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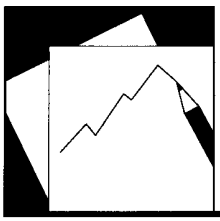

IMF Working Paper

When and Why Worry About Real Exchange Rate Appreciation?

The Missing Link between Dutch Disease and Growth

Nicolás Magud and Sebastián Sosa

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When and Why Worry About Real Exchange Rate Appreciation?

The Missing Link between Dutch Disease and Growth

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Authorized for distribution by Robert Rennhack

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Abstract

We review the literature on Dutch disease, and document that shocks that trigger foreign exchange inflows (such as natural resource booms, surges in foreign aid, remittances, or capital inflows) appreciate the real exchange rate, generate factor reallocation, and reduce manufacturing output and net exports. We also observe that real exchange rate misalignment due to overvaluation and higher volatility of the real exchange rate lower growth. Regarding the effect of undervaluation of the exchange rate on economic growth, the evidence is mixed and inconclusive. However, there is no evidence in the literature that Dutch disease reduces overall economic growth. Policy responses should aim at adequately managing the boom and the risks associated with it.

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Keywords: Dutch disease, real exchange rate, growth

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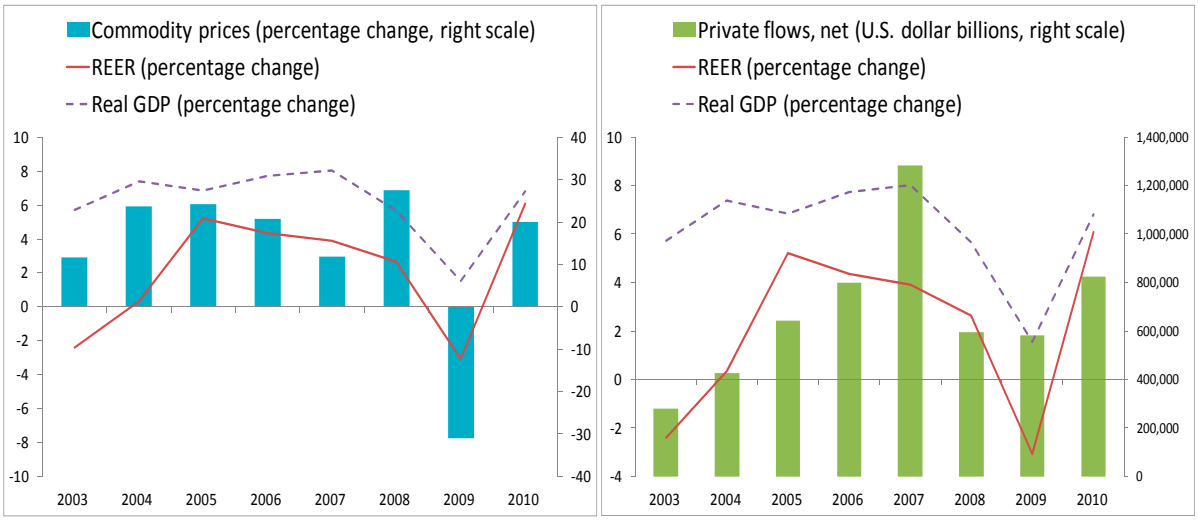
I. INTRODUCTION

In the aftermath of the recent financial crisis, interest rate differentials have triggered a surge in capital inflows to many emerging market countries. Meanwhile, strong growth of several emerging market countries, especially in Asia, will continue to support commodity prices. While this benign external environment brings opportunities, it also raises some risks and challenges. Capital inflows and higher commodity export prices exert appreciating pressures on the exchange rate, which poses a policy challenge in many countries out of a concern that a stronger currency would undermine the competitiveness of their tradable sectors and weaken growth.



Sources: Institute of International Finance and IMF staff calculations.

Based on the experience of the Netherlands in the 1960's, a literature on Dutch disease was developed in the early 1980s. Simply put, Dutch disease refers to the effects of discoveries or price increases of natural resources that result in real exchange rate appreciation, factor reallocation, and de-industrialization. Similar effects may stem from other shocks entailing an increase in foreign exchange inflows, such as capital inflows, aid, and remittances.

Economic growth has been shown to be affected by real exchange rates. Some views stress that any deviation of the real exchange rate from its fundamental (i.e. long-term) value reduces economic growth. Others suggest that while an overvalued exchange rate hampers growth, an undervalued exchange rate fosters growth. Others, in turn, argue that real exchange rate instability hinders growth.

Connecting the Dutch disease phenomenon with the relation between the real exchange rate and growth, a recent view suggests that Dutch disease lowers economic growth. Thus, economic policy should contain any Dutch disease effects.

The purpose of this note is to examine whether the literature provides strong support for concerns about the potential adverse effects of DD on long-term growth. To this end, we

review the existing literature on the so called Dutch disease and on the relationship between the real exchange rate and growth—two related but distinct concepts. We focus on the one hand on the theoretical contributions to rationalize the DD phenomenon and the empirical evidence. On the other hand, we also review the literature on the effects of exchange rate overvaluations and undervaluations on growth. Along the way we analyze the responses observed in the world economy over time and across countries and take stock of the policy implications.

We survey the existing literature, by reviewing over 60 papers (both theoretical and empirical) on these topics. The main contributions of each of the reviewed papers are described below. In order to make systematic comparisons of the papers' results, we construct simple indices to evaluate their partial and overall implications. In turn, the latter evidence is used to analyze the policy implications of Dutch disease shocks.

We document that Dutch disease does exist in some form. Shocks that trigger foreign exchange inflows (such as natural resource booms, surges in capital inflows, foreign aid, remittances, etc.) appreciate the real exchange rate, generate factor reallocation, and reduce manufacturing output and net exports. However, we do not find evidence that Dutch disease reduces economic growth. We also find that real exchange rate misalignment—in particular when due to overvaluation—and higher volatility of the real exchange rate lower growth. Regarding the effect of undervaluation of the exchange rate on economic growth, the evidence is mixed and inconclusive.

In principle, DD is an equilibrium phenomenon reflecting changes in fundamentals, so DD may not be a disease after all. That said, the policy response to a natural resource boom (or other shocks causing DD) could play a role in determining the overall impact of the shock. Policy responses should aim at adequately managing the boom and its associated risks. The optimal response would consist of taking advantage of the boom, while at the same time dealing with the undesired consequences that it may cause.

The rest of the paper is organized as follows. The next section describes the Dutch disease phenomenon and its implications. It also elaborates on the effects of real exchange rates on growth. Section III connects the Dutch disease implications with economic growth focusing on the questions that they pose to macroeconomic policy. Section IV reviews the existing literature, while Section V develops basic indicators to systematically compare the results in the reviewed papers. Section VI takes stock of these indicators to evaluate the implications for economic policy and to address the questions raised in Section III. Section VII concludes.

II. Dutch Disease, Real Exchange Rate Appreciation, and Economic Growth: The Missing Link

In the 1960s' the Netherlands discovered natural gas in the North Sea, increasing the country's wealth. On the back of the latter, the increase in the price of this commodity acted as a wealth effect, increasing domestic aggregate demand. For a small open economy such as the Netherlands the price of tradable goods was given. Since the price of non-tradable goods clears in the domestic market, higher domestic demand increased the relative price of non-tradable goods. Thus the Dutch guilder appreciated in real terms, decreasing the country's competitiveness which, in turn, reduced the other tradable industries' exports. Since then, this type of phenomenon (which could also be triggered by an exogenous increase in the price of a country's existing export, or an increase in capital inflows, foreign aid, or remittances) has been labeled "Dutch disease (DD henceforth)."[2]

Based on these facts, economic theorists started to develop models to rationalize the effects of these "natural resource shocks." Using conventional models, it was straightforward to show that these shocks (be it in the form of new discoveries or price increases) resulted in an appreciation of the real exchange rate. Assuming a capital-intensive manufacturing tradable sector—as opposed to a labor-intensive non-tradable sector—this relative price change triggers factor reallocation—out of manufacturing—and the appreciation of the real exchange rate, decreasing the competiveness of manufacturing tradable goods. As such, DD has been also labeled as a resource-based de-industrialization.

Empirical tests of the DD phenomena have documented the existence of such a pattern. The evidence shows that natural resource shocks are generally followed by real appreciation and de-industrialization.

