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Sector-specific Dutch Disease effects of the 2003 to 2013 commodity price boom in low- and middle-income countries

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Abstract

The commodity price boom from 2003 to 2013 was the most pronounced one many commodity-exporting countries ever experienced. Therefore, it represents a suitable case for the study of the Dutch Disease; a phenomenon that refers to the deterioration of the non-commodity tradable sectors caused by rising commodity revenue inflows. The Dutch Disease is widely studied. Nevertheless, at least for so called developing countries, the existing literature focuses mainly on the effects of commodity revenue windfalls on the manufacturing sector in relation to the services sector. This paper makes use of the recently published Economic Transformation Database (de Vries et al. 2021) to estimate the effect of commodity price changes on value added in ten non-commodity sectors in a sample of 46 low- and middle-income countries. Thereby, it provides the novelty of more detailed insights into the differentiated effects of the Dutch Disease on different tradable and non-tradable sectors. Panel data for the years from 2000 to 2018 is analyzed via a two-step System-GMM approach. The results show that an increase in commodity prices decreases the relative growth rate of the manufacturing sector in commodity export dependent countries significantly. This confirms the theory of the Dutch Disease. For other tradable sectors, however, no Dutch Disease effects are found. Likewise, construction and partly trade services are the only non-tradable sectors that benefit from rising commodity prices. This result indicates that the exclusive focus on the manufacturing sector by the literature in the field might overestimate Dutch Disease effects. For commodity-dependent low- and middle-income countries the results imply that diversification into tradable sectors other than manufacturing could avoid Dutch Disease effects and lead to more stable economic development. [JEL codes: C33, O11, O13, O14, O57, Q33]

Keywords: Dutch disease, Resource boom, Sectorial value added, Development

1. Introduction

The Dutch Disease is a much-debated economic phenomenon that refers to the deterioration of the non-commodity tradable sectors as a result of rising commodity revenue inflows. Since its theoretical foundation by Corden and Neary in 1982, a distinctive empirical literature that examines this phenomenon has emerged. However, so far, no uniform position about the existence of Dutch Disease effects has distilled from the extensive research (Nülle and Davis 2018). This paper readdresses the topic of the Dutch Disease by analyzing the effect of commodity price changes on the value added in ten economic sectors in low- and middle-income countries. The literature on so called developing countries focuses nearly exclusively on the development of the stylized manufacturing and service sectors as representatives of a tradable and a non-tradable sector when examining Dutch Disease effects (Mien and Goujon 2021). In contrast, the paper at hand emphasizes that also some service sectors can be classified as tradable (Mano and Castillo 2015). For the analysis of these different tradable and non-tradable sectors, the recently created Economic Transformation Database (ETD) (de Vries et al. 2021) is used. It provides data on sectorial value added for 12 economic sectors in 51 countries in Asia, Africa and Latin America. The ETD's sectorial differentiation and the introduction of tradable services allow for a more detailed examination of sectorial varied outcomes of Dutch Disease effects in tradable and non-tradable sectors. By doing this, the paper contributes to a better understanding of the mode of action of the Dutch Disease and constitutes the basis for targeted policies that can help to mitigate Dutch Disease effects in the affected sectors.

The effects of commodity price changes on sectorial value added are observed from 2000 until 2018, a period which includes the 2003 to 2013 commodity price boom as well as the subsequent years. This boom was the most pronounced one many commodity-exporting countries ever experienced (Erten and Ocampo 2013). It should thus provide a very fruitful case for the study of Dutch Disease effects that are related to commodity exports. By expanding the time horizon to the years following the boom, economic developments that occurred simultaneously to the commodity price boom but were not caused by this event, are easier to separate from effects of the boom. Additionally, the country sample includes countries with very different levels of commodity dependency. A comparison between commodity-dependent and non-commodity-dependent countries also helps to isolate the effect of the commodity price boom as the non-commodity-dependent countries serve as a control group. Despite the magnitude of the boom, so far, only few cross country studies of the Dutch Disease include its whole duration and the subsequent years (e.g., Amiri et al. 2019).

The research question *how commodity prices affect the value added in tradable and non-tradable sectors in commodity-dependent, low- and middle-income countries* is examined via a two-step system GMM approach (Blundell and Bond 1998). It is used to analyze panel data for 46 countries from 2000 to 2018. Following the theory of the Dutch Disease, the hypothesis is that all tradable sectors are affected negatively by rising commodity prices, as the real exchange rate appreciates, and export industries become less competitive. Likewise, it is assumed that the analysis will show that non-tradable sectors benefit from commodity windfalls, as the inflowing revenues increase the demand for non-tradable goods and services.

The results however show that manufacturing is the only out of four tradable sectors which is adversely affected by rising commodity prices, whereas construction is the only out of six non-tradable sectors that benefits in case of this event. This highlights that the simple differentiation into tradable and non-tradable sectors is not sufficient to predict the expected relation between commodity windfalls and Dutch Disease effects.

The remainder of the paper is structured as follows. Section 2 presents the underlying theoretical literature of the Dutch Disease and section 3 empirical evidence concerning this phenomenon. In section 4 the data, and in section 5 the methodology are described. The results are presented in section 6 and discussed in section 7. Section 8 concludes the paper.

2. Theoretical background

On first sight, natural resources provide a comparative advantage for resource-rich countries. The extraction and exportation of natural resources provide an additional source of income and attract foreign investment in these countries (Liebenthal et al. 2005). Therefore, according to the commodity export-based development model, in the case of a commodity windfall, the overall economic level raises due to job creation and spillover effects to other sectors. Furthermore, commodity exports provide the state with additional revenue, which enables increased spending on infrastructure, research and education, as well as industrial policy measures. This additional investment can contribute to the upgrading and diversification of domestic production structures (Cameron and Stanley 2017). The resource price boom would thus have a positive impact on economic development in non-commodity sectors due to the increased financial leeway.

In contrast, the theory of the Dutch Disease offers a more critical view on the opportunities of commodity export-led development. The basic model of this theory by Corden and Neary (1982) departs from a three sector economy. The resource sector and the manufacturing sector produce tradable goods, while the service sector produces non-tradable goods.[1] The model further implies that an external shock - like a resource revenue windfall - leads to a boom in the resource sector that causes two effects: The Resource Movement Effect (RME) and the Spending Effect (SE).

As the resource sector expands due to the positive external shock, its demand for labor increases. Wages in this sector rise, leading to the RME, as labor is attracted from the manufacturing and the service sector. This results in de-industrialization, as the output of the manufacturing sector decreases (Corden and Neary 1982).

The SE is based on the economy's increased income from the positive external shock in the resource sector. This income is spent for consumption in the manufacturing and the service sector, increasing demand in both sectors. As manufacturing is tradable, the higher demand can be satisfied via imports; for non-tradable services, this is not possible. Consequently, prices for services rise to neutralize excess demand. Thereby, higher profits in the service sector are generated, which increases labor demand and consequently wages in this sector, shifting labor away from the manufacturing sector. Additionally, prices of non-tradables increase in relation to those of tradables. That is the definition of a real exchange rate appreciation. It leads to de-industrialization in the manufacturing sector as the international competitiveness of the sector is reduced (Corden and Neary 1982).

