower relative growth rate of exportable industries with REER appreciation being the channel for such effects. He also proclaimed that aid inflows into an economy have systematic adverse effects on the developing economy's competitiveness as indicated by the decreasing growth of the export industries and harming long term growth, which is in line with the Core Dutch Disease Model.

Ismael (2010) discovered that the focal channel through which the Dutch Disease takes place is the spending effect. He also displayed that typical Dutch Disease effects are more influential in small open economies where the services sector is labour-intensive, since this exacerbates the REER appreciation induced by a non-elastic supply response in the expanding non-tradable sector.

FDI acts as a developmental tool in all sectors and tourism has no exceptions. Specifically, the tourism industry was also used to test the Dutch Disease effects due to massive investment of enterprises in small costal island. The Dutch Disease model was accustomed to observe the economic effects of an increase in tourism in a small, open economy which are very connected to other foreign markets. (Copeland, 2010) In relation to tourism related FDI, the Dutch Disease is sometimes called the 'Beach Disease' (Holzner, 2010). Capóet *al.* (2010) investigated whether tourism related FDI causes Dutch Disease. They find that investment in the tourism sector brought a substantial growth in general wealth but at the same time the increased emphasis on tourism and non-traded goods has led to a decline of manufacturing exports.

Some adjustments were necessary because there are important variances between tourism and commodity exports. In the presence of tourism, goods that are usually non-tradable become somewhat tradable and tourists typically avail themselves with bundle of goods and services. Chao et al (2007) explored the effects of an expansion in tourism related investment and concluded that this phenomenon leads to a resource allocation between service sector and manufacturing sector for exportation as backed by the Dutch Disease theory.

Although regularly thought to be synonymous, one should bear in mind that Dutch Disease and Resource Curse are dual distinct matters. Dutch Disease is defined as a pure economic problem in which the economy fine-tunes to the new equilibrium following large-scale inflows of foreign exchange which is FDI in our case. On the other hand, Resource Curse is a theory that sees natural resource profusion to cause inherently pessimistic impacts on growth and development. This proposition was supported by Sachs and Warner and later popularised by the seminal work by Auty (2010) when the Core Model was revamped.

Hirschman (2010) stressed that the contraction of the manufacturing sector makes this phenomenon a Disease which though is nothing harmful if neoclassical and competitive situations abound in the economy. In the same study, he mentioned that the Dutch Disease can be a real Disease and a basis of constant contraction if there is something special about the causes of growth in manufacturing, such as the "backward and forward linkages". He also forwarded that strong appreciation, the manufacturing sector loses competitiveness, causing a decline in output and employment and thus leading directly to deindustrialisation.

Javed (2011) argued that the permanent change of Dutch Disease can be worrisome. Dutch Disease creates a situation of resource allocation where labour and capital are transported from one sector to another. Some small businesses may be compulsorily shut down and employees will need to have new jobs. In economies where small businesses are major pillar for economic growth, Dutch Disease risk a country's long-term growth performance by choking off an important source of human capital development. He also mentioned in his study that it is not constantly easy to draw a relationship between FDI, REER and level of manufacturing exports because several other factors can contribute to the same signs of Dutch Disease.

On the other hand, Edwards (2010) conversed whether Dutch Disease is a Disease in the first place. Their findings showed that it is not a Disease if the real appreciation is not perpetual. Similarly, as per the study of Ha-Joon Chang (2010), Dutch Disease is merely an explanation of the causes and structural effects of an economy boom, that is, resource reallocation away from a less lucrative non-booming sector to those that have comparative advantage. However, the general economic growth of the country need not suffer from the lessening non-booming tradable sector.

Nkusu (2010) also showed that small economies that receive FDI need not experience Dutch Disease. This happens because these small countries have idle capacity and hence can efficiently content the demand brought by FDI boom. Olaopa (2010) build a model to explicitly analyse the effects of FDI in economic growth through the REER and thus the need to use a Dutch Disease type of model. It showed that if there is factor underutilisation, that is, unemployment, the Dutch Disease spending effect fades. Thus, REER appreciation will not affect the manufacturing sector and thus it will not lessen growth until the economy returns to full employment, that is, when the spending effect re-activates. Nevertheless, the Dutch Disease does not necessarily imply a deficit in the trade balance since the surplus of one sector is sufficient to cover the deficit in another sector goods.

