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**Alternative Sources of Dutch Disease: A Survey of
the Literature**

ESTUDOS DO GEMF

N.º 10

2016

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

*Este trabalho é financiado por Fundos Nacionais através da
FCT – Fundação para a Ciência e a Tecnologia no âmbito do
projeto UID/ECO/00031/2013.*

Alternative Sources of Dutch Disease: A Survey of the Literature

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Abstract

This work reviews the literature on the alternative sources of Dutch Disease. We discuss the so-called Core Model of Dutch Disease, its limitations, extensions and the main contributions to the most recent theoretical and empirical methodologies of the Dutch Disease Economics applied to alternative capital inflows. By analyzing the effects associated with foreign aid, remittances, foreign direct investment and tourism *booms* on the real exchange rate and on the manufacturing sector, we set the stage both on the theoretical ground and on empirical evidence for a wider application of Dutch Disease classical approach. While the core model of Dutch Disease makes unambiguously predictions regarding the negative effects of a resource *boom* on the manufacturing sector, the empirical literature on the alternative sources of the disease that has followed has not clearly identified such effects.

JEL Classification: F2, F41, O14, Q33.

Key Words: Dutch Disease, De-industrialization, *Resource Boom* and Capital Inflows.

1 Introduction

The term *Dutch Disease* (DD) was coined in 1977 by *The Economist* (The Economist, 1977) to describe the unfavorable outcomes on the Dutch manufacturing industry, after the discovery of natural gas reserves in 1959, through the effects on the real exchange rate (RER). However, in an earlier paper, James Meade and Eric Russell (Meade and Russell, 1957), seem to identify the mechanism behind of what became known as Dutch Disease. As explained by Meade and Russell (1957), the initial improve in the balance of payments caused by the increased external demand for Australian commodities, could lead to a negative long-term net effect, since the rise in export prices would drive wages and industry costs up, giving rise to a *substitution effect* between export and import goods. With the identification of this paradox relationship between resource export growth and internal economic tensions, emerged a stream of literature identified by Corden (1984), namely, the booming sector economics and the Dutch Disease.

The main objective behind the Dutch Disease literature was to provide an explanation for the process of de-industrialization (Cairncross, 1979). The adjustment mechanisms lying beyond that process are based on the evolution of the real exchange rate and on asymmetric growth paths within the tradable and non-tradable sectors.

In its classical version, Dutch Disease describes the adverse effect caused by a *boom* associated with natural resources, the export sector. However, the existence of *booms* in capital inflows, such as foreign aid, foreign direct investment, remittances and tourism, are pointed by many studies as analogous to the initial effects of Dutch Disease.

In this work, we propose to survey the theoretical and empirical studies on Dutch Disease focusing on the alternative sources that also give rise to analogous symptoms conceived in its classical version. In this context, we first revisit the so-called *Core Model* of Dutch Disease economics, deriving the fundamental equations, describing the set of symptoms and the inevitable outcomes of the model and referring to some extensions provided by more recent literature. Our contribution to the literature results from the fact that our research focus on the alternative sources of Dutch Disease and on the application of the core model to a considerable wider phenomena.

The remainder of the paper is organized as follows. Section 2 reviews the first formal approach about the mechanism of DD. We also cover the most influential theoretical and empirical contributions that followed the classical approach. Section 3 describes the new sources of DD, namely, foreign aid, remittances, foreign direct investment and tourism. Section 4 concludes.

2 The Core Model of Dutch Disease

The first formal approach about the mechanism of the DD was provided by the seminal work of Corden and Neary (1982), followed by the theoretical contributions of Bruno and Sachs (1982), Buiter and Purvis (1983), Corden (1984), Neary (1984) and Edwards (1984). Based on the small open economy model of Snape (1977), Corden and Neary (1982) and Corden (1984) present the so-called *Core Model* of Dutch Disease