While a natural resource boom (or any other shock entailing an increase in foreign exchange inflows) is in principle a positive development due to wealth effects, there have long been concerns among economists about the potential negative impact of DD on long-term growth. These concerns are usually based on the idea that the declining (usually manufacturing) tradable sectors may possess some special characteristics that would stimulate growth and welfare in the long term (such as increasing returns to scale, learning by doing, spillover effects or other positive externalities).

Recently, a new literature focusing on the relationship between the real exchange rate and growth has surged, in some cases proposing new channels. Motivated by the successful experiences of China and other east-Asian countries, the view that maintaining an undervalued or "competitive" real exchange rate may foster economic growth has been attracting adherents. This view, which is linked to the export-led literature and to the

[2] See The Economist, "The Dutch Disease," November 26, 1977, pp. 82–83.

traditional DD one, argues that the operative channel is the size of the (manufacturing) tradable sector. The export-led growth strategy emerged, in part, as a response to the failure of the import substitution growth strategy that started around the 1950s. Given the speed of technological progress, the production of manufacturing goods enabled a faster transmission of technology, raising the value added component of these type goods—as opposed to basic services that rely on unskilled labor. Banking on the latter, an export-led growth model is based on making an economy grow through exporting manufactures, which will raise a country's wealth much faster than by closing the domestic manufacturing markets and export raw materials only, allowing the country to increase its technological degree of sophistication in the process.

Other views link undervalued exchange rates to higher growth through different channels. Dooley, Folkerts-Landau, and Garber (2004), for instance, argue that an overvalued real exchange rate tends to shift demand away from tradable into nontradable goods, thus the real interest rate needs to rise to maintain internal equilibrium, increasing domestic saving rates. Levy-Yeyati and Sturzenegger (2007) point to an alternative channel: an undervalued real exchange rate is associated with lower real wages, leading firms to higher investment, and to higher saving rates to finance them.

The views discussed above suggest that, while real exchange rate overvaluations hurt growth, undervaluations foster it. This contrasts with another position, linked to the Washington Consensus view, which argues that any real exchange rate misalignment implies a sort of disequilibrium that could affect the growth process. According to this view, as any equilibrium relative price, whenever the observed real exchange rate differs from the equilibrium level, welfare is reduced. Misalignment applies for any deviation of the real exchange rate from its long-run (fundamentals' based) equilibrium. Thus, economic growth would be lower if the real exchange rate is above or below its long-run value, i.e. both undervaluation and overvaluation are pernicious to economic growth. For the export-led growth, on the contrary, only overvaluation decreases growth, but undervaluation increases it.

Putting together the concepts elaborated above, it might be tempting to jump to the conclusion that DD lowers economic growth, and in fact many DD theorists—as well as some empirical applications—come to this conclusion. However, this needs a strong assumption: that the manufacturing tradable sector is somehow "special." Mostly, it has been assumed the existence of learning by doing or other types of externalities in this sector to obtain theoretical models linking DD with lower growth. Absent these assumptions, DD only depicts an equilibrium real exchange rate appreciation reflecting stronger fundamentals and de-industrialization, but would not necessarily be bad for overall growth.

Most of the DD empirical literature focuses on the impact of foreign exchange inflows (natural resource booms, remittances, aid, etc.) on the real exchange rate and the reallocation of resources between the tradable and nontradable sectors, but do not examine the effects on

long term growth, and do not analyze whether the adverse effects associated to DD offset the beneficial effects of inflows. Research in this area has typically not attempted to directly demonstrate the presence of spillovers or other growth-enhancing qualities in the tradable sector. Hence, the evidence on the negative impact of DD on growth is still partial, and generally inconclusive. As Sala-i-Martin and Subramanian (2003) argue, the proposition that tradable sectors are "special" or "superior" because of learning-by-doing and other positive externalities—a necessary condition for DD to exert a drag on long-run growth—is "largely unproven."

Concerns about DD may also derive from the view that real exchange rate overvaluation lowers growth, a result that appears to be supported by the empirical evidence. Evidence on the positive effects that an undervalued real exchange rate may exert growth is mixed, with some studies suggesting that undervaluation actually hurts growth—as argued by the Washington Consensus view. In any case, the real exchange rate appreciation associated with Dutch disease is in principle an equilibrium phenomenon that reflects a change in underlying fundamentals and not necessarily implies overvaluation, so it is not clear why lower growth should be an unavoidable outcome.

Therefore, even though there is some debate onto whether misalignment or overvaluation lowers growth, the channel through which DD reduces economic growth is not found in the literature (see below). This is quite relevant, as it affects the economic policy discussion.

III. Dutch Disease and Real Appreciation: Is there Room for Policy?

The previous discussion on DD leads to the following question: is there room for economic policy to avoid real appreciation? But to answer this question, it is necessary first to address a prior one: is the real exchange rate a policy instrument? In principle, the real exchange rate is a relative price not directly controlled by policymakers. It is rather the outcome of other forces and policies affecting supply and demand. However, as discussed in the next section, it can be somewhat temporarily influenced by certain policies.

While the real exchange rate typically appreciates as a consequence of a natural resource shock, such real appreciation usually represents an equilibrium phenomenon that reflects a change in underlying fundamentals. Therefore, the appreciation should not need to be a cause of concern, and no economic policy response would be required, since there is no misalignment. Following this view, growth will be in line with fundamentals. The export-led growth supporters, however, would claim that there is always a role for economic policy to keep the currency undervalued so as to spur economic growth. Eventually, this is an empirical question—surveyed below—that essentially needs to compare the short run benefits of an undervalued exchange rate with the long run costs it might embed.

On the other hand, a real appreciation could result from inconsistent domestic economic policies. For instance, if economic agents take a temporary shock as permanent, the real exchange rate could overshoot and become overvalued, and eventually become unsustainable

if not corrected. If economic policy intends to permanently deviate the real exchange rate from its fundamental value, eventually the inconsistencies will emerge. The likely effects are that the long run pain would outweigh the short run gain.

Therefore, the nature of the shock, or its persistence, is an important factor in determining whether to worry about DD or not. If the shock is temporary, then there might be a role for economic policy to smooth the impact of the shock and curb the symptoms of DD. Unfortunately, in some cases it is actually very difficult to determine a priori if the shock is either temporary or permanent.

The bottom line is: even though DD could appreciate the real exchange rate, incentive resource reallocation, and generate lower productivity in the manufacturing sector, thus de-industrializing the country, would that imply that undervaluing the exchange rate will avoid DD and increase economic growth? Not necessarily. As documented below, DD does exist. But the link of DD to lower economic growth does not. Therefore, why would there be a role for economic policy to avoid DD on the basis on sustaining long-run economic growth? That said, the policy response to a natural resource boom (or other shocks causing DD) could play a role in determining the overall impact of the shock. The key challenge is how to adequately manage the boom associated with it.

Next, we document what the theoretical and empirical literature has found on these issues. We will then take stock of the literature to derive some policy implications.

IV. THE EXISTING LITERATURE

A. Dutch disease: real appreciation, factor reallocation, and de-industrialization

Theory

The theoretical literature on DD is quite extensive. Early contributions include Corden (1981, 1984), Corden and Neary (1982), Van Wijenvergen (1984), Edwards and Aoki (1983) and Haberger (1983). Corden (1981) uses a two-sector economy to illustrate the so called 'tradable squeeze' also known as Dutch disease. Using a simple model, he shows how the discovery of natural resources triggers large capital inflows—e.g. to finance investments in the natural resource sector—which in turn appreciates the domestic currency. The real appreciation results from two interconnected sources: capital inflows and the increase in demand for non-tradable goods (given higher income due to the discovered resources). Furthermore, expectations of further appreciations increase (speculative) capital inflows, reinforcing the appreciation. The overall effect of the real appreciation is to redirect resources from (traditional) tradable goods to the natural resource tradable and non-tradable goods. If nominal wages are rigid this might increase unemployment. To undo these effects, Corden suggests either contracting real domestic expenditures, or reducing public debt (in an amount equal to the capital inflows), or more importantly, spending the proceeds of natural resources in accumulating foreign financial assets.