Combining both effects, the RME and the SE, leads to an even higher real exchange rate appreciation as the increased demand for services is confronted with reduced output of the service sector due to the RME. Consequently, prices for services rise further (Corden and Neary 1982). While the SE and RME both lead to a contraction of manufacturing output, the effect on the service sector depends on the relative strength between the RME and the SE. When the former is stronger, sectorial output gets reduced whereas a more pronounced SE leads to a rise in output in the service sector (Corden and Neary 1982). Empirical observations show that resource extraction is capital intense, and its employment is marginal in comparison to the whole economy (Davis 2011; Cust and Poelhekke 2015). Also, at least for oil, the production of existing oil wells cannot be increased in times of higher commodity prices due to geological reasons. Therefore, in boom times, no additional labor is required for ongoing production (only for the expansion of exploration activity and drilling more labor might be needed) (Anderson et al. 2018). Consequently, the RME is estimated to be rather small in the event of a commodity price boom (Davis 2011). Accordingly, it should be ex-

[1] In the present literature review, services always imply non-tradability. This assumption is then modified in the empirical part of this paper.

pected for the analysis that a commodity price boom affects tradable sectors negatively while it has a positive effect on non-tradable sectors.

The basic Dutch Disease model describes a change in factor allocation that does not imply adverse economic effects. Nevertheless, the Dutch Disease is attributed to be economically challenging. This perception is based on the assumption that some sectors feature higher growth potentials than others. More precisely, the manufacturing sector is perceived to be superior to other sectors. Therefore, a shift from manufacturing production to primary good production and services would have adverse effects on the country's future economic development (Siliverstovs and Herzer 2007). In the model of the Dutch Disease, this concern manifests via the introduction of learning-by-doing. Following this concept, a sector's productivity in one period is defined by its output in the previous period, as more economic activity in the sector offers more possibilities to generate technological progress. Van Wijnbergen (1984a) and Krugman (1987) add this concept to the theoretical Dutch Disease literature and assume that it would only apply to the manufacturing sector. Thus, a temporary shift from the manufacturing sector to the booming sector would not only imply de-industrialization in the current period but also have adverse effects on future development due to missed learning-by-doing opportunities (van Wijnbergen 1984a).

The assumption that there is more learning-by-doing in the manufacturing sector than in commodity sectors is however contested. Torvik (2001) states that the relation of learning-by-doing between the different sectors varies between countries. In any case, there would be learning spillovers between tradable and non-tradable sectors. Additionally, some authors argue that there is no difference between the primary sector and manufacturing regarding learning-by-doing and technological progress (López 2012; Kojo 2014), or that the primary sector (represented in this case by agriculture) is even superior to manufacturing in this regard (Martin and Mitra 2001). Other authors oppose this position by providing evidence that productivity gains are indeed higher in the manufacturing sector (Siliverstovs and Herzer 2007; Murshed and Serino 2011).

The paper at hand focuses on possible Dutch Disease effects in low- and middle-income countries. The theoretical literature emphasizes that the magnitude of Dutch Disease effects might differ between so-called developed and developing countries. Van der Ploeg (2011) and van der Ploeg and Venables (2013) highlight that missed learning-by-doing opportunities might be the main driver of the Dutch Disease in developed countries. Meanwhile, in developing countries, the Dutch Disease might be mainly caused by insufficient absorption capacity in the non-traded sector. In their model, capital is needed as an input for the manufacturing sector and must be produced by the non-tradable sector (e.g., infrastructure, human capital etc.). In developing countries, they argue, the non-tradable sector is not capable to produce enough capital so that the manufacturing sector is not able to expand after the boom. This leads to a real exchange rate appreciation, since the demand for the capital producing non-tradable sector rises.

Furthermore, in comparison to high-income countries, low- and middle-income countries tend to have weaker institutions (Alonso and Garcimartín 2013). From the Resource Curse literature it is known that weak institutions favor rent-seeking and hinder economic growth in countries experiencing a resource windfall (Mehlum et al. 2006; Robinson et al. 2006). Regarding the Dutch Disease, rent-seeking might deviate entrepreneurial resources from productive activities in the manufacturing sector towards more unproductive activities, what weakens the development of the manufacturing sector (Amiri et al. 2019). Bjørnland et al. (2019) focus on another role institutions might play in the context of the Dutch Disease. In their model, the resource movement effect leads to more economic activity in the resource supply industry (in their case oil supply industry) which is tradable, has a high degree of learning-by-doing, and generates productivity gains which spill over to other industries. Under weak institutions, they argue, domestic investment in the oil supply industry does not occur, what prevents its development and the positive spillover-effects of this industry. Therefore, the adverse spending effect might dominate in developing countries with weak institutions while these countries do not benefit from the positive results of the resource movement effect.

Cherif (2013) argues that a larger productivity gap between the country that experiences the boom and its trade partners (what is generally the case for developing countries compared to developed countries) implies a higher wage differential between the two countries. When the windfall consists of one unit of foreign wages, this implies a higher income gain in terms of domestic wages in developing countries than in developed countries. As a result, the SE is more pronounced in a developing country. It leads to a stronger factor shift towards the non-traded sector. When assuming learning-by-doing only in the manufacturing sector, as Cherif (2013) does, this causes a higher productivity loss in a developing country compared to a developed country in a similar situation.

The effect of income inequality on the magnitude of Dutch Disease effects is investigated by Behzadan et al. (2017). In their model a higher income inequality leads to more pronounced Dutch Disease effects. This derives from the assumption that in more unequal societies mostly wealthy and high-income individuals benefit from natural resource windfalls. These people tend to consume proportionally more services than goods what leads to stronger demand for services and a higher real exchange rate appreciation. As the income distribution tends to be more unequal in developing than in developed countries (Roser and Ortiz-Ospina 2013), this indicates that Dutch Disease effects would be more pronounced in the former countries.

These theoretical contributions underline that Dutch Disease effects are especially likely to occur in low- and middle-income countries compared to high-income countries, what highlights the importance of studying specifically these countries.

3. Empirical evidence

Since the early theoretical works of Corden and Neary (1982), Corden (1984) and van Wijnbergen (1984b), a large body of empirical literature exploring the Dutch Disease has evolved. Due to the high number of academic contributions in this field and the specific focus of this paper, this section only presents studies that include non-industrialized countries. Furthermore, it mainly focuses on cross country studies as these provide better possibilities to control for counterfactual scenarios (Nülle and Davis 2018). For more comprehensive literature reviews, the publications by Magud and Sosa (2010), Van der Ploeg (2011), Nülle and Davies (2018) and Mien and Goujon (2021) can be consulted.

Dutch Disease literature studies either the effect of commodity windfalls on the real exchange rate, on tradable sectors, or on both indicators. In the latter case, the real exchange rate is often seen as the transmission channel from commodity windfalls to the contraction of tradable sectors. To review the literature, first studies that examine Dutch Disease effects related to the real exchange rate appreciation are presented, followed by analyses of effects on tradable sectors.