economics¹. The consolidated version of the model (Corden, 1984) assumes that there are three sectors in the economy, namely the Booming Sector (B), the Lagging Sector (L) and the Non-Tradable (N). The first two sectors, usually the resource export sector² for the former and agriculture or manufacturing for the latter, produce tradable goods at given world prices. The non-tradable good's price is determined domestically. In such model, monetary considerations are ignored, wages are perfectly flexible ensuring permanent full employment and perfect labor mobility among sectors, and capital is immobile, being single sector-specific. Following a *boom* in sector (B)³, two key adjustment mechanisms are identified: the demand-side driven *spending effect* and the supply-side driven *resource movement effect*. Assuming positive income elasticity of demand for non-tradable goods, the shock leads to a spending effect, raising the relative prices of (N) in terms of (B) and (L), and to an excess demand for (N) goods. On the other hand, at constant wages, the increased demand for labor in sector (B), switches workers from both (L) and (N) to (B). This is the resource movement effect. The movement of labor from sector (L) to (B) reduces the output of the tradable sector (L) and was labeled as the *direct de-industrialization*. Combining the two effects, the excess demand for non-tradable goods induces an appreciation of the real exchange rate (RER) and a reallocation of workers from (L) to (N), reinforcing the output reduction in sector (L), the latter effect being labeled as *indirect de-industrialization*.

A numerical simulation of the Dutch Disease was performed by Bruno and Sachs (1982) focusing only on the spending effect. The authors consider extensions such as short-run capital specificity, long-run capital mobility, international capital flows and inter-temporal optimization behavior, and conclude that the net effect of an energy *boom* reduces the long-run production of tradable goods. The works of Buiter and Purvis (1983), Neary (1984) and Edwards (1984) add monetary considerations about the DD effects. The model of Buiter and Purvis (1983) incorporates different speeds of adjustment in goods and asset markets, and analyses the effects of monetary disinflation as a possible source of de-industrialization. With this framework, they show that nominal inertia in both domestic prices and costs explain only part of the de-industrialization implied by a process of DD, preceding a shock in oil prices (or a windfall), and that one should also take into consideration the role of domestic stabilization policies that took place after the acceleration of inflation set-off in the 1970s. An additional mechanism has been proposed by Neary (1984) according to which the initial rise in real income leads to increased money demand and a fall in the price level. This *liquidity effect* states that under a floating nominal exchange rate regime, the domestic nominal prices of tradable goods fall leaving the effect on non-tradable goods' nominal price ambiguous. Under a fixed nominal exchange rate regime, inflationary pressures take

¹In Appendix we present the algebraic deduction of the model and the fundamental equations for the conclusions in the present Section. We use the notation of Corden (1984).

²Natural gas in the Netherlands, minerals in Australia and oil in the United Kingdom, Norway and other OPEC members.

³Corden (1984) identifies three shocks that raise the aggregate income of the factors initially employed in sector (B), namely 1) a once-and-for-all exogenous technical improvement; 2) a windfall discovery of new B-type resources and 3) an exogenous increase in the price of an export-only sector (B) on the world market relative to the price of imports. While qualitatively the effects are interchangeable, we shall stick with the case 1).

place, the nominal rise in non-tradable goods' price is the reason for the increase in the relative price of such goods. Additionally, the author argues that under price and wage stickiness, a floating exchange rate regime would intensify the effects of the DD. Using data for Columbia, Edwards (1984) proposes a model that analyses possible short-run monetary disequilibrium. In his view, following a commodity export *boom*, since foreign exchange reserves will accumulate and the rate of growth for money will also be higher, the final outcome can configure a short-run excess supply for money, a situation that exacerbates the RER appreciation.

Under the core model assumptions, the combined outcomes, which one can regard as the set of symptoms of a process of DD, are dependent on the magnitude of both the resource movement effect and the spending effect⁴. While RER appreciation and the contraction of the tradable lagging sector are inevitable⁵, the model predicts ambiguous effects on the booming sector as well as on the non-tradable sector. Considering the latter, if there is an high propensity to consume non-tradable goods, then the spending effect dominates and the non-tradable sector expands. In contrast, if the booming sector is labor-intensive, the magnitude of the resource movement effect is relatively high and a contraction of the non-tradable sector can be verified.

Since both resource movement and spending effects increase the demand for labor, wages defined in terms of (L) will rise⁶. However, the price of non-tradables increases and wage-earners are also consumers of (N)-type goods. While the resource movement effect tends to raise wages in terms of (N), since output contracts, the spending effects expands the non-tradable sector and, hence, (N) wages decline. This means that the final outcome is ambiguous. The stronger the magnitude of the spending effect relative to the resource movement effect the higher the likelihood that global true wages decrease⁷.

Moreover, Corden (1984) relaxes some of the main assumption of the model and shows that the final outcomes strongly rely on the assumptions made about factor intensity in each sector, inter-sector factor mobility and international factor mobility.