Following the above, Corden and Neary (1982) analyze the effects of DD on income distribution and resource allocation. With a general equilibrium model they study what they label as a "resource movement" and a "spending effect." The former arises as the boom industry affects the marginal productivity of the factors of production—drawing resources out of the non-booming sectors—while the latter increases spending as a result of the wealth effect of the exogenous shock that triggers the boom. Conditional on different factor intensities, the model shows the effects of DD on income distribution and factor-utilization. Corden (1984) extends Corden and Neary (1982) to analyze the effects of immigration, endogenous terms of trade, domestic absorption, and some dynamics. He also looks at unemployment and protection policy.

Van Wijnbergen (1984) includes learning by doing (LBD) to study the potential effects of Dutch disease on economic growth. Assuming that economic growth is mainly explained by LBD—mostly through the tradable sector—then DD will reduce a country's long-term growth. (As in standard DD, the DD shock increases demand for non-tradable goods, thus appreciating the real exchange rate.) Consequently, there is an argument for responding to DD shocks by extending a production subsidy to the tradable goods sector. However, the latter results and policy implications depend on having a closed capital account. If the capital account is open, the country can increase its stock of net foreign assets with the DD revenues, which will counter-balance the real appreciation pressures, thus unwinding the call for production subsidies.

In line with the seminal contributions mentioned above, Edwards and Aoki (1983) discuss whether DD is a disease in the first place—and show that it is not a disease as long as the real appreciation is permanent and a shift to a new long-run equilibrium. To show this, they model a small open economy subject to an exogenous increase in the price of a commodity export (e.g. oil). They show that in equilibrium the relative price of (traditional) tradable goods not only decreases with respect to the commodity exports, but also with respect to non-tradable goods. As a consequence, resources move out of the production of traditional tradable goods into non-tradable goods and commodity tradables. The paper then extends Haberger (1983), showing that an overshooting of the exchange rate might arise if an excess supply of money results from the government's monetization of the external shock—which triggers an overshooting of the price of non-tradable goods, thus impacting on the real exchange rate. DD tends to be amplified if the government owns the natural resource, as government expenditures are biased to non-tradable goods and the government spends the revenues. These points are also made by Haberger (1983), who also suggest the relevance of not spending the proceeds of the external shock domestically. As a consequence, he suggests that increasing foreign assets might not only avoid the real appreciation, but also increase the country's long-term growth.

In search for the causes of DD, Krugman (1987) introduces dynamic economies of scale into standard trade model. This enables him to show conditions under which DD may appear. However, it is only one of several possibilities in his model—and conditional on the size and

duration of the shock. For DD to be a de-industrialization problem it has to either last for long enough or be large enough; otherwise it will just be a temporary phenomenon. Buiter and Purvis (1980) examine the following as sources of de-industrialization: monetary disinflation, an increase in the price of oil, and a domestic oil discovery. They show that monetary disinflation and an increase in the price of oil will generate a real appreciation, and thus a reduction in domestic production of tradable goods. Domestic oil discoveries, however, has more ambiguous effects. They only focus on the demand side part of these shocks, though. They claim that oil shocks are not likely to increase unemployment—as opposed to most of the literature. The latter is based on the assumptions that oil is not an intermediate input—thus not causing long-term impact on the manufacturing sector—and inexistence of a non-tradable goods sector. An interesting result they obtain is that the increase in the price of oil will also have a negative effect on oil-importing manufacturing output.

Some papers emphasize intertemporal differences of DD, like Bruno and Sachs (1982), Chaterji and Price (1988), Arellano et al. (2005), and Prati and Tressel (2005)—the later two focusing on the DD-effects of foreign aid. Bruno and Sachs (1982) build a DD model extended to allowing for short-run capital specificity and long-run capital mobility, international capital flows, and intertemporal optimization. By simulating an infinite-horizon economy, the main contribution is to look at the transitional dynamics of DD shocks, as opposed to the long-run or short run effects only. The results confirm the mechanics of DD and the role for saving the capital inflows generated by DD: increasing the NFA position of the country smoothes the benefits of the DD shock over time. Chatterji and Price (1988) study the effects of DD on long-term unemployment. They show that although DD can increase unemployment in the short-run due to market rigidities, it lowers long-run unemployment. They assume that the quantity of oil production is exogenous, so there is no resource effect but only a spending effect. The labor market rigidity is assumed by a union that sets the wage rate in the tradable goods sector, thus obtaining equilibrium unemployment.

Arellano et al (2005) study the dynamics of foreign aid-induced DD in an open economy RBC model. The usual static effects of DD are obtained. In the dynamic setting, if foreign aid is a continuous flow, they find that it mainly finances consumption—in line with intertemporal optimization. If financial access is limited, then aid generates fluctuations in investment in order to smooth consumption. Some welfare analysis shows that volatility in aid results in a welfare reduction. The paper also presents empirical results on the relationship between foreign aid and the production of goods for export. Cross-country regressions for 73 aid-dependent countries indicate that manufactured good exports, as predicted by the theoretical model, are negatively related to the level of aid. The results are significant after controlling for initial endowments, transaction costs, the level of development, and a host other variables. Prati and Tressel (2005) also focus on DD-like effects of international aid. They develop a two-sector open economy that receives an exogenous flow of foreign aid that can be either consumed or invested in productivity-

enhancing public goods. They show a role for macroeconomic policy by adjusting domestic credit—i.e. sterilization. The ability of the latter to increase welfare is conditional on the time profile of foreign aid. When foreign aid is mainly front-loaded (back loaded), a(n) contractionary (expansionary) monetary policy will stimulate savings (consumption), thus smoothing the effects of aid. The level of international reserves should be high enough for the domestic credit interventions to be feasible. On the contrary, if aid is too front-loaded sterilization costs may reduce the ability of transferring purchasing power over time to increase welfare—since these costs could be large in practice. In the presence of learning-by-doing (LBD) sterilization might raise productivity and increase future consumption by reducing present consumption—i.e. the economy needs tighter monetary policy to increase future growth.

Gylfason et al (1997) focus on the effects of DD on the volatility of the real exchange rate, which further lowers productivity and investment in the tradable goods sector. This amplifies the standard DD effects. They show that abundance of a natural resource tend to inhibit economic growth by reducing investment in human capital. The paper analyzes the case of a flexible exchange rate regime—unlike most of the preceding literature—which can provide insurance to the primary export industry at the expense of increasing exchange rate uncertainty for all other industries. To test for this they run cross-sectional and panel regressions based on data for 125 countries in the period 1960–1992. They confirm a statistically significant inverse relationship between the size of primary sector and economic growth, but not between the volatility of the real exchange rate and growth.

The recent literature on DD has started to dispute the negative implications of DD. Nkusu (2004) shows that low income countries that receive foreign aid need not experience DD. This is the case if countries can draw on their idle capacity to satisfy the demand induced by foreign aid. The author builds a model to specifically analyze the effects of foreign aid in economic growth through the real exchange rate—thus the need to use a DD-type of model. It shows that if there is factor underutilization—e.g. unemployment—the DD spending effect disappears. Thus, a real appreciation will not affect the tradable sector and thus it will not reduce growth until the economy returns to full employment—i.e. when the spending effect re-activates. Torvik (2001) assumes LBD both in the tradable and the non-tradable sectors, as well as learning spillovers between sectors. Under these assumptions the economy depicts a real depreciation in the long-run—despite the short-run appreciation—and production and productivity may go either up or down, unlike traditional DD models. The argument is based on the following: under the LBD and spillovers assumptions, in the short-run the higher demand for non-tradable goods increase production. This increases the demand for labor in the latter sector. However, LBD and spillovers also increase productivity faster in the non-tradable sector. Over time this implies a reduction in labor demand by the non-tradable sector, which in equilibrium requires a real exchange rate depreciation. Furthermore, Matsen and Torvik (2005) show the existence of some level of optimal DD. This optimal level implies adjusting the national wealth of the DD that is consumed each period to be lower than current DD models predict—i.e. increase saving—yet positive and increasing over time.

As such, if lower growth is observed it would be part of the optimal growth path. Therefore, the paper shows that the greater the growth generated by the traded sector, the more resource should be spent in the early periods. (Alternatively, the greater the share of consumption of non-tradable goods, the more likely it is optimal for the economy to depict an increasing spending time path.) Making policy endogenous enable the authors to support why some resource-rich countries have been successful while others not: it depends on the government generating the intertemporally optimal level of saving.