Cashin et al. (2004) observe the long-run relationship of commodity price developments and the real exchange rate in 58 commodity-dependent countries from 1988 to 2002. They detect a positive relationship between rising commodity price and an appreciation of the real exchange rate for about one third of the countries whereas it cannot be observed for the other two thirds. While Cashin et al. (2004) create an index of 44 commodities to account for changes in commodity prices, other authors focus only on oil as the commodity of interest. Korhonen and Juurikkala (2009) find that higher oil prices lead to an appreciation of the real exchange rate in oil exporting countries. Interestingly, for these countries, no effect of GDP per capita on the real exchange is observed. This contradicts the theoretical assumption, that GDP per capita is one major determinant of the real exchange rate (Balassa 1964; Samuelson 1964). According to the authors, this finding highlights that the dependence on oil might be more important for the determination of the real exchange rate in oil exporting countries than usual determinants. Out of 14 oil exporting countries analyzed by Jahan-Parvar and Mohammadi (2011), a long-run correlation between oil prices and the real exchange rate can only be established for Angola, Mexico, Saudi Arabia and Russia. In the short run unidirectional causality from oil prices on the real exchange rate is equally found for four countries (Angola, Colombia, Norway, and Venezuela). In the following year, the same authors published another study, in which only Bolivia, Mexico and Norway (out of 13 oil-exporting countries) exhibit a long-run relationship between oil prices and the real exchange rate (Mohammadi and Jahan-Parvar 2012). Meanwhile, Beverelli et al. (2011) base their analysis on oil discoveries instead of oil price changes. The focus of their paper is on differentiated effects of these discoveries on the real exchange rate, depending on the intensity of the use of resources as inputs in the manufacturing sectors in the observed countries. The authors provide evidence that specialization in oil-intensive manufacturing dampens the real exchange rate appreciation in the aftermath of oil discoveries. One reason for this observation is that when more oil is used domestically, less oil is exported, reducing the upward pressure on the real exchange rate (Beverelli et al. 2011). Overall, these studies with focus on the real exchange rate present rather weak evidence for the Dutch Disease, as links from commodity price rallies to this variable are only partly detected.

In an early study, Spatafora and Warner (1999) use panel regressions with data from 18 oil-exporting countries to examine the effect of oil price rises both on the real exchange rate and on manufacturing value added. While they observe an appreciation of the real exchange rate in 13 of the 18 countries, they do not encounter an adverse effect on value added in the manufacturing sector. Using descriptive statistics, Albrieu (2012) derives a similar result in his study of 19 Latin American countries: Real exchange rate appreciations take place in some of the countries, mostly agriculture and energy exporters, whereas positive commodity price shocks do not have an effect on manufacturing exports. These results indicate that there might be some forces that avoid the transmission of Dutch Disease effects from real exchange rate appreciations to the deterioration of the manufacturing or tradable sectors. Other studies point out that policies can be used to prevent the transmission of these adverse effects (Usui 1997; Lama and Medina 2012; Matsen and Torvik 2005). In contrast, Reisinezhad (2020) indeed finds an appreciation of the real exchange rate that then leads to a contraction of the manufacturing sector in his study of 132 countries. He derives the result that the growth rate decelerates not only in manufacturing, but also in the service sector. The effect is stronger in the manufacturing sector, what coincides with the relative loss of this sector in the theory of the Dutch Disease.

In the literature about the Dutch Disease, oil is the most widely studied commodity. This is likely because oil has by far the highest trading volume of all commodities and thus a predominant economic importance in many countries (Cameron and Stanley 2017). One example of an analysis that focuses on the effect of oil price changes on tradable sectors is the one by Ismail (2010). He examines the effect of these events on the manufacturing sector's output in 90 countries. The result is that a 10% oil price appreciation is associated with a 3.4% reduction in industrial value added and a 3.6% decline in industrial output. Abdlaziz et al. (2018) do not focus on effects of the oil price on the manufacturing sector, but on the likewise tradable agricultural sector. Their analysis of 25 oil exporting countries derives the result that oil price rises indeed lead to a contraction of the agricultural sector.

Studies, that not only examine oil but a larger variety of natural resources, include the one by Harding and Venables (2016). They examine the effect of a windfall in non-renewable resource revenues on exports in 41 countries and conclude that a one US-dollar increase in non-renewable resource revenues decreases other exports by 74 cents. Within these exports, manufacturing is affected more severely than agricultural products and services. According to the authors, the higher level of mobility of the manufacturing sector is a possible explanation for the stronger decline of this sector. Whereas agriculture relies on the soil, manufacturing production facilities can be moved to other countries more easily. This does however not explain the lower impact on tradable services which also have a high level of mobility. The results further point out, that high- and upper-middle income countries face considerably stronger declines in non-resource exports than economically less developed countries. The relatively stronger reaction of the manufacturing sector to commodity export increases may partly explain this observation as the more developed countries account for higher shares of manufacturing exports than lower-middle and low-income countries. Therefore, for the former group, Harding and Venables find a reduction in non-resource exports of 91 cents per one USD in resource exports, whereas for the lower classified countries this reduction amounts only to 47 cents. This result goes hand in hand with the theoretical thoughts of van der Ploeg and Venables presented in section 2, that the loss of learning-by-doing is not so pronounced in developing countries as their economy is less based on manufacturing. Moreover, Amiri et al. (2019) examine 28 natural resource rich countries with different levels of institutional quality. They derive the result that a contraction of the manufacturing sector in relation to the service sector does not occur in countries with strong institutions, while it is apparent in countries with weak institutions. It confirms the theoretical thoughts about the role of institutions presented in section 2. Apart from institutional quality, the type of natural resource exports might also have an influence on the consequences of revenue windfalls. Fernández and Villar (2014) demonstrate this with their study of 104 countries. While manufacturing value added does not contract due to a boom in agricultural exports, it does so for a boom in oil, mining, and mineral exports. However, their choice of the dependent variable to be manufacturing sector's value added as a share of GDP implies that a stronger boom (that generates GDP growth in the booming sectors) leads automatically to a fall in the dependent variable, even though the manufacturing sector might not be affected negatively. In a second estimation, they use the economic complexity index (ECI), developed by Hausmann and Hidalgo (2011) to measure the diversity and the sophistication of a country's export basket, as the dependent variable. The result is similar to the one using manufacturing value added as the dependent variable: Economic complexity declines after a boom in the extractive industries, but not following agricultural booms. Dutch Disease effects on the ECI are also examined by Gala et al. (2017) who find evidence for a diminishing ECI for 122 countries. According to their results, countries with an initially higher ECI experience less pronounced adverse effects than those with a less complex export structure. This would imply, that developing countries, whose export structure is not as sophisticated, would experience higher losses in export complexity than industrialized countries. The results of the cross-country study by Bahar and Santos (2018) confirm that countries with high shares of commodities in their exports have a lower level of diversification in the non-resource exports. These exports are mainly concentrated on capital-intense products and services.