It is also obvious that FDI inflows comes with macroeconomic management problems. As Calderon (2010) highlighted, the more flexible the exchange rate regime and the more sovereign the monetary policy, the more unstable are the fluctuations. Supporters of “competitive” exchange rates, most flagrantly Asafu (2010), claimed that exchange rate undervaluation should be part as a strategic growth plan and the neutralisation of the Dutch Disease always involves the implementing an effective and efficient exchange rate policy. Connecting the Dutch Disease phenomenon with the relation between the REER and growth, a recent view suggested that economic policies maintained by the government should contain any Dutch Disease effects (Bresser-Pereira, 2011).

Ebrahim-Zadeh (2011) noted that the fading away of the competitiveness of the tradable sector is irrespective of the exchange rate policy that the country operates. In summary, while the early and original Dutch Disease literature offered an insightful theory as to why countries might suffer from a resource boom, they also provided precautionary care to FDI. To reverse these negative effects, Chenery (2011) suggested that by either diminishing the real domestic expenditures or reducing public debt in an amount equal to FDI or more importantly, use the FDI in accumulating foreign financial assets. The related literature revealed a disparity in the impact of the different types of capital flows on competitiveness and even a disparity in the impact of specific types of capital flows across countries and regions. The impact rest on the types of expenditure each flow is tied to.

Empirical Evidence

There are abundant empirical studies, both single-country and cross-country panel data, on the Dutch Disease theory. The results from the rigorous statistical testing indicate that for the annual data increases/decreases FDI inflows are associated with a depreciation/appreciation in the REER. White (1992) carried out their studies in Asia and found that an increased in FDI and aid caused a real appreciation of the Sri Lankan currency. To support this, Elbadawi (1993) conducted a study on 62 developing countries found that for Sri Lanka that FDI appreciated the REER of the recipient countries in their study.

The Computable General Equilibrium (CGE) approach was commonly used to test for the Dutch Disease effect. Devaranjan et al (1998) used this model to approximate the change in the equilibrium REER with respect to changes in FDI. This model was popularly used to analyse the effects of Dutch Disease. For instance, Vos (1998) found that FDI prompt strong Dutch Disease effects in Pakistan. Similarly, Nyoni (1998) examined the impact of FDI in Tanzania on macroeconomic variables such as the REER, export performance, government expenditure, investment and growth. Using time series data from 1969 to 1993, the study employed cointegration techniques and an error-correction model to approximate the long-run equilibrium and the short-run REER, respectively. They argued that although seemingly beneficial, FDI generated undesirable consequences for Tanzania. These undesirable impacts include appreciation of the REER and the following deterioration in export performance. Laplagne et al. (2000) found the same evidence of Dutch Disease effects by calibrating a CGE for some South Pacific countries.

In the study of Ouattara (2000), she found that the issue of private capital flows, which is more important than foreign aid to Latin America was associated with a depreciation of the REER while other capital flows have the counter effect. Stijns (2003) investigated the Dutch Disease effects by using a gravity model of trade. This model has helped him to take out the other macroeconomic effects faced by a home economy. In the paper, four different testable hypotheses are being identified; an appreciation of the REER; an increase in non-traded output; a decrease in manufacturing sector production; and a contraction in manufacturing exports.

The 'Salter-Swan-Corden-Dornbusch model' was also used to analyse the impact of foreign inflows on the REER in emerging economy. The apparatus explained that the increase in different foreign inflows induces appreciation in the REER. Studies carried out Athukorala and Lartey (2007) also used the same model which were devoted in assessing the power of FDI on the REER. The results confirmed the presence of Dutch Disease effects over time in Macau where the first symptom was manifested in the appreciation of REER.