Considering the possibility that capital is mobile between sectors (L) and (N), making up a mini-Heckscher-Ohlin economy, in which one industry is capital-intensive and the other labor-intensive. If (L) is the capital-intensive sector, there will be a movement of labor out of sectors (L) and (N), following the shock in sector (B), due to the resource movement effect, and the outcome will be an expansion of sector (L), a paradoxical result. If the spending effect is not strong enough to offset this *pro-industrialization* phenomenon, the shock could cause a RER depreciation, the so-called Paradox Model⁸. In the same fashion, one can hypothesize that both capital and labor are mobile within a specific sector. Decomposing sector (L), the new mini-Heckscher-Ohlin economy, if follows from Rybczynski (1955) that, with the stock of capital fixed in the whole sector

⁴The notation in Appendix for these effects is, respectively, ξ_N and η .

⁵See Equation (8) with respect to the RER appreciation.

⁶See Equation (9).

⁷See Equation (12).

⁸Corden and Neary (1982) also considers the effects of the *boom* when capital is mobile between all three sectors. De-industrialization occurs only when the capital-labor ratio in sector (L) is intermediate between those in the other two sectors.

and the amount of labor reduced, labor-intensive industries will contract output but capital-intensive industries will expand.

On step further in order to obtain a more realistic model is to consider that there are international flows of capital and labor. Again, with sector-specific capital factor but allowing some degree of international capital mobility, rents in (L) unambiguously fall. Additionally, rents in (B) likely rise while rents in (N) could go either way, rising if output rose. Consider the latter. In such alternative, there will be outflows of capital in sector (L) but inflows in sectors (B) and (N). Thus, output effects are reinforced, and so the process of de-industrialization, but the impacts on returns to capital are lessened.

If labor is mobile between regions, that is migration is allowed, and assuming that the true real wage increases, migrants are attracted to the domestic economy, at least while real wages are restored. At constant prices, this will increase both demand for and supply of (N). In this situation, increased demand for non-tradable goods configures an extra spending effect, a crucial condition for remaining some degree of de-industrialization.

If one allows for wage resistance, unemployment variations are dependent on the considerations made for the path of wages. If the shock would have raised the real wage in the core model, with a rigid real wage it would reduce unemployment instead. If real wage decreases after the shock in the core model, it would generate unemployment in the stickiness case⁹.

The analysis of the core model is strictly static and assumes that the balance of payments on current account has stayed constant. Thus, all the effects regarding output, expenditure, resource movements and exchange rate have all happened at the same time. If one allows for particular time paths of such dimensions, the type of the *boom* and the expectations about it may imply distinctive outcomes. The spending effect may lead or follow with a lag the increased output in (B), while the resource movement effect likely follows with a lag that initial rise in output. The current account is the net result of the spending and the value of output changes, and may not coincide with the path of RER. One possibility is that the anticipation (or announcement) of a *boom* rises spending, the latter being intensified in the shock period, due to changes in output. As stated, these are RER appreciation periods, the first owing to the spending effect and the second to the resource movement effect. If the shock is temporary, output may fall, a RER depreciation occurs, while spending could continue at its high level. In this situation, the anticipation and the restoration of output to its initial level comprises periods of current account deficits. This is the example of an exogenous temporary increase in the price of the export-only sector (B). The spending reflects both consumption expenditures and domestic investment. If the shock is expected to be permanent, consumption¹⁰ (spending) should rise more initially, running a greater deficit, but there are further surpluses to offset this in later periods, rather than that owing to resource movement effect occurring in the period when the shock takes place.

⁹Corden (1984) mentions two additional cases in which there is unemployment in sectors (L) or (N). These cases can yield opposite results, the first case resulting in unemployment intensification and the latter resulting in a positive employment effect.

¹⁰We disregard the investment dimension.

Other than the initial effect, current account deficits (surpluses) are smoothed. A once-for-all technological improvement or the discovery of an inexhaustible new resource are analogous to the case of a permanent increase in the price of good (B). In the case of an exhaustible resource windfall, there is likely to be uncertainty about the size of the shock. For that reason, the whole rise in spending may not take place in the anticipation period.

3 Alternative Sources of Dutch Disease

The phenomenon of Dutch Disease was primarily associated with an economy that faces a *boom* in a natural resource export sector. However, it can be caused by any economic change that provides a significant increase in the availability of foreign exchange reserves. For this reason, the research on DD has shifted, widening its scope, and started focusing on different shocks, namely external capital flows associated with foreign aid, foreign direct investment, remittances and tourism. In this section we propose to analyze this stream of literature.