In a meta study, Magud and Sosa (2010) review the findings of over 60 theoretical and empirical papers that cover aid, remittances and resource exportation as causes of Dutch Disease. Over 80% of the results state that a positive shock in one of these types of revenues appreciates the real exchange rate and leads to de-industrialization. While this meta study provides evidence that Dutch Disease phenomena are likely to occur, Nülle and Davis (2018) come to a more skeptical conclusion after reviewing the related literature. They underline the ambiguity and disagreement between the results of the empirical studies.

4. Data

To address the research question of this paper, sectorial value added data is essential. It is taken from the recently published Economic Transformation Database (ETD) by de Vries et al. (2021). This database includes information about value added in twelve sectors: agriculture, mining, manufacturing, utilities, construction, trade services, transport services, business services, financial services, real estate, government services and other services. The high number of sectors included in the ETD is a novelty for comparable data on sectorial value added in low- and middle-income countries. Before, data constraints prevented a differentiated analysis of outcomes in sectorial value added in these countries. Therefore, most studies focus on the manufacturing and services sectors as broader categories (Brahmbhatt et al. 2010). By making use of the ETD, this paper provides a more differentiated view at value added in a higher number of sectors. It entails the advantage that divergent effects of the Dutch Disease on different sectors within the categories of tradable and non-tradable sectors can be identified. This provides the basis for an analysis of the causes of these differentiated outcomes.

This paper follows part of the empiric literature in the field of the Dutch Disease (e.g., Spatafora and Warner 1999; Fernández and Villar 2014; Amiri et al. 2019) by using value added data. In contrast to other studies (e.g., Harding and Venables 2016; Albrieu 2012; Arguello et al. 2016; Meller et al. 2013; Stijns 2003) that rely on export data, the use of value added as dependent variable has at least two advantages. Firstly, it allows for the inclusion of non-tradable sectors, which are not represented in export data. Secondly, value added is more precise than exports as it refers directly to the economic activity in the sector. Exports, on the other hand, do not account for possible re-exports, overestimating the importance of products which rely strongly on previous imports and include low domestic value added (Koopman et al. 2014).

For the analytical purposes of this paper, the respective share of sector j's value added (SVA_j) as percentage of the non-commodity value added of the country's economy is used as the dependent variable (RVA_j):

$$RVA_j = \frac{SVA_j}{SVA_{total} - SVA_{agr} - SVA_{min}} \quad (1)$$

Excluding the booming commodity sectors mining and agriculture from the overall value added is important to avoid price-induced distortions. For example, during the commodity price boom, export prices for fuels increased fivefold, for precious metals 5.8-fold, for base metals 4.5-fold and for agricultural products 2.2-fold (IMF 2022). Thus, price rallies in these sectors would inflate the denominator and thereby reduce the share of value added in the other sectors, even though their contribution to the economy would not decline. This explains why analyses, that rely on sectorial value added as share of GDP as dependent variable, tend to overestimate Dutch Disease effects in the tradable sector. Some studies, mainly focusing on developing countries, examine the effect of non-renewable resource price shocks on the agricultural sector (e.g. Apergis et al. 2014). In many developing countries, the agricultural sector is more pronounced than the manufacturing sector and might be most affected by Dutch Disease effects (Mien and Goujon 2021). To study the effects of the commodity price boom, however, it is more suitable to exclude the agricultural sector from the analysis in the same way as mining is excluded as the boom did not only push prices in the mining sector upwards but, even though to a lesser extent, also in the agricultural sector (Gruss 2014).

The sample size of this paper is limited by the presence of the country in the ETD, which includes 51 countries from Latin America, Asia and Africa and covers the years from 1990 to 2018. As four countries in the ETD were classified as High-Income Countries (HIC) by the World Bank by the beginning of the observation period in 2000, these countries were excluded from the sample as their economic conditions differ considerably from those of countries with lower incomes[2]. The remaining 46 countries are listed in Appendix A with their respective region- and income-classification.

The degree of commodity dependence of the countries in the sample varies widely. To classify the countries, commodity dependence is defined by the share of commodity exports in total exports in the base year 2000. To use the base year for the countries' classification avoids problems of endogeneity that could arise when continuous classifications over the whole observation period would be applied. Following the definition by UNCTAD (2021), countries are classified to be commodity-dependent when their initial share of commodities in exports is above 60%. Data for this variable is taken from The Growth Lab At Harvard University (2019) which offers the advantage that data on trade of goods at the SITC 2-digit-level (Rev. 2) and data on trade of services are combined in one dataset. Unfortunately, data for services is not available for all countries of the sample so that only the share of commodities in exports of goods is considered.

The theory of the Dutch Disease distinguishes between tradable and non-tradable sectors. To be able to test the theory with data for sectorial value added from low- and middle-income countries, the tradability of the different sectors must be assessed. Yet this assessment of sectorial tradability often runs the risk to be rather arbitrary (Ricci et al. 2008). To avoid this problem, the paper at hand resorts to a classification by Mano and Castillo (2015). As shown in table 1, they divide economic sectors in traded and non-traded sectors. Their division is based on the relation of the sectors' exports to the sectors' value added for a sample of 56 countries over 16 years. If this relation is larger than 10%, the sector is classified as tradable, if it is lower, it is non-tradable. In some cases, the ETD uses broader categories for the classification of the economic sectors than Mano and Castillo (2015). Trade services include the categories of wholesale (tradable), retail trade (non-tradable) as well as hotels and restau-

[2] Additionally, Chinese Taipei was excluded from the sample as it is not a member of the World Bank and data for most variables is not available for Chinese Taipei.

rants (non-tradable). Two of the categories are classified as non-tradable by Mano and Castillo whereas one is classified as tradable. Therefore, I assess trade services to be mostly non-tradable. For transport services, the sub-categories land transport, air transport, water transport and supporting and auxiliary transport activities are all classified to be tradable while only post and telecommunications are classified as non-tradable. Consequently, transport services are labeled as mostly tradable.

Table 1: Tradability of economic sectors, following Mano and Castillo (2015)

Sectors	Tradable (T) / Non-tradable (N)
Agriculture	T
Mining	T
Manufacturing	T
Trade services	Mostly N
Transport services	Mostly T
Business services	T
Financial services	T
Utilities	N
Construction	N
Real estate	N
Government services	N
Other services	N

Source: Elaboration by the author, based on information from Mano and Castillo (2015).