Furthermore, using the Bayesian techniques, Acosta (2007) tested whether there is the existence of Dutch Disease in El Salvador. He designed a DSGE model for this small open economy and found that remittances cause more contraction in the manufacturing sector than FDI. Javaid (2008) investigated Dutch Disease hypothesis by analysing the impact of foreign exchange inflows namely, FDI, on appreciating REER for selected East Asian countries over 1981-2007. The study initially estimates the effect of surge in foreign exchange inflow on REER and subsequently investigates contraction in the tradable sector. Overall, the findings confirmed the existence of Dutch Disease effect. Likewise, Biswas and Dasgupta (2008) observed the impact of foreign capital inflows in India on the REER using quarterly data. The result indicated that both FDI and workers' remittances induce REER appreciation which is in accordance with the Dutch Disease hypothesis. Rajan and Subramania (2009), for the case of 33 developing countries during 1980 to 1990, also confirmed that foreign investment causes a loss in competitiveness in its manufacturing sector through REER appreciation.

Besides, Palma (2009) came up with a new approach to the Dutch Disease. She analysed a sample of 105 countries and acknowledged that the Dutch Disease can also arise in macroeconomic policies. Similarly, Harold (2010) carried out his analysis on a sample of 50 developing countries and observed that REER appreciation was only a matter to what extent a government can adopt the right policies. Conflicting results have also been found in a study of foreign aid and the REER in Ghana. Using twelve-monthly data on six Central American countries over the period of 1985 to 2004, Izquierdo and Montiel (2010) found the REER to be steady despite increased FDI.

Under the GCE model, empirical evidence showed that the impact of FDI on the REER varies from region to region. In a study on FDI and the REER in twelve francophone West African countries, Quattara & Strobl (2011) found that FDI do not generate Dutch Disease effects. Strobl (2004) also examined the relationship between FDI and the REER in 12 countries of the West African CFA Franc zone. Their results from dynamic panel analysis indicated that FDI do not generate Dutch Disease effects in these countries as FDI and the ratio of exports and the measure of openness tend to cause the REER to depreciate.

Taguchi (2017) studied the case of a sample of Asian economies and interestingly reported that the Dutch Disease was identified for 1980-1995, but not for 1995-2014. The authors posited that this could be due to their institutional improvements. More recent work from Barczikay et al. (2020) using nonlinear model with Botswana as a case study reported a partial Dutch disease phenomenon related to Botswana's trade with Namibia and South Africa. Murshed and Rashid (2020) for four emerging South Asian economies Bangladesh, India, Pakistan, and Sri Lanka on the other hand found that FDI inflows triggered a depreciation of the real exchange rate.

3. The econometric methodology, data sources and data descriptions

Model description

The 2-empirical model as established by Nyatepe-coo (1994) is given below. The first function captures the relationship between REER and FDI and the second function captures the relationship between MEXP and REER.

$$\text{REER} = f(\text{FDI}, \text{ODA}, \text{TOT}, \text{OPEN}) \dots\dots\dots(1)$$

$$\text{MEXP} = f(\text{REER}, \text{TOT}, \text{OPEN}, \text{INV}) \dots\dots\dots (2)$$

Thus, we re-write the linear equations as such:

$$REER_t = \alpha + \beta_1 FDI_t + \beta_2 ODA_t + \beta_3 TOT_t + \beta_4 OPEN_t + \xi_{1t} \dots \dots \dots (3)$$

$$MEXP_t = \mu + \lambda_1 REER_t + \lambda_2 TOT_t + \lambda_3 OPEN_t + \lambda_4 INV_t + \xi_{2t} \dots \dots \dots (4)$$

According to Bourdon and Korinek (2012), natural logarithmic chosen for various studies as it condenses multicollinearity as well as plummets the large values to relatively manageable ones. Also, it displays elasticity and thus rate of change. The empirical model equation can be thus presented as follows:

$$LNREER_t = \alpha + \beta_1 LNFDI_t + \beta_2 LNODA_t + \beta_3 LNTOT_t + \beta_4 LNOPEN_t + \xi_{1t} \dots \dots \dots (5)$$

$$LNMEXP_t = \mu + \lambda_1 LNTOT_t + \lambda_2 LNREER_t + \lambda_3 LNOPEN_t + \lambda_4 LNINV_t + \xi_{2t} \dots \dots \dots (6)$$