Focusing on policy reactions to DD-phenomena, Caballero and Lorenzoni (2007) and Lama and Medina (2010) study the impact of exchange rate interventions to contain DD-effects. Caballero and Lorenzoni (2007) analyze the convenience of foreign exchange intervention to preclude a real exchange rate appreciation. The key condition is the degree of financial constraint of the export sector. The criterion for intervention, however, is not whether firms go bankrupt but whether these can cause a strong real exchange rate (depreciating) overshooting. If export firms are not financially constrained, only ex-post (i.e. during the overshooting depreciation) intervention is justified. If these firms are highly financially constrained, on the contrary, ex-ante (i.e. during the prolonged real appreciation phase) intervention is worth to smooth the overreacting real depreciation. In the model the overshooting results from the export sector's lack of ability to absorb resources (labor) freed by the non-tradable sector—which are channeled by a contraction in real wages that depresses domestic demand. Specifically, if after a prolonged appreciating period the financial constraint of exporting firms binds during the depreciating phase, these firms are unable to absorb labor until real wages are sufficiently low, which amplifies the depreciation, and eventually help these firms recover. Lama and Medina (2010) analyze the welfare effects of stabilizing the exchange rate—through intervention—to contain the appreciation derived from a Dutch disease shock. Using a stochastic dynamic general equilibrium model with learning by doing and nominal rigidities, they show that although exchange rate stabilization sustains tradable goods production (i.e. it keeps it an efficient level), it contributes to misallocate resources and it increases the economy's volatility. Thus, welfare decreases in the case of exchange rate intervention. Finally, Bresser-Pereira (2008) claims the government should react to the real appreciation that DD generates by taxing exports and sales alike to manage the exchange rate, making it clear that the accumulated tax revenues should not be spent domestically. However, he presents no convincing evidence or theoretical model to support his argument.

Applications and Empirical studies

The empirical literature on Dutch Disease is also extensive. Most of the literature focuses on the impact of higher foreign exchange inflows (stemming from remittances, aid, etc.) on the real exchange rate and the reallocation of resources between the tradable and nontradable sectors. Notably, most papers do not examine the effects of the DD phenomenon on long term growth—more specifically, they do not analyze whether the adverse effects associated to DD offset the beneficial effects of inflows.

One strand of the literature focuses on the impact of remittances, generally finding evidence of DD symptoms. For instance, Lartey et al (2008) study the existence of DD effects stemming from remittances, trying to capture both spending and resource movement effects. To this end, they run a set of regressions using the ratio of tradable to nontradable output as the dependent variable, in addition to the standard regressions using the real exchange rate. They use a GMM estimator to estimate a dynamic panel model, tailored to deal with potential endogeneity in the explanatory variables. They find that an increase in remittances leads to real exchange rate appreciation (spending effect) and a decline in the ratio of tradable to nontradable output (resource movement effect), two features of the DD phenomenon. Moreover, they find evidence that these effects are stronger under fixed exchange rate regimes. The authors do not address the issue of whether these effects of remittances harm growth and welfare, and what policies should be pursued to address them.

Acosta et al (2009) use Bayesian techniques and data for El Salvador to estimate a DSGE model of a small open economy to analyze the effects of remittances on resource reallocation and the real exchange rate. The results suggest that a surge in remittances lead to DD phenomena. This is because higher remittances lead to a decline in labor supply and an increase in consumption demand that is biased toward nontradables. The higher price of nontradable stimulates an expansion of that sector, reallocating labor away from the tradable sector. Interestingly, results also show that remittances improve households' welfare as they smooth income flows and increase consumption and leisure levels. Using a Bayesian VAR they find that the empirical results are consistent with the dynamics of the model, in particular regarding the impact of an increase in remittances on nontradable output and the real exchange.

Amuedo-Dorantes and Pozo (2004) assess the impact of workers' remittances on the real exchange rate using a panel of 13 Latin American and Caribbean countries. They also find that an increase in remittances leads to a real exchange rate appreciation, with a doubling of remittances appreciating the real exchange rate by 23 percent. In contrast, Rajan and Subramanian (2005) find evidence suggesting that remittances do not create DD effects.

Another strand of the literature examines the existence of DD effects stemming from foreign aid. While there is some evidence of DD symptoms stemming from aid, that is not an inexorable outcome, and would mainly depend on how aid inflows are actually spent. Moreover, the overall impact on growth would depend on whether spillovers and/or learning-by-doing externalities accrue to either tradables or nontradables sectors, and on supply side effects associated with aid-related investments.

Rajan and Subramanian (2005) analyze why there is no robust association between aid and growth, and suggest that a plausible explanation is that aid may lead to real exchange rate overvaluation, affecting competitiveness in the tradable sector. Using a methodology that exploits both cross-country and within-country variation, they find that aid inflows negatively affect a country's competitiveness, as reflected in a decline in the share of labor

intensive and tradable industries in the manufacturing sector. Their results also suggest that the channel is the real exchange rate overvaluation caused by aid inflows. Based on these results, the authors conjecture that because the tradable sector is typically the source of productivity improvements, positive spillovers associated with learning-by-doing, and scarce foreign exchange earnings that filter through to the rest of the economy, the adverse impact of aid on its competitiveness could retard not just that sector but also the growth of the entire economy. However, they do not show that aid is, on net, harmful to growth. They just provide evidence consistent with a channel that could offset potential beneficial effects of aid.

Rajan and Subramanian (2009) examine the impact of aid on the relative size of and growth in the tradable manufacturing sector, using an approach that exploits the variation within countries and across manufacturing sectors, and corrects for possible reverse causality. They also focus on finding evidence on the channel through which aid might have these effects. They find evidence that aid inflows negatively affect tradable manufacturing sectors, with real exchange rate appreciation being the channel for such effects. Although they do not provide any evidence of causation from manufacturing exports to growth, they conjecture that their findings may explain why the evidence about the impact of aid on growth is so ambiguous.

Adenauer and Vagassky (1998) test the existence of DD symptoms in four CFA zone countries during 1980–1992, by using regression analysis to study the link between higher aid and the real exchange rate. They find that an increase in aid leads to a RER appreciation. Then, they examine the channels of aid on a country-by-country basis, focusing on the particular policies followed by each of them. They argue that government policies, consumption levels and investment are crucial factors in determining the extent of Dutch disease effects in each country. Amuedo-Dorantes and Pozo (2004), in contrast, find no systematic effect of foreign aid on the real exchange rate.

Adam and Bevan (2004) show that the conventional DD effects of aid may be overturned when productivity spillovers accrue in both the tradable and non-tradable sectors. They present a model, calibrated to Ugandan data, where public infrastructure investment generates an intertemporal productivity spillover which may exhibit a sector-specific bias. Their results suggest that for reasonable values of the parameters regarding the supply-side effects of public expenditure, the traditional DD effects are not present beyond the short-run. In fact, for a country like Uganda, public expenditure with productivity effects skewed towards the non-tradable sector leads to significant export and output growth in the medium term. These results hold even in the presence of learning-by-doing externalities in the manufacturing tradable sector. Hence, the authors conclude that analysis of the impact of aid must take into account supply-side issues, and these are likely to depend on how aid is spent.

Some studies show that DD is not an inexorable consequence of aid inflows. For instance, IMF (2005) looks at low-income countries that have experienced a surge in aid inflows and

are strong performers in terms of institutions and economic policies (Ethiopia, Ghana, Mozambique, Tanzania and Uganda), finding that the aid surge was actually accompanied by real exchange rate depreciation, not appreciation. In fact, during the years in which aid inflows increased, there is typically a depreciation of the real effective exchange rate, ranging from 1.5 percent (Mozambique, 2000) to 6.5 percent (Uganda, 2001). Consistent with real depreciation, export performance was strong in most of the sample, especially Mozambique and Tanzania.

Other studies focus on natural resource booms, associated with either discoveries or price increases. Sachs and Warner (2001) try to explain why countries with large natural resource endowments tend to grow slowly (i.e., the natural resource curse). They find evidence that natural resource intensive economies tend to have higher price levels (hence higher nontradable prices, assuming roughly similar tradable prices across countries), after controlling for the relationship between price levels and per-capita income. They then show that resource abundant countries tended to have small contributions from export growth in manufactures. They use these results as a potential explanation of the resource curse, by implicitly assuming that a larger manufacturing tradable sector drives long-term growth. However, they do not attempt to show evidence on this relationship. They also discuss other possible explanations for the curse, which relate natural resource abundance with crowding-out of entrepreneurial activities or innovation, rent-seeking behavior (voracity effects), and higher corruption. Natural resource countries would thus experience lower innovation, lower entrepreneurial activity, poorer governments and lower growth.