Unlike other authors (e.g., Lartey 2011), Mano and Castillo (2015) do not only classify manufacturing, agriculture, and mining as tradable sectors, but also services like transport, business and financial services. Transport and business services are part of the so-called 'industries without smokestacks' (Newfarmer et al. 2018), which are sectors that share important features with the manufacturing sector. These include tradability, high value added per worker, possibilities for technological upgrading, economies of scale and the possibility to employ large numbers of moderately skilled workers (Page 2020). Given these characteristics, these sectors are more comparable to manufacturing than to traditionally defined service sectors and entail important properties for sustained economic development. For the present analysis of possible Dutch Disease effects, this refinement provides important advantages as the evolution of the transport, financial and business sector would have fallen under the category of non-tradable sectors in earlier classifications. This could lead to distortions of the results, mostly because trade in services gained importance in the last decades, growing much stronger than merchandize trade (Page 2020). This growth is mainly led by modern services like computer and information service, financial services, and business services, which outperformed traditional exportable services like travel, tourism, and transport by far. Mostly for low- and middle-income countries with underdeveloped transport infrastructure, trade in these modern service sectors provides an opportunity as transportation costs do not play a major role (Newfarmer et al. 2018). Furthermore, in a less disaggregated view, manufacturing would be the only non-commodity sector that is classified as tradable. Most studies of the Dutch Disease follow this approach which comes with the disadvantage that particular developments of the manufacturing sector might be attributed to the whole tradable sector. The inclusion of tradable services allows for a better understanding if changes in commodity prices affect only the manufacturing sector or the tradable sector as a whole, as predicted by the theory of the Dutch Disease. The same holds for the different non-tradable sectors, which might as well react unanimously to commodity price increases.

Commodity price developments for each country are pictured by the IMF Commodity Terms of Trade Index further described by Gruss and Kebhaj (2019). The index represents the price development for each country's specific commodity export products and accounts for changes in the export composition over time by applying rolling weights. The use of this dataset represents an advantage in comparison to most other studies which focus exclusively on the effect of price changes of one commodity (e.g., oil). It allows for an incorporation of consequences of simultaneous commodity price changes in countries that export several commodities. Additionally, commodity prices can be taken as exogenously given for most countries and commodities (Gruss and Kebhaj 2019). In comparison to commodity revenues and commodity exports which depend on the endogenous decision to increase or decrease extraction, the use of commodity prices as explanatory variable reduces endogeneity issues considerably.

The effect of commodity price rallies on sectorial value added is established with the help of some control variables. These include firstly productivity. A rise in productivity increases the competitiveness of the domestic economy, what should mainly favor the tradable sectors which have to compete internationally. The most common indicator for productivity would be the relation of consumer prices to producer prices (Poncela et al. 2017). However, data for these two variables is not available for all countries of the sample. Thus, in a first step, following some articles of the Dutch Disease literature (e.g., Amuedo-Dorantes and Pozo 2004; Cerutti and Mansilla 2008; Korhonen and Juurikkala 2009; Fernández and Villar 2014; Bahar and Santos 2018), GDP per capita is used as a proxy for this variable. For the study of sector-specific effects, this proxy entails however some disadvantages. Firstly, it only captures overall economic activity and does not provide any information about productivity gains in certain sectors. Secondly, in times of a commodity price boom, it is likely that GDP per capita inflates due to a price effect in the booming sectors without representing any productivity gains. To take these weaknesses of GDP per capita as a proxy for productivity into account, each sector's labor productivity is used to indicate productivity in another specification of the model. Therefore, sectorial employment and sectorial value added data from the ETD are combined to derive the value added per worker.

The second control variable is trade openness, measured by the sum of exports and imports divided by GDP. On the one hand, it indicates how open for trade the country is or to say it in another way, how dependent the country is from trade. At the same time, this can also be perceived as a proxy for the size of the domestic market. When the domestic market is larger, the share of imports and exports to GDP is lower. For tradable sectors, a higher degree of trade openness implies either stronger international competition, as the domestic market is relatively small, and firms have to compete on foreign markets to sell their products and services, or that they have easier access to foreign markets due to export-friendly policies in their country of origin. Therefore, the effect of trade openness on value added in tradable sectors could be positive or negative. The third applied control variable is government expenditure as a share of GDP. If this share rises, it might favor non-tradable sectors as a large share of government expenditure is directed towards construction and government services which are both classified to be non-tradable (Froot and Rogoff 1994; Ricci et al. 2008). For these three control variables (GDP per capita, trade openness, government expenditure), data is taken from World Bank Open Data. The last control variable is institutional quality. As Amiri et al. (2019) show, institutional quality helps to mitigate Dutch Disease effects in the event of commodity windfalls. As the observation period of this paper contains periods of strongly rising commodity prices, it can be expected that a relative decline of tradable sectors is less likely to occur when institutional quality is higher. The index for institutional quality is created by calculating the average of the six indicators for different aspects of institutional quality included in the World Governance Indicators.

5. Methodology

As mentioned in the previous section, the empirical analysis of this paper is carried out with panel data for 46 countries and 19 years (2000 until 2018). For a dynamic panel like this, where previous observations of the dependent variable affect the magnitude of the dependent variable in later observations, the Generalized Method of Moments (GMM) is a commonly used estimation technique. GMM estimators have the advantage that they address potential endogeneity of all regressors and incorporate fixed effects. Also, they can be applied to unbalanced panels. To use a GMM approach, N (in this case the number of countries) must be larger than T (in this case the number of years). Additionally, the number of instruments used to solve the equation cannot be larger than N (Roodman 2009b). The first GMM estimator, the Difference-GMM, was developed by Arellano and Bond (1991). An expansion of this estimator is the System-GMM by Blundell and Bond (1998). Whereas the Difference-GMM estimator includes only lagged levels as instruments, the System-GMM additionally adds lagged differences as instruments of the right-hand side variables (Blundell and Bond 1998). Bond et al. (2001) demonstrate that the System-GMM approach is better suited for certain macroeconomic analyses than the Difference-GMM. Behzadan et al. (2017) confirm this statement for the study of Dutch Disease effects by comparing their results of Difference- and System-GMM estimations. For these reasons, I follow large part of the field’s recent literature (e.g., Rajan and Subramanian 2008; Lartey 2011; Apergis et al. 2014; Behzadan et al. 2017; Anyanwu et al. 2021) and analyze my panel data with the two-step System-GMM estimator. One requirement to use this estimator is that panel data is stationary and does not show a unit root behavior. To test for unit roots, the Im-Pesaran-Shin test for panel data is applied to all variables (Im et al. 2003). As this paper focuses on growth rates and therefore uses first differences, it does not surprise that none of the variables shows a unit root behavior.[3]

The general estimation equation is shown in equation 2:

$$y_{i,t} = \alpha + \delta\, y_{i,t-1} + \beta X'_{i,t} + \mu_i + v_{i,t} \quad (2)$$

where $y_{i,t}$ is the dependent variable that is also defined by its lagged observations. $X'_{i,t}$ is a vector of the included independent variables, α is the constant, and the error term is split into μ_i, representing the country-fixed effects and $v_{i,t}$ including the idiosyncratic shocks. $i = 1, \dots N$ and $t = 1, \dots T$ define the panel data by indicating the countries and the years (Roodman 2009b).

In a GMM approach, possibly endogenous variables are instrumented with their own lags to avoid endogeneity. Each additional lag is an additional instrument that is used for the estimation. In the sample of this paper, T has 19 periods and N includes only 46 countries. The difference between these two numbers is relatively small. When time dummies are used to control for time fixed effects, as it is common in a two-step System-GMM estimation, the number of instruments rises with a larger T. At the same time, the number of instruments must not surpass the size of N to avoid the bias of too many instruments (Roodman 2009a). Thus, in

[3] The results of the unit root test can be found in Appendix B.

this case, it is not possible to use unlimited lags for the endogenous variables. Instead, their number is limited to three lags in this work. While it would be possible to include further lags in the baseline model with few control variables, in the extended models, a larger number of lags would distort the results. To keep the results for the baseline and the extended model comparable, three lags will be used for all estimations.