Where:

t is the time trend

α is the intercept for equation 3 and 5

μ is the intercept for equation 4 and 6

$\beta_1, \beta_2, \beta_3,$ and β_4 are the slope coefficients of the equations 3 and 5

$\lambda_1, \lambda_2, \lambda_3$ and λ_4 are the slope coefficients of the equations 4 and 6

ξ_{1t} and ξ_{2t} are the error terms which is presumed according to Ordinary Least Squares assumption to be distributed in zero mean and constant variance.

LN = Natural logarithm

Data descriptions

Annual time series data were used for the study, and they are purely secondary data. This study covers the period 1980 to 2019 to test the existence of Dutch Disease syndrome in Mauritius. Below is a brief description on the variables that has been integrated in both model functions. Appendix B gives a description on the various variables used in this study and also gives the sources of data.

Econometric Testing and model

Vector Error Correction Model

Usually, according to Asteriou (2007), in economics it is normal to have models where some variables are not only explanatory variables for a given dependent variable, but they are also explained by the variables that they are used to determine. Sims (1980) advocated that the Vector Autoregressive (VAR) is an alternative to derive multivariate equations. In a VAR model, each variable is treated as a priori endogenous and are treated symmetrically. The above framework is accordingly used to investigate the hypothesised link as, to estimate the outcome of Dutch Disease on the Mauritian economy, it is important to measure the impact of variables on each other both in the short run and long run.

The presence of a cointegration relation forms the basis of the Vector Error Correction Model (VECM) specification. The VAR model in which is in levels can suitably be reformulated into a VECM in rappings of first differences and levels without altering the value of the log-likelihood function since no compulsory limitations is forced on model parameters. The VECM is just a special case of the VAR for variables that are stationary in their first differences. Brooks (2002) mentioned that a cointegrating relationship indicates a long-term or an equilibrium phenomenon. However, since it is possible that cointegrating variables may diverge in the short run but that their association will return to what the results indicated in the long run. The base equation for VECM is as follows:

$$y_t = \sum_{j=1}^p \alpha_j y_{t-j} + \sum_{j=1}^q \beta'_j x_{t-j} + \epsilon_t$$

Empirical analysis

Test for stationary and Cointegration

Dealing with time series data calls for a test of the time series properties of the data. The ADF and Phillips Perron test reveal that all variables are integrated of order 1. Even if individual variables are not stationary at level, which was the case in the above, the group of variables may drift together so that a long term or a cointegrating relationship exists among them. However, the variables must be integrated of the same order and greater than zero. On this note, the Johansen cointegration is applied which states that, if a group of time series data is integrated of the same order, then there is a long run relationship

among them. Both the Max- Eigen test and the Trace test validate the existence of cointegration for both model specifications.

Since we have co-integrating equation from both tests, we can conclude that there is a long-run equilibrium relationship in the system of variables. The presence of co-integrating relationships between the variables infers that the Dutch Disease variables in Mauritius are most capably characterised by an error correction specification.

Vector Error Correction Model

Since we found cointegration relationship in the Johansen test, this allows us to distinguish between short run and long run effects of variables. In this section, we shall consider and analyse, first, the REER equation and last, we will analyse the MEXP equation.

Long run and short run effects of REER equation

The above equation establishes the long run cointegration vector of REER.

$$\text{LNREER} = 20.12942 - 0.203303\text{LNFDI} - 0.106331\text{LNODA} + 2.049034\text{LNTOT} - 5.102600\text{LNOPEN}$$