3.1 Foreign Aid

From a structural adjustment and macroeconomic point of view, the similarity between increased income from natural resources and foreign aid inflows has been pointed out by Edwards and van Wijnbergen (1989). Both are almost certainly temporary and provide an increase in foreign exchange reserves availability at little or no additional use of domestic factors of production. However, since the latter is generally a transfer of foreign currency, the definition of a tradable sector hit by such a shock is no longer necessary to build a model of DD. The seminal works for the case of foreign aid inflows are van Wijnbergen (1986a) and van Wijnbergen (1986b), which are built on the core model in the context of a resource windfall.

Increased aid, which accrues in the first instance to the public sector, may be used by the governments to widen the net-of-aid fiscal deficit in order to finance a reduction in taxation or an increase in expenditures. In the case of the former, the private sector budget constraint expands (van Wijnbergen, 1986a), higher expenditures influence the demand for non-tradables exerting upward pressure on their prices, leading to an appreciation of the RER, for exogenous tradable prices. Consequently, the tradable sector becomes less profitable, labor is drawn into the non-tradable sector, the real wage in terms of tradable goods will increase, affecting external competitiveness and, hence, economic growth. We could reach similar effects if, instead, the government opts to finance an increase in expenditures, which are often predominantly on domestic goods (Adam, 2005) and (Bevan, 2005), such as construction, health care and education. The weaker the economy, the most significant is the unmet demand for such services (Rajan and Subramanian, 2011), the lower is the supply of skilled labor, the more important is the increase in wages and, therefore, the most outstanding is the appreciation of the RER (van Wijnbergen, 1986b). These dynamics describe the DD hypothesis for the

case of foreign aid relying on the *spending* dimension¹¹ and provide a possible causal link between aid and its apparent failure in promoting a viable export sector and, thus, economic growth. However, the literature often bestow contradictory results in this respect.

Perhaps the most well-known discussion on international assistance tracks back to the Keynes-Ohlin debate over the Germany's ability to pay for reparations after the World War I. In his classical partial equilibrium view, Keynes argued that a transfer would cause a terms-of-trade deterioration for the donor, increasing its burden, specifically in the presence of non-tradable goods. In contrast, Ohlin asserted that a transfer would have an impact on the demand of the receiver and that the effect on the donor's terms-of-trade is ambiguous. In addition, the price of non-traded relative to traded goods would rise for the recipient. With these arguments emerged a brook of literature on the welfare effects of a transfer shadowing the possibility that a recipient country could be left worse off than it was before. Such a situation become known as the *transfer paradox* - see Brakman and van Marrewijk (2005) for a survey on the transfer paradox. For the context of a small-country recipient, the *aid transfer paradox* problem was introduced by Chichilnisky (1980) and further developed by Yano and Nugent (1999). Under these models, increased aid may lead to unmet supply for non-traded goods, decreasing its relative price, which may drive real income down. This is rather a situation of reversed DD.

Two-gap models frameworks generally confirm the ultimate objective of aid: that aid will increase growth in the recipient country (Chenery and Strout, 1966). Nevertheless, empirical studies do not tend to indicate consensual evidence - see Clemens et al. (2012) for a survey on the effectiveness of aid - and, since aid can replace domestic savings (Griffin, 1970), the link could even be negative. Making use of a wide estimation strategy, with a variety of generalized methods of moments estimators, Rajan and Subramanian (2008) attempts to revisit the cross-country aid-growth literature and to gather the different focuses studied in that relationship. For a sample of all developing countries that received aid during the post-war period, and for which there was available data, they show that there is no robust relationship between aid and economic growth and that this result holds accounting for endogeneity, different time horizons and periods and types of aid. The evidence also suggests that one should be concerned about what aspects of aid offset the potential benefits of increased resources, then reviving the DD hypothesis. In fact, as shown by Rajan and Subramanian (2011), the inflow of aid, for countries that received a ratio-to-GDP greater than 1% or are low income countries, is correlated with slower manufacturing growth and the slower growth of manufacturing relative to services. Furthermore, using a within-country cross-industry methodology for the decades of 1980s and 1990s, the authors conclude that exportable industries grow relatively more slowly than other industries in countries that receive more aid and that the transmission mechanism operates through excess appreciation of the RER. Similar results are obtained by Adam (2005) after a simulation of an increase in scale-up of grant aid equivalent to 2% of GDP in a economy already operating with