Sachs and Warner (1999) present a model with natural resources, increasing returns in the spirit of big push models, and expectations and show that when the increasing-returns-to-scale (IRS) sector is non-tradable, a resource boom can indeed pull more goods into that sector, and thereby set off a dynamic growth process. However, when the IRS sector is in tradable manufactures, a resource boom can hurt growth, via the DD phenomenon. Empirically, they present evidence from seven Latin American countries that natural resource booms are sometimes accompanied by declining per-capita GDP. However, they recognize that they cannot distinguish between several possible channels associated with natural resource booms: DD, political instability, costs of high variability of export earnings (with imperfect financial and insurance markets), etc.

Gylfason (2001) discusses the concept, existing literature, and case studies of DD to draw some lessons out of it. In the empirical section he shows that across countries: (a) economic growth varies inversely with natural resource abundance, (b) two different measures of education intended to reflect education inputs and participation are both inversely related to natural resource abundance, and (c) economic growth varies directly with education. Therefore, natural resource abundance seems likely to deter economic growth not only through the Dutch disease, rent seeking, and overconfidence that tends to reduce the quality of economic policy and structure, but also by weakening public and private incentives to accumulate human capital. If so, the adverse effects of natural resource abundance on

economic growth since the 1960s that have been reported in the literature may in part reflect, and possibly displace, the effect of education on growth.

Larsen (2004) shows that Norway was able to avoid the effects of DD after the discovery and extraction of oil in the early 1970s, and discusses the policies behind the success. He argues that the factor movement effect was dampened through income coordination: a highly centralized wage formation system made it possible to make the manufacturing sector the wage-leader (based on productivity increases). This made it possible to limit wage increases to all sectors from an expanding resource sector. The spending effect, in turn, was curbed because the government shielded the economy by fiscal discipline and investing abroad (through the creation of a Petroleum Fund). The spillover-loss effect was limited because losses were substituted for by gains in the highly technological off shore oil extraction sector, which requires more capital than on-land oil extraction. Moreover, social norms, transparent democracy, proper monitoring, an effective judicial system, and the wage negotiation system reduced rent seeking behavior, limiting the typical negative effects associated to the resource curse.

Ismail (2010) builds a static model. Then he tests it for the existence of Dutch disease using microeconomic data, as opposed to most of the other studies. Although using annual data for the period 1977–2004 in 90 countries, the problem is that only data from the manufacturing sector are used—due to data availability issues. With this caveats, he finds that a permanent oil shock resulted in manufacturing production reductions. Furthermore, these effects seem to be stronger in economies with more open capital accounts. The relative factor price of labor increases with respect to capital. Consequently capital intensity increases in the oil shock—consistent with his labor-intensive non-tradable sector model. Finally, he finds that sectors with higher capital intensity are affected relatively less by these types of shocks.

Spatafora and Warner (1995) look at oil exporting countries and observe that the real exchange rate tend to appreciate in response to terms of trade shocks, but without the existence of Dutch disease. Sala-i-Martin and Subramanian (2003) do not find Dutch disease evidence. Similarly, Gelb (1988), doing a cross-country analysis for oil exporter countries finds no evidence of Dutch disease in the manufacturing sector.

B. Real exchange rate and growth

There is an extensive literature on real exchange rate misalignment and economic growth. Among them, Cottani et al. (1990) document the existence of a strong negative relation between per capita GDP growth and two measures of real exchange rate behavior: real exchange instability and real exchange rate misalignment. They find no significant relation of the purchasing power parity (PPP) exchange rate on economic growth. Building on Cottani el at., Ghura and Grennes study the effects of the real exchange rate on growth in Sub-Saharan countries. They confirm the negative relationship between real exchange rate misalignment and instability, and economic growth. For their sample of countries they also find a negative

relation between PPP real exchange rate and growth. In a similar vein, Dollar (1992) finds that existence of a negative relationship between distortions in the real exchange rate and per capita GDP after controlling for the effects of exchange rate variability and the level of investment.

A new literature on the level of the real exchange rate and growth has emerged in recent years, with the view that a depreciated or undervalued exchange rate fosters growth. This view has been motivated by the successful experiences of China and other east-Asian countries. While there is some evidence suggesting that exchange rate overvaluation hinders growth and/or undervaluation stimulates it (Hausmann, Pritchett and Rodrik, 2004, Prasad, Rajan and Subramanian, 2007, Levy-Yeyati and Sturzenegger, 2007, Rodrik, 2008, Eichengreen, 2008), the evidence is still limited and far from conclusive. The literature addressing these linkages is still in its infancy, and there is no consensus on the precise channel through which they operate.

A common view, linked to the export-led literature and to the traditional DD one, argues that the operative channel is the size of the (manufacturing) tradable sector. In this view, this sector is "special," typically because of externalities associated with export-linked activities (Prasad et al, 2007, Rodrik, 2008). There is, however, little systematic evidence on the specific nature of such externalities, and it is empirically very difficult to distinguish between alternative hypotheses. Similarly, while there are a few studies trying to document spillover effects stemming from manufacturing, the evidence is quite inconclusive (Eichengreen, 2008).

Hausmann, Pritchett and Rodrik (2004) examine episodes of rapid growth accelerations that are sustained for at least eight years, and find that such episodes tend to be associated with increases in investment and trade, and with real exchange rate depreciations.

Prasad, Rajan and Subramanian (2007) assess the impact of capital inflows on economic growth in nonindustrial economies. Their results show a positive link between current account surpluses and growth, and interpret this as evidence that nonindustrial countries receiving foreign capital inflows have not recorded higher growth rates. They present evidence suggesting that foreign capital inflows can lead to real exchange rate overvaluation, hurting manufacturing exports and thus overall economic growth.

Rodrik (2008) finds that an undervalued real exchange rate has a positive effect on growth, and provides some evidence that the operative channel is the size of the (manufacturing) tradable sector. He then discusses two alternative hypotheses to explain the stylized facts, but is unable to distinguish between them empirically. Finally, he develops a small open economy model where both the tradable and non-tradable sectors face an economic distortion. If such distortion is larger in the tradable sector, the size of this sector would be smaller than optimal in equilibrium. Hence, any policy leading to a real exchange rate depreciation would have positive effects on growth.

Berg and Miao (2010) analyze Rodrik (2008) and find an identification problem, since determinants of misalignment are also determinants of growth. In Rodrik's story, undervaluation is good for growth and overvaluation is bad. The so called Washington Consensus view, on the contrary, considers both types of misalignment to be bad for growth. Berg and Miao show that Rodrik's explanation regarding this symmetry holds. However, Berg and Miao also show that, after controlling for fundamentals, deviations of the real exchange rate from PPP values, as used in Rodrick (2008), do not explain long-term growth. On the contrary, deviations from fundamental real exchange rates, as in the Washington Consensus view, do explain long-term growth.

Eichengreen (2008) analyzes how the real exchange rate affects economic growth and what are the channels through which this link operates. He states that while there is some evidence suggesting that a competitive real exchange rate may stimulate growth, such evidence is not overwhelming. Moreover, the literature has not yet identified the relevant channels of transmission. In particular, he argues that the evidence on the nature and prevalence of positive externalities associated with export-related activities (or other spillovers stemming from them) is inconclusive and usually indirect. He argues that these results may indicate that a competitive real exchange rate is only a "facilitating condition"—not a sufficient one—that would enable a country to capitalize on certain strong fundamentals (such as a disciplined labor force, a high savings rate, or its attractiveness as a destination for foreign investment). Finally, he notes that while a competitive real exchange rate may play a role in jump-starting growth there are also costs of keeping a weak currency for too long, so it is important to develop an exit strategy.

A second view in the more recent literature links an undervalued exchange rate to growth through an increase in domestic saving. Dooley, Folkerts-Landau, and Garber (2004) argue that a depreciated real exchange rate tends to shift demand away from tradable into nontradable goods, so that the real interest rate needs to rise to maintain internal equilibrium, increasing domestic saving rates. Levy-Yeyati and Sturzenegger (2007) point to an alternative channel: an undervalued real exchange rate is associated with lower real wages, leading firms to higher investment, and to higher saving rates to finance them. They find evidence suggesting that the effects of a depreciated real exchange rate on growth do not stem from export-led expansions, but rather from increased domestic saving and investment rates. Montiel and Servén (2007), however, argue that the link between the real exchange rate and saving is theoretically and empirically weak. First, they find no evidence of an association between an undervalued real exchange rate and higher saving. Second, they show that, while it is possible for a depreciated real exchange rate to have positive effects on saving in a standard new open macroeconomic model, the conditions required for it are highly implausible.