Note: ** significant at 5%

All the independent variables are statistically insignificant in explaining REER except for OPEN which is significant. Of interest to this study, other things being equal, FDI has an insignificant impact on REER, and this suggest the nonexistence of the Dutch Disease syndrome which relates to REER appreciation. Such results are consistent with the past empirical work of Ouattara (2000) for West African countries for the case of a sample of Latin American country, Strobl (2004) and Ouattara & Strobl (2011) for West African Countries, Izquierdo and Montiel (2010) for a sample of Central American countries and Taguchi (2017) and Murshed and Rashid (2020) for samples of South Asian economies. Similar results are reported for the other foreign capital flow namely ODA which is found to have an insignificant relationship with REER. We can deduce that in the long run, the influx of FDI or any other capital flows does not impose any negative spill overs in the economy through the Dutch Disease. TOT exerts an upward pressure on REER. Other things being equal, 1% increase in TOT leads to an 2.04% increase in REER. As noted by Myndel (2008), there is no systematic sign of relationship between TOT and REER. Also, OPEN is significant and 1% increase in OPEN leads to 5.10% decrease in REER. Adrino (2008) considered openness as a measure of trade liberalisation and stipulated that an improvement in trade openness will lead to a depreciation of the REER.

Table 2: Short run terms REER

REER EQUATION			
Dependent variable: LN_REER	Coefficients	Standard Error	Prob.
Adjustment Speed	0.119350***	0.023262	0.0000
Short run parameters:			
LN_FDI (-1)	0.005622	0.010510	0.5983
LN_ODA(-1)	-0.016901	0.016200	0.3087
LN_TOT(-1)	-0.126839	0.163907	0.4476
LN_OPEN(-1)	-0.312377**	0.144063	0.0418
R-squared	0.620119	Mean dependent var	-0.000854
Adjusted R-squared	0.421134	S.D. dependent var	0.044566
S.E. of regression	0.033907	Akaike info criterion	-3.655101
Sum squared resid	0.024143	Schwarz criterion	-3.110916
Log likelihood	72.30916	Hannan-Quinn criter.	-3.471999
F-statistic	3.116409	Durbin-Watson stat	2.177371
Prob(F-statistic)	0.012126		
Note : *significant at 1%, ** significant at 5%, ***significant at 10%			

In the short run, results confirm the insignificant relationship between FDI and REER and thus do not indicate any Dutch Disease problem. In any ways, as indicated in the literature review, the REER appreciation should be permanent enough causing exports deterioration. The insignificant relationship between FDI and REER can be explained according to the study of Barry and Bradley (1997). They concentrated on determining the nature of FDI in many developing countries and small economies,

analysed the effects of FDI on exports through REER' movements and concluded that most of the FDI was not export orientated.

As such, an explanation for this is that in Mauritius, FDI concentration is situated mostly in the real estate sector and financial sector. The Mauritian financial sector is a very well developed one and as such attract international companies that are willing to implant in Mauritius thus raising most FDI in this sector. Even during the EPZ boom in earlier years in Mauritius, FDI in the manufacturing sector rarely exceeded 5%.

Also, our findings confirm the study made Nkusu (2004). He deduced in his study that when a country's capital markets are more developed compared to other sectors, which is the case in Mauritius, they attract international firms willing to branch out their portfolios via FDI and thus not affecting the elements in the manufacturing sector, including REER. Additionally, Edwards (1995) also found that while FDI might lead REER to escalate in the short run, its impact is diluted over time as part of the flows which leaves the country in the form of imports in the long run. That what explains the spending effect of Dutch Disease but was found void in our case.

Effectively, in the short run, ODA push down the REER but is insignificant though. This is because most development from ODA funds are credited to infrastructural development and managing government budget deficit in Mauritius. Rajapatirana (2003) specified that if FDI is extensive enough in comparison with other foreign flows such as ODA, it could pledge the negative upshot on competitiveness. In this situation, REER is representing the competitiveness of a country. Furthermore, OPEN imposes a negative relationship with REER as noted by Myndel (2008). In the short run, a 1% increase in OPEN will leads REER to deflate and is significant in both terms as it is an indicator that stimulates an economy's international competitiveness.