¹¹In aid literature, the spending dimension captures the extent to which a government increases its fiscal deficit following an increase in aid. A related concept is *aid absorption* which reflects the increase in net imports resulting from increased aid (IMF, 2005), (Gupta et al., 2005) and (Verbeke, 2007).

an high aid-to-GDP ratio. Abstracting from productivity effects, the author shows that increased aid leads to an appreciation of the RER of about 3% and to a sizable contraction in exports. Gupta et al. (2005) summarizes the empirical evidence of the relationship between aid and RER appreciation for the African countries. While most cross-sectional studies find a positive effect between those variables, the country-specific analysis tells us a somewhat different picture. For the particular cases of Uganda and Ghana the evidence is contradictory and for Tanzania the relationship is unambiguously negative. According to Nkusu (2004), the mixed results indicate that country-specific circumstances are relevant in the analysis of a DD phenomenon in low-income aid-recipient countries and reveal applicability problems of the main hypothesis of the core model. In a modified model of DD, the author stresses that the supply of non-tradables can be increased without driving prices up or decreasing the production of tradable goods in an economy that is not producing in its highest efficiency level, and that this assumption may well be applied to the case of Uganda. But also, in many developing countries, the domestically-produced importable goods' prices are not determined by the world market (the case in which these goods are imperfect substitutes for the imported goods), leaving room for shifts in prices and quantities in response to the changing conditions in the domestic market. These two remarks can significantly lessen the macroeconomic problems predicted for developing economies once they are integrated in an aid-induced model of DD.

The DD effects that can arise by increased aid may depend on the specific macroeconomic circumstances of the recipient country, but also on the fiscal, monetary and exchange rate policies pursued by the authorities. On the one hand, the spending pattern constitutes a vital option through which the DD can be mitigated, or even eliminated, in a medium to long-term perspective. Public investment that is able to stimulate private factors and direct resources to expand aggregate supply or affect the productivity of domestic non-tradables is one of the major channels that can counteract the adverse effects. Vos (1998) employs a Computable General Equilibrium model that accounts for rigidities in commodity, foreign exchange, and labor markets, calibrated for Pakistan, and simulates the effects of set of policy measures to deal with aid inflows. The model shows that a fiscal adjustment comprising a shift from current to capital expenditures seems to allow for a more sustained reallocation toward the tradable goods sector and that private investment would be further stimulated if such adjustment is combined with a debt reduction program. In his experiment, Adam (2005) shows that the actual evolution of the economy depends crucially on the form of public investment, how quickly it spreads back onto private production capabilities, and the unpropitious short-run shrinkage of the export sector. Barder (2006) distinguishes two-speed productivity improvement effects¹² and reinforces the role of channeling aid to expand the supply side. Indeed, the *diminishing returns to aid* empirical literature shows evidence

¹²The author refers to rapid effects such as investment in infrastructures, improvements in power generation and distribution, agricultural technologies or alleviation of administrative bottlenecks and long effects such as improvements in education and health. In a study for the European regions, developed by Checherita et al. (2009), the positive effect of the structural funds on output convergence, for the period 1995-2005, seems to be captured by the long effect, that is, through human capital formation.

that countries' *aid saturation points* are higher in good policies (Clemens and Radelet, 2003). Notwithstanding, one should be aware that aid can be associated with the maintenance of imprudent policies, increasing dependence¹³ and rent seeking phenomenons (Svensson, 2000), thus reducing positive marginal returns.

On the other hand, monetary and exchange rate policies, operating on the aid absorption dimension, should be supportive to ensure a full effectiveness of the fiscal policy (McKinley, 2005). In an aid spent but not absorbed option, reserves accumulate, the fiscal deficit widens and the impact is likely to be inflationary, deepening the DD effects. Alternatively, monetary authorities can soak up domestic currency by selling the foreign exchange reserves to the private sector, which contributes to a nominal appreciation of the exchange rate, but facilitates the purchase of imports. If, however, there are fears of capital outflows, the foreign currency can be used to buy imports directly, widening the current account deficit. As Rajan and Subramanian (2011) point out, the sterilization of income through direct purchases capital goods abroad is usually the preferable option despite the dismal growth effects in the short-run (Gupta et al., 2005). In accordance with IMF (2005), the correct coordination of both monetary and fiscal policy is one of the main determinants for good macroeconomic management of aid flows.