First differences are used for all variables as the effect of changes in the growth rate of commodity prices on the growth rate of relative sectorial output may yield economically more interesting results than the effects on levels. Three different models are used to analyze this relationship. In the baseline model, the growth rate of relative sectorial value added is estimated by its past growth rate, the commodity price growth rate and the GDP per capita growth rate as a proxy for productivity. To derive the effect of commodity price changes on sectorial value added in commodity-dependent countries, a dummy for commodity dependence as well as an interaction term of said dummy with the commodity price growth rate are both included. Additionally, year dummies are added to control for time fixed effects. For all estimations, robust standard errors are used to control for heteroskedasticity.

The equation for the first model can be described as[4]:

$$\Delta SVA_{j,i,t} = f(\Delta SVA_{j,i,t-1}, \Delta gdp_{i,t}, \Delta compr_{i,t}, comdep_i, comdep_i * \Delta compr_{i,t}, yr^*) \quad (3)$$

This baseline model only takes into account changes in commodity prices and in the countries' productivities. For this specification, no data is missing, and a fully balanced panel can be used. However, it raises doubt whether reducing the model to this minimum could lead to an omitted variable bias, as important control variables might be missing. To avoid this problem, an extended version of the model adds trade openness, government consumption and institutional quality as control variables to the variables already included in the baseline model. While the inclusion of these variables provides more detailed results, the panel becomes unbalanced, as some observations for government consumption and trade openness are missing for a few countries. Additionally, one country has to be dropped. However, the num-

[4] j denominates the different sectors, ΔSVA is the growth rate of the relative share of the sector in total non-resource value added, Δgdp is the growth rate of GDP per capita, $\Delta compr$ is the growth rate of each country's commodity price index, $comdep$ is a dummy variable that takes the value of 1 if commodities account for more than 60% of the country's total exports in the base year 2000, yr are the included year dummies.

ber of missing observations is relatively small, so that the results should still be comparable to the results of the baseline model.[5]

In the first two specifications of the model, productivity is proxied by GDP per capita. Yet this approach may lack accuracy as it only refers to the development of the whole economy but does not include valuable information about changes in sectorial productivity. This shortcoming is addressed in a third specification of the model. By combining sectorial value added and sectorial employment data in the ETD, labor productivity for each sector can be assessed. The third specification of the model replaces the GDP per capita growth rate with the respective labor productivity growth rate of each sector.[6] As sectorial productivity is closely linked to sectorial value added, the lagged value of the sectorial productivity growth rate is used as an endogenous explanatory variable (in the same way as lagged sectorial value added is used).

The main novelty of this paper is that it looks at a wider range of economic sectors than the existing literature in the field does. To compare the sectorial differentiated results with estimations that use a more aggregated view, the estimations are not only run on each of the ten economic sectors, but also, with the same specifications, on the relation of manufacturing to services and the relation of tradable to non-tradable sectors. The ratio between manufacturing and services is the most commonly used dependent variable for Dutch-Disease-related analyses. In this case, it is calculated as the sectorial value added of the manufacturing sector divided by the sum of value added in trade services, transport services, business services, financial services, government services and other services:

$$man\_serv_{i,t} = \frac{SVA_{man,i,t}}{SVA_{tradesv+transpsv+bussv+finsv+govsv+othersv,i,t}} \quad (4)$$

Following the argumentation of Mano and Castillo (2015), some of the services sectors are classified as tradable. A more aggregated look at value added in these categories of tradable and non-tradable sectors is obtained by dividing the sum of value added of manufacturing, financial services, business services and transport services by the sum of value added of trade services, utilities, construction, real estate, government services and other services:

$$trade\_nontrade_{i,t} = \frac{SVA_{man+finsv+bussv+transpsv,i,t}}{SVA_{tradesv+uti+cons+realest+govsv+othersv,i,t}} \quad (5)$$

[5] Data is missing for: Openness and government consumption: Ethiopia: 2000-2010; Lesotho: 2000-2006; Malawi: 2000-2018 (dropped as data misses for the whole observation period); Government consumption: Myanmar: 2000-2009; Zambia: 2000-2009.
[6] Data for productivity in the real estate sector is missing for the whole observation period for Colombia, Ecuador, and India; for Senegal from 2000-2005 and for Laos in 2005.

For these two broader categories, no sectorial productivity data is available. Therefore, the third specification of the model is not applied to these dependent variables.

The Arellano-Bond test for AR (2) and the Hansen J test are performed to test if the results of the two-step System-GMM estimation are econometrically reliable. The former tests for autocorrelation. Its null hypothesis states that second-order serial correlation is absent (Arellano and Bond 1991). If the null hypothesis is not rejected, autocorrelation is not problematic in the analyzed data. The Hansen J test controls for model overspecification and the exogeneity of all used instruments. If the null hypothesis that all instruments are exogenous is rejected, the results are invalid. On the other hand, the Chi^2 value for the Hansen test should also not be too close to one. This would indicate that too many instruments might have inflated the value of the Hansen test. In this case the test results are unreliable (Roodman 2009a). There is, however, no exactly specified critical value that indicates a too high value of the Hansen test. The difficulty for this paper is that the same estimation is applied to ten to twelve different dependent variables. As the observations of the different dependent variables are not distributed in the same way, also their results for the Arellano-Bond test and the Hansen J test differ. While autocorrelation can be ruled out in all cases, in some cases the values for the Hansen test are very high for individual estimations. This casts doubt on the exogeneity of the instruments and on the model identification. However, it is preferred to use the same equation for all dependent variables to enable a better comparison than to have more reliable values for the Hansen test in individual cases. The results of the estimations where the Hansen test is close to one should be interpreted carefully.