Levy-Yeyati and Sturzenegger (2007) present evidence suggesting that foreign exchange rate intervention has typically been aimed at limiting appreciations rather than depreciations (what they call "fear of appreciation"). After establishing whether such interventions were

actually successful in maintaining an undervalued real exchange rate, they examine the effects of "fear of appreciation" on growth in developing countries. They find that fear of appreciation indeed leads to higher long-term growth rates. However, in contrast to the view that points to the relative size and growth of the tradable sector as the relevant channel, they find that higher growth comes from increased domestic savings and investment.

Montiel and Servén (2007) focus on the claim that an undervalued real exchange rate fosters growth through an increase in domestic savings rate. They find no evidence of a positive relationship between a depreciated currency and higher saving rates. Moreover, they claim there is no consensus and no analytical basis in the literature to explain the precise channels through which this link would operate. They also use a standard new open economy model to show that while it is possible to generate a positive impact from a depreciated real exchange rate on saving, the necessary conditions to get this result are quite implausible. Finally, they show that the empirical literature trying to explain international differences in saving rates has not provided evidence on a possible role for the level of the real exchange rate as a potential determinant.

V. THE LITERATURE REVIEW IN NUMBERS

In this section, we put together the information contained in the papers reviewed in a systematic way, developing some basic indicators. Each of the reviewed papers—either theoretical or empirical—obtains results, e.g., on whether DD exists or not, or if real exchange rate undervaluation increases economic growth, etc. To this end, the papers were divided into two categories: (i) those analyzing DD; and (ii) the ones studying the effects of the real exchange rate on growth.

The papers focusing on DD were first separated according the nature of the DD shock: (i) natural resource/capital inflows; (ii) remittances; and (iii) foreign aid. Within each category, in turn, each paper was surveyed looking for the result in the paper regarding the following. Do DD shocks cause:

- a real appreciation?
- lower relative production of tradable goods vs. non-tradable goods?
- factor reallocation?
- a reduction in the relative productivity of tradable vs. non-tradable sectors?
- lower net exports? and
- lower growth?

The papers analyzing the effects of exchange rates on growth were reviewed looking for the papers' conclusion regarding the following questions:

- Does misalignment of the real exchange rate lowers economic growth?
- Does it make any difference if the misalignment is due to overvaluation?
- Does it make any difference if the misalignment is due to undervaluation?
- Does an appreciation of the real exchange rate (level) decrease economic growth?
- Does a depreciation of the real exchange rate (level) decrease economic growth?
- Does volatility of the real exchange rate misalignment lower economic growth?
- Does volatility of the real exchange rate level lower economic growth?

Figure 1 shows the results for the papers analyzing DD. As mentioned above, the results were separated according to the source of the DD shock. The overall results are quite suggestive. In over 80 percent of the cases a DD-shock appreciates the real exchange rate and causes de-industrialization (i.e. a decline in the ratio of tradable to non-tradable output). In over 90 percent of the cases DD shocks generates factor reallocation and a decrease in the relative productivity of the tradable sector, and in about 75 percent of the cases exports are reduced. However, and contrary to the common view, no lower growth is observed as a result of DD in close to 80 percent of the cases. It is worth noting that only a few papers address this question; as most of them focus on real exchange rate appreciation, factor reallocation, and relative output (tradable to non-tradable). This results hold regardless of the paper being theoretical or empirical, as shown in Figure 2.

Opening up by the source of the shock, we observe consistent results (Figure 1). For natural resource/capital inflows episodes the shares are larger in each category. A similar pattern is found for foreign aid shocks. As to remittances, the results show a strong indication of real appreciation, but not much net effect on relative tradable/non-tradable output or economic growth.

Figure 3 presents the results corresponding to the effects of the real exchange rate on growth. There is evidence that real exchange rate misalignment does reduce growth. 90 percent of the reviewed observations show that when the misalignment (defined as a deviation from its fundamental value) is due to overvaluation growth is reduced. When the misalignment is due to undervaluation, some results indicate that it lowers growth, but the evidence is broadly inconclusive. If anything, the evidence seems to indicate that misalignment lowers growth. Regarding the exchange rate level, an appreciation appears to reduce growth in 75 percent of the surveyed observations, whereas depreciation seems not to reduce growth (100 percent of the observations). It should be noted, however, that the majority of the studies addressing the

relationship between the real exchange rate and growth focus on misalignment (either overvaluation or undervaluation) and not on the level of the real exchange rate.[3] Finally, real exchange rate volatility appears to be negative for growth regardless of whether we focus on the volatility of the misalignment or the volatility of the real exchange rate level.

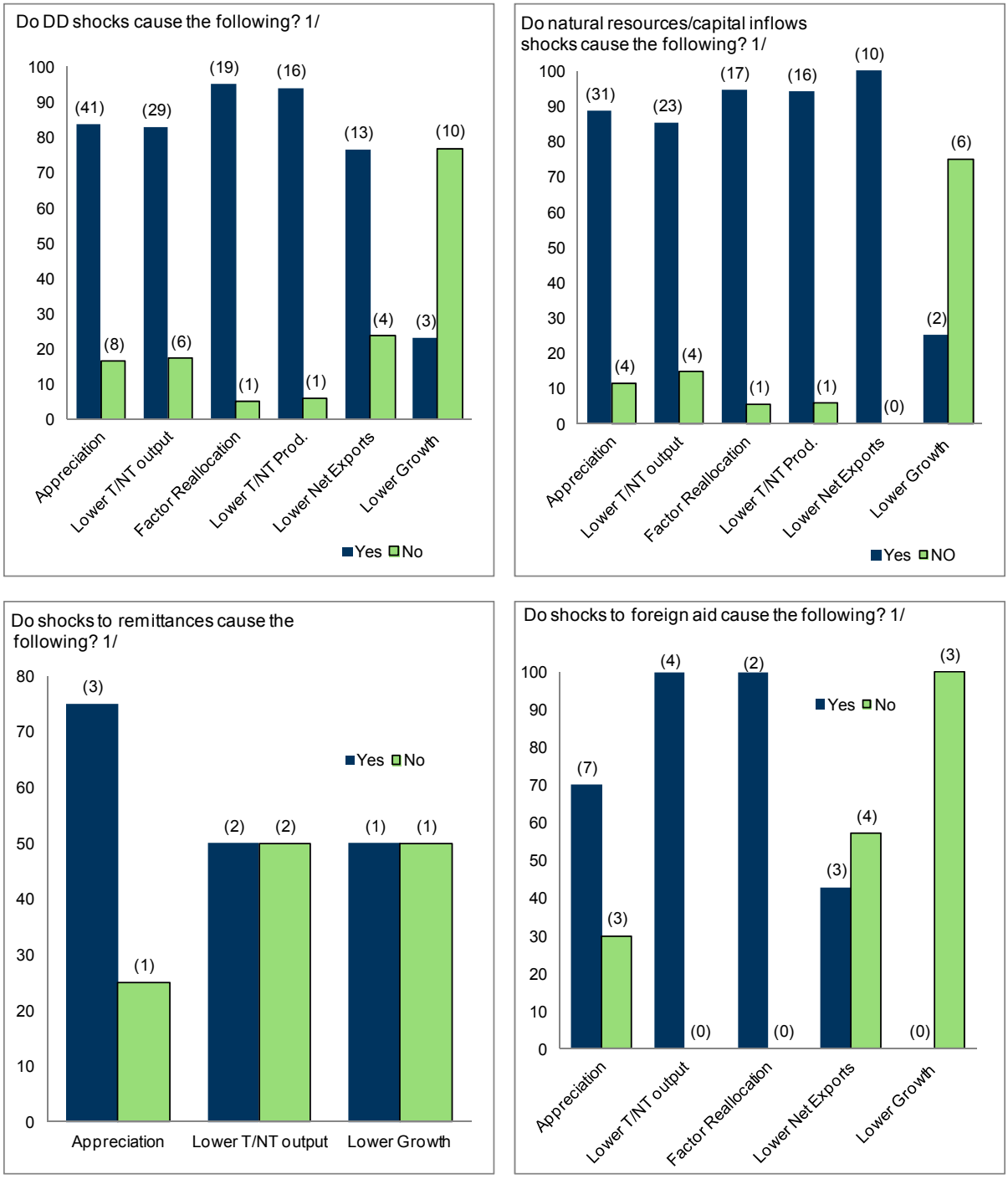
Putting together both pictures, the reviewed literature gives a clear message. On the one hand, DD does exist—as the real exchange rate appreciates, there is factor reallocation, and production switches away from manufacturing. On the other hand, exchange rate volatility hampers economic growth. Misalignment of the real exchange rate from its fundamental value also lowers growth. Overvaluations (however defined) are always negative for economic growth, while the evidence on undervaluation is inconclusive.