3.2 Remittances and Foreign Direct Investment

The case of workers' remittances, the repatriated earnings of emigrant workers, have been subject to an increasing coverage in the literature. One reason is that they have grown to be an important source of external funding for many countries, twice as large as the level of official aid in developing countries (Adams and Page, 2005). But also, because of the puzzling findings related to its driving forces and macroeconomic impacts on the real exchange rate and competitiveness or in reducing poverty and inequality (Acosta et al., 2008).

Remittances are different in nature from other types of capital flows, such as foreign aid or foreign direct investment. On the outset, they improve the current account position of the home country¹⁴. Additionally, remittances tend to be more stable than private capital inflows (Buch et al., 2002) and, if altruistic motivated, they contribute directly to an higher disposable income of households. This expansion in the aggregate demand culminates, for given world prices of tradable goods, in higher relative prices of non-tradable goods, which corresponds to a RER appreciation. Higher non-tradable prices lead to an expansion of that sector, causing a greater reallocation of resources toward the non-tradable sector. Moreover, the effect of remittances on income also increases the reservation wage of recipients, causing a decline in labor supply, higher wages and production costs, and a further contraction of the tradable sector (Fajnzylber et al., 2008) and (Acosta et al., 2009). The negative impact on the tradable sector is then likely to be magnified when labor supply is endogenous to the income level.

¹³According to Paldam (1997), Greenland's dependence on Danish financial assistance has been the major reason for the absence of production initiatives in the economy.

¹⁴This is also the case of other current transfers such as donations, grants or foreign aid that don't give rise to a liability in the recipient country.

These are the DD symptoms applied to remittances inflows, identified by several empirical studies. In particular, pooling annual data for thirteen Latin American countries, Amuedo-Dorantes and Pozo (2004) find that a doubling of workers' remittances would lead to a RER appreciation of about 22%. This result is robust when accounting for possible reverse causality between remittances and the RER. Lartey et al. (2012) specify an unbalanced dynamic panel model that is estimated using a generalized methods of moments estimator, tailored to deal with potential endogeneity, and show that remittances have a significant positive impact on the RER for a sample of 109 developing and transition countries¹⁵. The authors also show that remittances flows lead to a resource reallocation towards the non-tradable sector. This change in the economic structure, combined with the reduced competitiveness of exports through the effects on the RER and shrinking labor supply, implies an increased dependence on remittances, as argued by Bayangos and Jansen (2011), that simulate a 15% increase in the remittances inflows on the Philippine economy. In our view, this is a suitable argument to explain the results found by Beja (2011). Based in a dataset of twenty countries estimated with the seemingly unrelated procedure, the author shows that international remittances adversely affects both the tradable and non-tradable sectors for the group of low income countries. Thus, remittances may be increasingly used as income substitutes for domestic production, which supports the dependence effect, sustaining the overall supply retrogression.

In contrast with the aforementioned studies, Mongardini and Rayner (2009), making use of a pooled mean group estimator, find no link between workers' remittances and RER appreciation in the long-run, for the Sub-Saharan African countries. This result is consistent with Rajan and Subramanian (2011) who show that, unlike private capital and aid flows, remittances do not actually hurt overall competitiveness. One could argue that the mixed findings may arise from the coverage of the data. We prefer to highlight some alternative channels that should be taken into account. The effects of remittances on the RER appreciation and loss of competitiveness in exports are highly dependent on the consumption patterns. However, even in the case of a large share of consumption devoted to the non-tradable sector, education and health expenses, which are non-tradables, also have a positive impact on productivity and, in turn, on external competitiveness. This may be notably relevant for an economy characterized by unskilled-labor intensive activities, like many developing countries. A related point is that the non-tradable sector may be limited to resources, making the short-run RER effects less important in the long-run (Bourdet and Falck, 2006). For the particular case of self-interest driven remittances, an increased inflow may boost capital accumulation, increase liquidity on financial markets, which exerts downward pressure on market interest rates, conducive to business formation (Fayad, 2011).

The case of foreign direct investment (FDI) was analyzed by Athukorala and Rajapatirana (2003) in a comparative study for Latin America and Asia during the period 1985-2000. The authors conclude that while RER appreciation is a phenomenon associated with other non-FDI forms of capital inflows, the results suggest contradictory

¹⁵Similar results have been reported for single-country analysis such as Makhoul and Mughal (2011) for Pakistan, Rabbi et al. (2013) for Bangladesh, and Gerard et al. (2014) for Macedonia.

effects in both regions. In fact, FDI may be associated with RER depreciation, since FDI shows a greater bias towards tradable sectors when compared to other capital inflows. In contrast, Lartey (2007), using a dynamic panel data for a set of Sub-Saharan countries, show that FDI is positively correlated with RER appreciation. Similar conclusions are suggested by Javaid (2011) for a group of Southeastern Asian countries.