6. Results

Table 2 shows the results for the baseline model, in which the effect of commodity price growth rates on relative sectorial value added growth rates is estimated by using the growth rate of GDP per capita as a proxy for productivity. The interaction term of the commodity price growth rate with the commodity dependence dummy indicates the effect of commodity price changes in commodity-dependent countries. According to the results in table 2 in commodity-dependent countries, a rise in the commodity price growth rate significantly lowers the growth rates of manufacturing in relation to services as well as aggregated tradable to non-tradable sectors at the 99% and 95% confidence level respectively. A one percentage point increase of this explanatory variable causes these two dependent variables to decrease by approximately 0.2 percentage points. This result confirms the expectations of the theory of the Dutch Disease. When looking at the more disaggregated results, it becomes however clear that the different tradable sectors do not react homogenously to a rising commodity price growth rate. While the relative manufacturing growth rate is affected adversely at the one percent significance level with a strong decline of 0.35 percentage points, financial- and transport services do not react in a significant way. Even though the effect on business services is also not significant, it even has a positive sign. For the non-tradable sectors, the results are also heterogenous. The relative growth rate of construction reacts strongly and positively with a 0.46 percentage point increase to a one percentage point increase of the commodity price growth rate. Of the other non-tradable sectors only trade services respond significantly. Contrary to expectations, the sign for utilities is even negative.[7]

In the extended model, the growth rates of trade openness, government expenditure and institutional quality are added as further control variables. Table 3 contains the results. The magnitude of the effect of an increase of the commodity price growth rate on the growth rates of manufacturing to services and tradable to non-tradable sectors diminishes in comparison to model one, what also leads to less significant, respectively insignificant results. In model one, it was derived that manufacturing and construction are the sectors that are most significantly affected by rising commodity prices. This remains valid in model two, also with comparable magnitude but at a lower significance level of 5%. The effect on trade services is not significant anymore and the insignificant results for financial services, real estate and government services changed their sign. In countries which do not depend on commodities, in this model, an increase in commodity prices has only a significant and negative effect on the relative growth rate of the construction sector. As expected, rising government expenditure has a positive and significant effect on government services, whereas the other two additionally added control variables have no significant impact.[8]

In the third specification, the proxy for productivity is changed from GDP per capita to sectorial labor productivity. Therefore, it includes only the ten sectors for which data for sectorial productivity is available and leaves the two aggregated dependent variables out. As it can be noticed in table 4, the results are quite robust to this change, as most values for the increase of commodity prices in commodity-dependent countries remain similar. Only the magnitude of the effect of commodity price rises on the construction sector in commodity-dependent countries falls from 0.43 to 0.34 going hand in hand with a lower significance level of 10%.[9]

[7] For this specification, the results for manufacturing to services, construction, and government services should be interpreted with care because of their high Chi² values in the Hansen test.
[8] With this specification, the results for trade services and financial services should be interpreted carefully due to their high Chi² values for the Hansen test.
[9] With this specification, only the Hansen Chi² value for financial services remains high and questions the reliability of the results.

To test for the robustness of the results of the three empirical models, the same estimations are repeated with two additional variables. To account for the heterogeneity of the countries' level of development, income level dummies (low income, lower middle income, upper middle income) are added to the models. Moreover, the lagged commodity price growth rate is included as an additional explanatory variable. It could be possible that the effects of commodity price changes do not manifest directly but with a delay. The results of the three models remain robust to the addition of these variables. The only major difference is that the effect of commodity price changes on trade services in commodity-dependent countries becomes significant at the 10% level in the newly specified models 2 and 3, as it already is in the baseline model.[10]

[10] The results of the specifications with income level dummies and lagged commodity price changes can be found in Appendix C.

Table 2: Model 1: Baseline Model[11]

VARIABLES	(1) man_serv_gr	(2) trade_nontrade_gr	(3) relmangr	(4) relbussvgr	(5) relfinsvgr	(6) reltranspsvgr	(7) relutigr	(8) relconsgr	(9) reltradesvgr	(10) relrealestgr	(11) relgovsvgr	(12) relothersvgr
L.man_serv_gr	0.211***											
	(0.077)											
comprgr	0.171**	0.213**	0.310**	-0.157	-0.279	0.069	0.137	-0.586***	-0.167	0.342	-0.138	-0.331
	(0.075)	(0.098)	(0.139)	(0.224)	(0.257)	(0.136)	(0.584)	(0.159)	(0.151)	(0.370)	(0.315)	(0.237)
comdep	0.001	-0.338*	-0.019	-1.164*	-0.524	0.525	0.194	1.858***	0.292	-1.528*	-0.030	-1.518
	(0.112)	(0.183)	(0.330)	(0.584)	(0.961)	(0.394)	(0.944)	(0.508)	(0.249)	(0.801)	(0.392)	(1.139)
1.comdep#c.comprgr	-0.204***	-0.217**	-0.359***	0.249	-0.045	-0.064	-0.169	0.465***	0.264*	0.081	0.154	0.080
	(0.067)	(0.100)	(0.111)	(0.205)	(0.275)	(0.162)	(0.579)	(0.145)	(0.153)	(0.420)	(0.250)	(0.233)
gdpgr	0.123***	0.148***	0.252***	0.065	-0.019	-0.028	-0.226	0.589***	0.023	-0.208	-0.108	-0.034
	(0.035)	(0.053)	(0.074)	(0.142)	(0.200)	(0.078)	(0.137)	(0.152)	(0.084)	(0.149)	(0.224)	(0.176)
L.trade_nontrade_gr		0.104**										
		(0.050)										
L.relmangr			0.182***									
			(0.061)									
L.relbussvgr				0.092								
				(0.088)								
L.relfinsvgr					-0.038							
					(0.066)							
L.reltranspsvgr						-0.049						
						(0.087)						
L.relutigr							-0.028					
							(0.034)					
L.relconsgr								0.014				
								(0.057)				
L.reltradesvgr									0.096**			
									(0.041)			
L.relrealestgr										-0.134*		
										(0.070)		
L.relgovsvgr											-0.010	
											(0.071)	
L.relothersvgrp												-0.101**
												(0.049)
Observations	872	872	872	872	872	872	872	872	872	872	872	872
Number of idnr	46	46	46	46	46	46	46	46	46	46	46	46
F	11.84	8.824	11.83	7.590	9.780	2.467	5.019	9.341	4.386	10.63	5.285	2.656
F_p	0	3.89e-10	0	4.49e-09	6.86e-11	0.00474	1.95e-06	1.50e-10	1.13e-05	0	9.70e-07	0.00250
ar2p	0.347	0.986	0.210	0.192	0.654	0.0893	0.305	0.112	0.969	0.331	0.659	0.514
hansenp	0.803	0.423	0.146	0.296	0.468	0.183	0.249	0.967	0.779	0.580	0.967	0.210

Standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Variable names: comprgr = Growth rate (GR) of the commodity price index, comdep = Dummy for commodity dependence, gdpgr = GR of GDP per capita, man_serv_gr = GR of manufacturing to services ratio, trade_nontrade_gr = GR of tradable to non-tradable sector ratio, relmangr = relative GR of manufacturing, relbussvgr = rel. GR of business services, relfinsvgr = rel. GR of financial services, reltranspsvgr = rel. GR of transport services, relutigr = rel. GR of utilities, relconsgr = rel. GR of construction, reltradesvgr = rel. GR of trade services, relrealestgr = rel. GR of real estate, relgovsvgr = rel. GR of government services, relothersvgr = rel. GR of other services.

[11] In all results, the values for the intercept and the year dummies are suppressed.