Finally, the evidence shows the lack of connection from DD to economic growth. DD does exist; but its existence does not imply lower growth. Even though overvaluation may hinder growth, DD could perfectly be rationalized as an equilibrium phenomenon in which a country becomes richer.

In light of the above, are there any benefits from smoothing DD effects using economic policy? What are the implications regarding exchange rate policy? The next section addresses these issues.

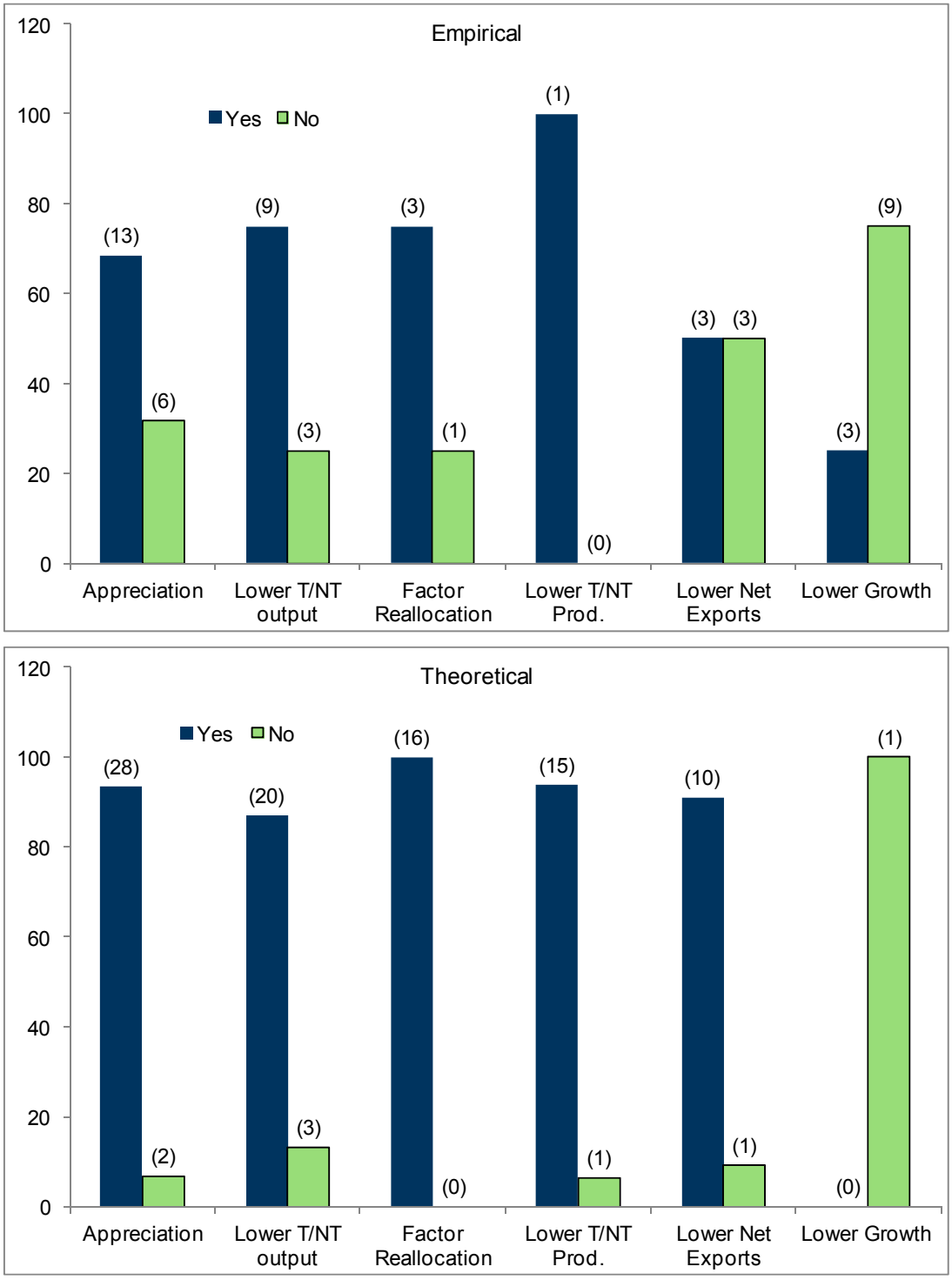
[3] While we found 47 studies examining the relationship between real exchange rate misalignment and growth, we found only 9 focusing on the level of the real exchange rate.

Figure 1. Literature Review in Numbers: Dutch Disease



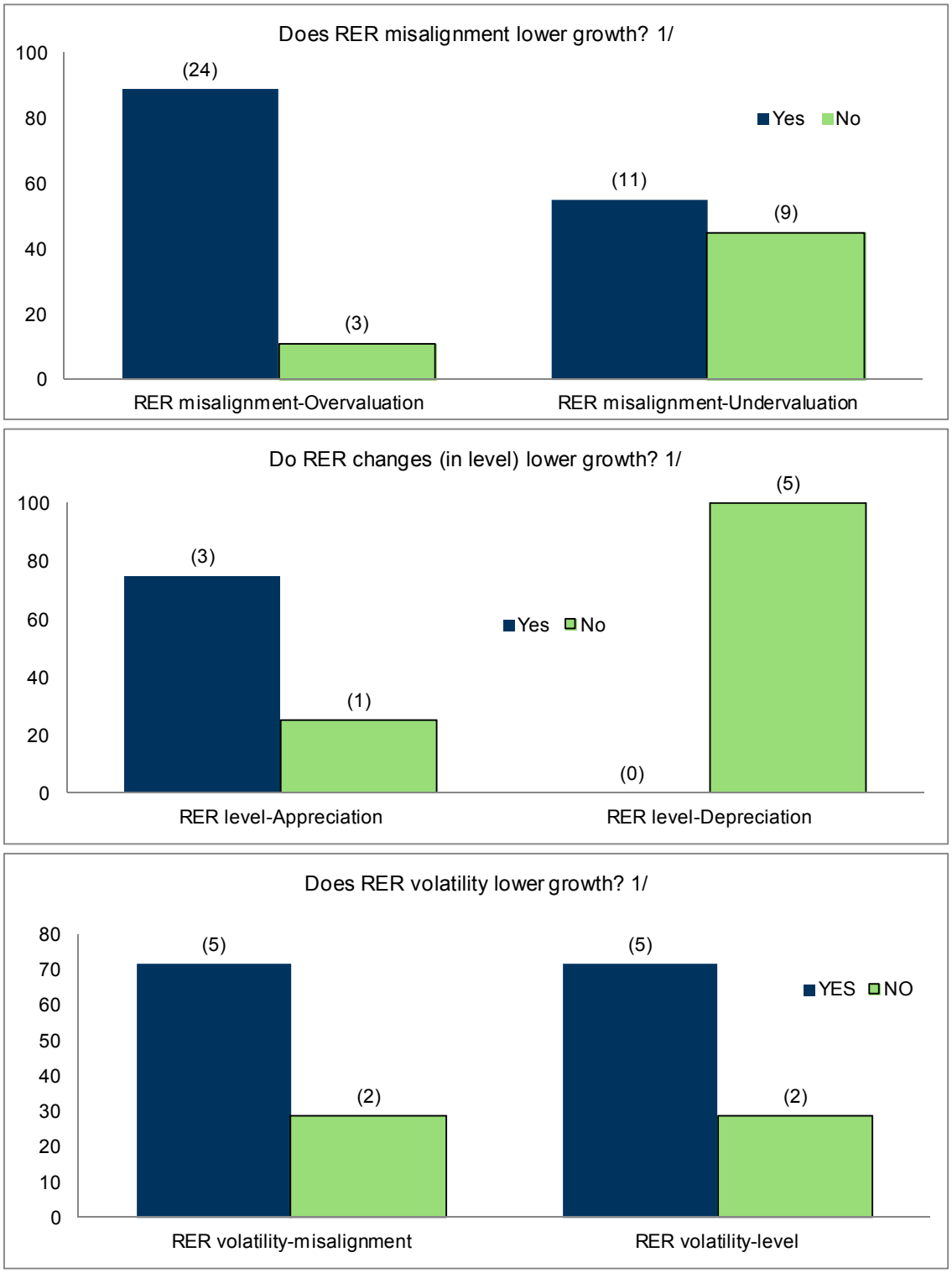
Source: Authors' calculations.
1/ Inpercent of total observations. Number of observations in parenthesis.