As it was suggested by the case of remittances, the possibility that FDI constitutes an initial source of DD is not consensual. The sectorial orientation of such capital inflows is crucial for resource allocation but also for the effects caused on the RER. It seems clear, nonetheless, that a RER appreciation induced by FDI is less intense when compared with other capital inflows, in particular, remittances or foreign direct investment.

3.3 Tourism

In many countries, tourism is one of the major sources of exports income. According to Copeland (1991), economies enjoying a tourism *boom* also experienced some adverse DD effects. Using a three-sector general equilibrium model, the author analyzed the economic effects of an expansion of tourism in the form of an exogenous increase in demand or domestic policies intended to increase foreign visitors. The author concludes that an increase in tourism would be welfare-improving only if the relative price of non-tradables increased, corresponding to a terms-of-trade improvement. In addition, the author shows that tourism can cause a contraction of the manufacturing sector as a consequence of a flow of capital out of the manufacturing sector to foreign countries.

A Dutch Disease approach for tourism economies should be sensible to the fact that there might be important differences between tourism exports and traditional tradable sector exports. First, in order to purchase tourism goods and services, consumers need to travel to the host country, as opposed to the cross-border transportation of commodities. Second, tourists usually consider bundles of goods and services at their disposal rather than individual prices. Lastly, tourists also consume unpriced natural amenities, such as climate. For these reasons, a straightforward application of the DD theory to tourism economies may be misleading.

Based on the core model of DD, Capó et al. (2007) conceived a theoretical framework in intensive tourism economies. In a comparative analysis applied to tourism-oriented Spanish regions, the Balearics and the Canary Islands, which experienced a tourism *boom* in the early 1960s, the authors conclude that there were signs of DD, low levels of education, innovation and technological progress, resulting from tourism specialization. Similar conclusion are drawn by Blake and Gooroochurn (2005) using a Computable General Equilibrium static model for Mauritius. In contrast, Kenell (2008) investigate the case of Thailand's increasing tourism industry and conclude that the harmful DD effects of de-industrialization did not materialize. The main reason for that result was that Thailand's economy was not tourism dependent, being the manufacturing industry the major contributor to the GDP. Using a sample of 134 countries, for the period 1970-2007, Holzner (2011) provide an empirical analysis to assess the long-run danger of a DD effect in tourism-dependent countries. The author's main conclusion was that there was no fear of a *Beach Disease Effect*, at least in the long-run. There is no evidence of

tourism-dependent countries' RER appreciation nor de-industrialization. The author also points out that countries with higher income from tourism show higher levels of investment in secondary school enrollment, and that tourism affects economic growth indirectly through physical and human capital channels.

The diagnosis of the presence of the DD in tourism economies lead to contradictory evidence. Tourism exploitation contribute to the development of physical and human capital and the initial fear of de-industrialization may not materialize. However, a tourism *boom* would change the relative prices with direct and indirect effects on the production of both tradable and non-tradable sectors. An increase in the marginal labor productivity within the tourism sector can ultimately lead to a rise in wages, after dragging labor to the booming sector, that is, the classical resource movement effect. In addition, the resident's extra real income, the spending effect, conduct to an increase in the relative prices of tradable and non-tradable goods. The reduced production of tradable goods, since resources were diverted away, would lead to an increase in imports to satisfy the new demand. Given that prices of tradable goods are considered internationally determined, the RER would appreciate.

4 Conclusion

The phenomenon of Dutch Disease was primarily associated with an economy that faces a *boom* in a natural resource export sector. The contributions of Corden and Neary (1982) and Corden (1984) provided a general framework of the phenomenon and possible extensions that relax some of the main assumptions of the core model, which show that the final outcomes strongly rely on the factor intensity in each sector, inter-sector factor mobility and international factor mobility. In these models, the objective was to provide an explanation to the process of de-industrialization.