Long run and short run effects of MEXP equation

The equation establishes the long run cointegration equation of MEXP.

$$\text{LN MEXP} = -19.75611^{**} + 5.389771^{**} \text{LN REER} + 1.730620^{**} \text{LNTOT} - 3.485188^{**} \text{LN OPEN} + 2.281054^{**} \text{LN INV}$$

Note: ** significant at 5%

All the coefficient of the variables is significant in explaining MEXP. The long run equation indicates that 1% increase in REER leads to a 5.39% increase in MEXP. This is not in line with the Dutch Disease effect because appreciation in REER is not leading to a decrease in exports but to an increase. This confirms the findings of Gupta and Chowdhury (1984) where a small REER appreciation may lead to an increase in exports because export manufacturers are powerful, big and profitable enough to sustain such a small effect. This is a similar case in Mauritius, where our exports producers are very powerful in terms of their volume of sales and the markets they target. This view is supported by the rapid expansion of Mauritian firms operating in South and East Asia. Also, from a competitiveness standing point, Mauritius has benefited a lot from PTA's which has helped local firms to secure their position in American and European markets. Also, for local Mauritian firm to sustain their growth globally, markets diversification showed resiliency, notably toward the European Union and regional markets like South Africa and Madagascar.

A more strong and convincing argument for the positive and significant relationship between REER and MEXP was brought by Alder and Dumas (1999). He put much emphasis on exporting firms using hedging techniques to reduce foreign exchange risks. This exposure is common for those who are engaged in international trade and hence they use derivatives such as forwards, futures and options. Therefore, despite an appreciating REER, MEXP skyrocketed instead because many firms, in the long run, found popular hedging techniques to secure their international transactions.

Other things being equal, 1% increase will lead to 1.73% increase in MEXP. A 1% increase in OPEN will derive a 3.49% decrease in MEXP. This is supported by Calderon (2003) where OPEN will have a more positive impact of imports rather than exports. This supports the situation in Mauritius where there is a major percentage of imports rather than exports. According to Hussain (2008) and De Gregorio and Wolf (1994), TOT always shows a positive sign in the case of small open economies. Other things being equal, 1% increase in INV leads to 2.28% increase in MEXP.

The government plays an important role in MEXP performance through policies pursued in respect of both the facilitation of private investment and their own investment programme. Emerging and developing countries often dedicate a higher % of GDP to investment in their country. Countries with speedy rates of economic growth severely invest in more fixed assets to empower sustained economic growth. In Mauritius, sectorial investment is more towards promoting its exports position. As supported by Solow (1956), when a country does not receive FDI in a particular sector, an immense “push up” as means to welcome growth, with open importance are attached to fixed capital formation.

Table 3: Speed of adjustments and short run terms of MEXP

MEXP EQUATION			
Dependent variable: LN_MEXP	Coefficients	Standard Error	Prob.
Adjustment Speed	-0.166709**	0.056057	0.0072
Short run parameters:			
LN_REER (-1)	-0.510005	0.675928	0.4589
LN_TOT (-1)	0.669745	0.700938	0.3502
LN_OPEN (-1)	0.1571836**	0.576369	0.0126
LN_INV (-1)	0.252335	0.310169	0.4250
R-squared	0.617319	Mean dependent var	0.065229
Adjusted R-squared	0.416868	S.D. dependent var	0.178963
S.E. of regression	0.136662	Akaike info criterion	-0.867329
Sum squared resid	0.392205	Schwarz criterion	-0.323144
Log likelihood	26.31092	Hannan-Quinn criter.	-0.684227
F-statistic	3.079641	Durbin-Watson stat	2.305400
Prob(F-statistic)	0.012874		
Note : *significant at 1%, ** significant at 5%, ***significant at 10%			

Source: Author own work based on Eviews computations

In the short run, the speed of adjustment parameter of -0.167 is negative and highly significant and is approximately stable in magnitude. The results suggest that the variables return to a long-run equilibrium. Every year, the deviation is corrected by 0.167% to finally reach to its long run equilibrium. The relationship between REER and exports is negatively insignificant. In fact, the reform made to the exchange rate system of Mauritius and other measures taken in the 1990's, were designed to provide an incentive to our export sector to flourish which is in line with the findings of Sauer (2001). This hypothesis was also supported by Hooper and Kohlhagen (1978) who found no evidence of a significant relationship between REER and MEXP.