Figure 2. Literature Review in Numbers: Dutch Disease
Empircal vs.Theoretical Papers



Source: Authors' calculations.
1/ In percent of total observations. Number of observations in parenthesis.

Figure 3. Literature Review in Numbers: Real Exchange Rate and Growth



Source: Authors' calculations.
1/ In percent of total observations. Number of observations in parenthesis.

VI. Policy Discussion

Should real exchange rate appreciation be a source of concern for policymakers? Should they act to curb DD effects? If yes, is it due to concerns about long-run growth? What is policy really capable of doing? In this section, we build on our discussion of the literature to address these questions.

The literature reviewed above reveals that there is little theoretical and empirical basis on the adverse impact of DD on growth. While DD may be accompanied by a contraction of manufacturing tradables, this would not necessarily offset the beneficial effects associated to the positive wealth effect. The policy response should aim at taking advantage of those positive effects, while at the same time mitigating the undesired consequences that it may cause.

A given appreciation of the real exchange rate may have a differential impact on economic growth depending on whether or not it reflects an equilibrium phenomenon. If the appreciation is driven by a permanent change, then it will imply a long-run equilibrium movement, and in principle DD should not be a concern. However, the real exchange rate could overshoot and become overvalued (for instance, if agents overestimate the persistence of the shock, or in case an excess supply of money results from the government's monetization of the external shock—which triggers an overshooting of the price of non-tradable goods). Thus, macroeconomic policy should focus on avoiding overshooting, overheating, and the surge of macroeconomic imbalances that could later become unsustainable.

It is sometimes very difficult for policymakers to assess if a certain shock and the corresponding real exchange rate appreciation will be temporary or permanent. If the authorities treat a permanent shock as temporary and decide for example to intervene in the foreign exchange market, they will delay an unavoidable—and desirable—macroeconomic adjustment, incurring also in substantial quasi-fiscal costs due to sterilization. If, on the contrary, they treat a temporary shock as permanent, they may experience costs in terms of reduced growth. In the particular case of capital inflows shocks, this dilemma has in recent years provided a justification for the use of capital controls in some countries. The latter, was based on the belief that they would provide an instrument to limit the cost of accumulating reserves while avoiding a real exchange appreciation that may need to be reversed in the future. A discussion on the merits of capital controls is, however, out of the scope of this paper (see Reinhart and Magud, 2007, for an extensive study on this issue).

Fiscal policy is a natural instrument to help curbing DD effects. In fact, excessive public spending has been a common component of economic mismanagement of booms stemming from positive DD shocks. Fiscal policy may play a role not only by mitigating the "spending effect" associated with DD but also by smoothing expenditures to reduce output volatility. A prudent expenditure policy would help saving part of the increased revenues, which could be

used to either repay external debt or accumulating foreign assets—typically in a sovereign wealth fund to be invested abroad. This would help to limit aggregate demand pressures and hence the spending effect, and weaken real appreciation pressures. Directing spending to tradables (imported capital goods, for example) would also help curbing the negative impacts of DD. If there is a presumption that the shock may be temporary, smoothing expenditure over time would help to reduce volatility. In this case, a fiscal rule and the use of a stabilization fund could be appropriate.

How to spend the inflow is crucial not only to curb DD effects, but also to maximize the benefits associated with the positive income shock. It is the policymakers' job to ensure that these benefits outweigh any potential adverse effect on long-term growth due to a contraction of the tradable sector. In this regard, there is a case for improving the quality of expenditures, for example by promoting investments that would entail positive supply side effects. Investments that foster productivity and supply of nontradables (such as investments in infrastructure, education or other activities to improve and expand the availability of skilled labor) would be particularly advantageous.

Norway after the discovery and extraction of oil in the early 1970s provides a good example of policies that proved successful in avoiding the effects of DD. The factor movement effect was dampened through income coordination: a highly centralized wage formation system made it possible to make the manufacturing sector the wage-leader (based on productivity increases). This made it possible to constrain wage increases to all sectors from an expanding resource sector. The spending effect, in turn, was curbed because the government shielded the economy by fiscal discipline and invested its savings abroad (through the creation of a petroleum fund). The spillover-loss effect was limited because losses were substituted for by gains in the highly technological offshore oil extraction sector, which requires more capital than on-land oil extraction. Finally, social norms, transparent democracy, proper monitoring, an effective judicial system, and the wage negotiation system reduced rent seeking behavior, limiting the typical negative effects associated to the resource curse.

The optimal policy response would depend, to some extent, on the type of shock behind the DD. For instance, in case of a surge in aid inflows, the creation of a sovereign wealth fund to be held abroad would not make sense. On the contrary, policies would need to focus on ensuring that the increased inflows are spent adequately. Investments with positive supply side effects, in particular those that would enhance productivity in non-tradable sectors could be helpful to ensure that the increase in aid does not hinder long-run growth.

In case of a positive terms-of-trade or capital inflows shock, policies should focus on mitigating the spending effect and avoiding an excessive increase in aggregate demand, overheating, and inflation pressures—the more so if there is uncertainty about the duration of the shock. Countries that do not want to accept too much real exchange rate appreciation should be ready to tighten fiscal policy. This would be the most reliable way to contain domestic demand, keep inflation in check, and—in the wake of a surge in capital inflows—

avoid an excessive deterioration of the current account. Finally, improving financial regulation and supervision could play an important role in helping to contain credit booms or assets bubbles, reducing the likelihood of boom-bust cycles.

VII. Concluding Remarks

Concerns about sustained adverse growth effects of real appreciation have been explored for many years, going back at least to the "Dutch disease" literature of the early 1980s. The debate continues today, including with a related recent literature that proposes further links from the real exchange rate to growth—but is still far from resolved. While the logic of some of the theoretical arguments for this link is clearly established, these arguments lean heavily on special assumptions about the nature of economic growth. And the evidence seems insufficient: to date, while there are a few exceptions, empirical studies of Dutch disease have focused mainly on how shocks that cause real appreciation may affect the level of traded goods production—rather than on whether this sector has a special role in economic growth, or on whether it is permanently damaged by temporary episodes of real appreciation. Moreover, while the literature on real exchange rate and growth suggests that an overvalued exchange rate hinders growth, DD is in principle an equilibrium phenomenon reflecting changes in fundamentals, and not necessarily implying an overvaluation.

Our survey shows that on the one hand, DD does exist—as the real exchange rate appreciates, there is factor reallocation, and production switches away from manufacturing. On the other hand, exchange rate volatility hampers economic growth. Misalignment of the real exchange rate from its fundamental value also lowers growth. Overvaluations (however defined) are always negative for economic growth, while the evidence on undervaluation is inconclusive.

Should policymakers worry about real exchange rate appreciation? Should they act to prevent an appreciation and potential DD symptoms? As discussed in this paper, the evidence on the impact of DD effects on growth is mainly inconclusive. Moreover, it is worth noting that shocks that cause DD—large capital inflows, export price booms, etc.—are usually associated with periods of economic bonanza. DD effects are an unintended consequence of foreign exchange abundance, but these negative effects would not necessarily offset the beneficial effects of the inflow. The challenge for policymakers is to adequately manage the boom and the risks they come with. Therefore, the optimal policy response would consist of taking advantage of the boom, while at the same time dealing with the undesired consequences that it may cause. When thinking about "what to do" about DD, policymakers should beware—in responding to the effects of the disease—of killing the goose that laid the golden egg.

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