A country may specialize in any production activity in which it has a comparative advantage, even in the case of natural resources. However, the process of de-industrialization implied by the Dutch Disease can be a serious one if the country faces the depletion of such commodities. In addition, de-industrialization limits technological progress, for example through *learning-by-doing*, which is lower in the non-tradable sector and faster in unprotected tradable sectors, with important implications for economic growth. One way to overcome these pernicious effects is to subsidize manufacturing activities, in particular those industries with potential productivity gains. A considerable brook of literature has focused on other economic policies that may limit or offset the negative effects of Dutch Disease.

Recently, the research on Dutch Disease has shifted and started focusing on different shocks. External capital flows associated with foreign aid, foreign direct investment, remittances and tourism can also give rise to the harmful effects predicted by the classical approach. In such cases, the process is still caused by an economic change that provides a significant increase in the availability of foreign exchange reserves. The Core Model is as well the starting point for most of these analysis. Notwithstanding, one should be sensible to the extensions of that model present in the literature, meaning that a correct analysis of the structure of the economy, the source of the shock and

the dynamics of both spending and resource movement effects are crucial for a prudent diagnosis.

Appendix: Core Model's Key Equations of DD

In the core model we assume full employment. Following Corden (1984), and considering L_j as employment in sector j , X_j as sector j supply, with $j = (B, L, N)$, this may be written as:

$$a_{LB}X_B + a_{LL}X_L + a_{LN}X_N = L \quad (1)$$

where a_{ij} denotes the quantity of factor i , $i = (K, L)$, used per unit of output in sector j .

The only source of a change in real income is the shock verified in sector B . Therefore, using a circumflex to denote a proportional rate of change, the real growth rate of output is:

$$\hat{y} = \theta_B \pi \quad (2)$$

where θ_B describes the relative contribution of B and π is an impact shock measure in that sector. The demand for non-tradable goods, assuming that the market always clears, is given by:

$$\hat{C}_N = -\epsilon_N \hat{p}_N + \eta \theta_B \pi \quad (3)$$

where ϵ_N is the compensated price elasticity and η the income elasticity of demand.

Since capital factor is sector specific and that we have full employment, we can use the stock capital share in each sector, $a_{Kj}X_j = K_j$, to get:

$$\lambda_{LB}(\hat{a}_{LB} - \hat{a}_{KB}) + \lambda_{LL}(\hat{a}_{LL} - \hat{a}_{KL}) + \lambda_{LN}(\hat{a}_{LN} - \hat{a}_{KN}) = 0 \quad (4)$$

where λ_{Lj} is the proportion of labor in sector j . Each element $(\hat{a}_{Lj} - \hat{a}_{Kj})$ should vary inversely with the differential variation between the wage rate and returns on capital per each sector.

Defining the wage growth rate as:

$$\hat{w} = \xi_B \pi + \xi_N \hat{p}_N \quad (5)$$

where p_N is the unit-price of the non-tradable good, normalized in terms of L , and ξ_j is the proportional contribution of sector j for the wage elasticity of the aggregate demand for labor.

The supply of non-tradable goods depends only on the real wage. Thus:

$$\hat{X}_N = \phi_N(\hat{p}_N - \hat{w}) \quad (6)$$

where ϕ_N is the price elasticity of supply. Equating demand (3) and supply (6) yields:

$$(\phi_N + \epsilon_N)\hat{p}_N = \phi_N \hat{w} + \eta \theta_B \pi \quad (7)$$

We can now solve (5) and (7) jointly for the effects of a shock on p_N and w :

$$A\hat{p}_N = (\eta \theta_B + \phi_N \xi_B) \pi > 0 \quad (8)$$

$$A\hat{w} = [\eta\xi_N\theta_B + (\phi_N + \epsilon_N)\xi_B]\pi > 0 \quad (9)$$

$$A \equiv \phi_N(1 - \xi_N) + \epsilon_N > 0 \quad (10)$$

where A is the elasticity of excess supply of N when the change in w is induced by a change in p_N .

From these equations we can determine the effects, in terms of (real) output and employment levels, of a shock in sector N , given by:

$$A(\hat{w} - \hat{p}_N) = [-\eta\theta_B(1 - \xi_N) + \xi_B\epsilon_N]\pi \quad (11)$$

Assuming that the share of non-tradables in the consumption basket of wage-earners is given by α_N , the change in real wages from their standpoint is:

$$A(\hat{w} - \alpha_N\hat{p}_N) = \{\eta\theta_B(\xi_N - \alpha_N) + \xi_N[\phi_N(1 - \alpha_N) + \epsilon_N]\}\pi \quad (12)$$

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