Under a managed float exchange rate regime, REER volatility is quite small and the ability to press down an appreciation is quite high compared to other countries which function under a freely floating exchange rate system. This is also in line with the results obtained by Medhora (1990). As in 2012 the BOM started to arbitrate regularly in the foreign exchange market to prevent some major trading currencies, which forms part of the weighting of REER, from depreciation to soothe exporters' proceeds. Also, Sungupta(2013) stated that an exchange-rate policy that purely attempts to foil appreciation may fall victim to the so-called Penn effect, which briefly suggests that appreciation of REER goes hand in hand with growth and high performance in the export sector.

Other things being equal, an insignificant relationship was established between TOT and MEXP as well as between INV and MEXP. It is hard to measure the impact of public and private investment in the short run because the benefits accrue only in the long term. However, the theoretical impact of investment by both private and public sector on real exchange rate is ambiguous. It would be required to determine if the spending is oriented more toward tradable or non-tradable goods. As such, as noted in the long run equation, the relationship between INV and MEXP becomes positive and significant. In general, the R-squared is approximately 62% which indicates most variables fits the MEXP equation.

4 Conclusion and policy recommendations

Summary of Results

This study investigated the existence of Dutch Disease via FDI in Mauritius. It is expected that FDI would be translated in REER appreciation and as such hurting the exportation pillar. This study was carried for a period 1980 to 2019. If the spending of flows of FDI is left unrestricted, this might lead to undesirable consequences such as the Dutch Disease. We modelled the Dutch disease syndrome into 2 equations to capture REER appreciation because of FDI and a decline in the manufacturing exports because of REER appreciation. Results from the analysis concluded that Mauritius has been able to avoid a huge REER appreciation following to an FDI boom and avoiding a contraction in its manufacturing exports. We found in our first equation the insignificant relationship between REER and FDI. This impact has been much counter back by huge outflow of foreign currency due to the volume of Mauritian imports. Mauritius is a country that have been effective in intensifying its exports pillar significantly by implementing alert exchange-rate policies, inducing a gradual falling trend in REER overvaluation.

It can also be deduced that the lack of FDI in the manufacturing sector in Mauritius has exercised weight on the government and the domestic sector to purchase technology via other means. For example, the purchase of latest production technologies, setting up joint ventures and vocational training. This is according to the study of Ekholm (2007) where he stated that FDI in other sectors can lead to export diversification directly because the government is forced to invest massively in the export sector. As such this eliminates the pressure of REER. Indeed, although FDI has been low, domestic private and public sector investment in the manufacturing sector has never been below 15 % of GDP since 1985 and has often been over 20%. Hesse (2008) suggested that export and market diversification assisted many developing countries in overcoming export instability, terms of trade shocks and foreign exchange instability, a view which was also documented by Ghosh and Ostry (1994).

Implications of the Study

To sum up, a small island like Mauritius has been going through the phase of modern industrialisation and it was decisive for policy makers to take care of a possible Dutch Disease effects. Though, we questioned if REER appreciation would be a source of apprehension for policymakers, appreciation of the REER might have a differential bearing on economic growth conditional on whether it replicates a balanced phenomenon. Thus, macroeconomic policy implemented by the policy makers should lay emphasis on circumventing overreaching and the outpouring of macroeconomic differences that possibly later become unsustainable.

However, policymakers usually face difficulties to evaluate if whether a certain shock, in our case FDI and the matching REER appreciation will be provisional or perpetual. If a permanent shock is treated as temporary by the local authorities and agree to mediate on the exchange market, they might suspend an inevitable and desirable macroeconomic modification, experiencing also in considerable quasi-fiscal charges due to sterilization. Furthermore, using fiscal policy will be an important tool to curb the Dutch Disease effects. De facto, extreme public expenditure has been a prevalent element of economic mismanagement of booms restricting from positive Dutch Disease shocks. It can also play a role not only by qualifying the "spending effect" associated with Dutch Disease but also pressing expenditures down to reduce output instability.

It is the policymakers' job to safeguard that the welfares outweigh potential hostile effect on long-term growth due to a shrinkage of the manufacturing export sector. Spending FDI in an efficient and also to make best use of the benefits associated with the positive income shock is crucial to curb the effects of Dutch Disease. The optimum policy would be contingent, to some extent, on the type of shock behind the Dutch Disease. The features that entice FDI to a country rest upon the precise forms of FDI in question that is, export oriented, market seeking, or efficiency seeking (Cushman, 1985).

Those investments with positive supply side effects and that would lift productivity in non-tradable sectors could be helpful to guarantee that the increase in FDI does not hinder long-run growth. When discerning about "what to do" about Dutch Disease effects, policymakers should "beware of killing the goose that laid the golden egg." (Aesop's Fables, 1912).

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Appendices

Appendix A – Exchange rate policy shifts in Mauritius

Source: *Mauritius, A Competitive Assessment, IMF Working Paper WP/08/212 by Patrick Imam and Camelia Minoiu (2008)*

Source: *Mauritius, A Competitive Assessment, IMF Working Paper WP/08/212 by Patrick Imam and Camelia Minoiu (2008)*

Period	Exchange Rate Policy
1870	Mauritius swapped between Pound Sterling (gold) and Indian Rupee (Silver)
Between 1878 and 1934	A common monetary union was held with India where the legal tender was the Indian rupee. This decision reflected the inflow of Indian rupees with Indian immigrants to Mauritius
Throughout the 19 th and 20 th Century	Mauritius was almost linked to the GBP via currency boards
1934	Mauritius introduced its first own currency but still pegged to GBP through currency board
1967	The currency was still fixed to the GBP but dual forex market was held separating capital account transactions from current account transactions.
1972	Mauritius left the GBP in June 1972 and there was the creation of a central exchange rate with Special Drawing Rights (SDRs)
1976	The currency was pegged to SDRs with a 2% band
1979 and 1981	The devaluation of MUR currency occurred
1982	Mauritian rupee was officially de-linked from the SDR and pegged to a trade-weighted basket of the currencies comprising of key trading partners. This was done because the US dollar had the highest weight in the SDR basket and the appreciation of the currency caused the rupee to appreciate considerably and hence causing inflation.
1992	Exchange Rate Controls and restrictions were removed
1994	Capital Account fully liberalised

Appendix B – Data Sources and Descriptions

VARIABLES	LABEL	DESCRIPTIONS	SOURCE (Annual data)
REER	Real Effective Exchange Rate (Rs per weighted foreign currencies)	This is the same variable used to investigate the spending effect. Marquez (2006), Sheldon et al (2011) defines REER weighted average of a country's real exchange rate vis-à-vis its main trading partners' currencies. It takes into consideration changes in the purchasing power and competitiveness of the home country and selected trading partners. It's through the appreciation of the REER that the Dutch Disease phenomenon manifest itself.	International Monetary Fund
FDI	Foreign Direct Investment (% of GDP)	FDI is in real investment that boosts the supply of non-tradable goods through the FDI-associated spillover effects, the envisaged appreciative effect of FDI inflow can be reversed. Hence, the overall effect depends on whether the supply-side effects of FDI inflow prevail over demand-side effect of Dutch disease.	World Bank
ODA	Official Development Assistance (% of GNI)	Official Development Assistance are grants given out by official agencies and other states to promote economic development and welfare of developing counties. There is a convincing argument that the impact of foreign aid on the REER depends on what the foreign aid	Knoema

		Disease syndrome should experience a shortfall. According to Ozkan (2002), we can evaluate the competitiveness of developing countries mainly through their export performance. As such, this variable will indicate whether Mauritius has been able to avoid the Dutch Disease.	
INV	Domestic investment (% of GDP)	The Gross Domestic Fixed Capital has been taken as a proxy for INV. The impact on GDFC on MEXP is ambiguous. However, according to Al-Faki (2006), it would be necessary to determine if the public and private spending is oriented more toward tradable or non-tradable goods. Empirical studies tend to confirm that government expenditure is biased toward non-tradable goods.	World Bank