Table 3: Model 2 with trade openness, government expenditure and institutions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	man_serv_gr	trade_nontrade_gr	relmangr	relbussvgr	relfinsvgr	reltranspsvgr	relutigr	relconsgr	reltradesvgr	relrealestgr	relgovsvgr	relothersvgr
L.man_serv_gr	0.105											
	(0.069)											
comprgr	0.110	0.066	0.187	-0.285	-0.376	0.072	0.149	-0.717***	-0.044	0.303	0.182	-0.315
	(0.092)	(0.116)	(0.176)	(0.229)	(0.254)	(0.150)	(0.770)	(0.214)	(0.131)	(0.562)	(0.179)	(0.269)
comdep	-0.032	-0.312*	-0.122	-1.349*	-0.299	0.645*	0.522	2.509***	0.183	-3.236***	-0.210	-1.160
	(0.134)	(0.158)	(0.384)	(0.722)	(0.877)	(0.382)	(0.865)	(0.654)	(0.256)	(1.047)	(0.441)	(0.779)
1.comdep #c.comprgr	-0.164*	-0.130	-0.322**	0.305	0.190	-0.050	-0.024	0.435**	0.217	-0.267	-0.092	0.022
	(0.089)	(0.128)	(0.157)	(0.238)	(0.309)	(0.171)	(0.754)	(0.214)	(0.132)	(0.577)	(0.181)	(0.258)
gdpgr	0.082*	0.046	0.239**	-0.100	-0.320**	-0.055	-0.250	0.615***	0.061	-0.452*	-0.315***	-0.199*
	(0.045)	(0.038)	(0.091)	(0.098)	(0.158)	(0.094)	(0.166)	(0.168)	(0.064)	(0.226)	(0.097)	(0.110)
D.openn	0.020	0.038	0.025	0.017	-0.097	-0.026	0.014	0.063	-0.012	0.175	-0.005	0.060
	(0.020)	(0.028)	(0.055)	(0.053)	(0.064)	(0.037)	(0.101)	(0.074)	(0.026)	(0.168)	(0.069)	(0.061)
D.govexp	-0.029	-0.036	0.074	-0.157	0.345	-0.047	-0.237	-0.307	-0.003	-0.206	0.416**	-0.273
	(0.056)	(0.062)	(0.176)	(0.307)	(0.328)	(0.161)	(0.548)	(0.276)	(0.140)	(0.302)	(0.198)	(0.176)
D.Institutions	-0.497	-0.385	-0.736	-0.072	1.391	-0.279	-1.861	-1.122	3.048	5.950	1.127	-0.737
	(0.843)	(1.219)	(1.967)	(4.438)	(4.938)	(3.231)	(6.356)	(4.330)	(1.865)	(6.412)	(2.194)	(3.131)
L.trade_nontrade_gr		0.073										
		(0.055)										
L.relmangrp			0.059									
			(0.087)									
L.relbussvgrp				0.104								
				(0.082)								
L.relfinsvgrp					0.048							
					(0.104)							
L.reltranspsvgrp						-0.021						
						(0.063)						
L.relutigrp							-0.070**					
							(0.032)					
L.relconsgrp								0.075				
								(0.075)				
L.reltradesvgrp									0.051			
									(0.052)			
L.relrealestgrp										-0.224***		
										(0.080)		
L.relgovsvgrp											-0.113	
											(0.131)	
L.relothersvgrp												-0.090
												(0.063)
Observations	688	688	688	688	688	688	688	688	688	688	688	688
Number of idnr	45	45	45	45	45	45	45	45	45	45	45	45
F	9.756	7.032	8.704	6.010	13.92	7.160	5.212	5.307	7.235	4.574	5.514	2.624
F_p	9.95e-11	1.88e-08	6.56e-10	1.91e-07	0	1.43e-08	1.38e-06	1.08e-06	1.22e-08	7.59e-06	6.40e-07	0.00293
ar2p	0.439	0.655	0.418	0.0971	0.844	0.0755	0.421	0.459	0.353	0.276	0.854	0.631
hansenp	0.128	0.612	0.120	0.278	0.933	0.423	0.372	0.408	0.838	0.138	0.218	0.494

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

New Variables: D.openn = Growth rate (GR) of trade openness, D.govexp = GR of government expenditure, D.Institutions = GR of institutional quality.

Table 4: Model 3 with sectorial labor productivity

VARIABLES	(1) relmangr	(2) relbussvgr	(3) relfinsvgr	(4) reltranspsvgr	(5) relutigr	(6) relconsgr	(7) reltradesvgr	(8) relrealestgr	(9) relgovsvgr	(10) relothersvgr
L.relmangrp	0.080									
	(0.077)									
comprgr	0.167	-0.228	-0.286	-0.025	0.241	-0.549***	-0.108	0.384	0.200	-0.148
	(0.184)	(0.230)	(0.303)	(0.139)	(0.677)	(0.166)	(0.170)	(0.590)	(0.151)	(0.344)
comexp2000dum	-0.063	-1.056	0.892	0.903**	0.851	1.971***	0.302	-3.592***	0.043	-0.679
	(0.390)	(0.756)	(0.706)	(0.442)	(0.898)	(0.669)	(0.260)	(1.191)	(0.345)	(0.848)
1.comexp2000dum#c.comprgr	-0.342**	0.238	0.164	-0.056	-0.005	0.348*	0.270	-0.341	-0.106	-0.094
	(0.164)	(0.235)	(0.293)	(0.192)	(0.666)	(0.178)	(0.165)	(0.618)	(0.163)	(0.335)
D.ProdMan	1.011***									
	(0.288)									
D.openn	0.019	0.036	-0.046	-0.020	0.040	0.060	-0.005	0.150	0.032	0.077
	(0.054)	(0.048)	(0.051)	(0.037)	(0.094)	(0.074)	(0.031)	(0.157)	(0.060)	(0.062)
D.govexp	0.025	-0.081	0.172	-0.071	-0.200	-0.209	-0.032	-0.253	0.455**	-0.191
	(0.156)	(0.293)	(0.246)	(0.188)	(0.543)	(0.278)	(0.153)	(0.342)	(0.204)	(0.179)
D.Institutions	-0.606	-0.146	1.259	-0.894	-4.174	-19.414	3.256	2.906	-1.055	-1.402
	(1.749)	(4.773)	(4.540)	(3.251)	(5.794)	(50.378)	(2.322)	(8.031)	(1.974)	(3.157)
L.relbussvgrp		0.097								
		(0.079)								
D.ProdBussv		0.256								
		(0.341)								
L.relfinsvgrp			0.043							
			(0.079)							
D.ProdFinsv			0.484***							
			(0.088)							
L.reltranspsvgrp				-0.040						
				(0.068)						
D.ProdTranspsv				1.097***						
				(0.361)						
L.relutigrp					-0.075**					
					(0.036)					
D.ProdUti					0.116**					
					(0.053)					
L.relconsgrp						0.071				
						(0.232)				
D.ProdCons						2.628				
						(2.391)				
L.reltradesvgrp							0.034			
							(0.062)			
D.ProdTradesv							0.832			
							(0.719)			
L.relrealestgrp								-0.218***		
								(0.079)		
D.ProdRealest								-0.000		
								(0.001)		
L.relgovsvgrp									-0.083	
									(0.111)	
D.ProdGovsv									0.435	
									(0.538)	
L.relothersvgrp										-0.077
										(0.069)
D.ProdOthersv										0.440
										(0.269)
Observations	688	688	688	688	688	688	688	634	688	688
Number of idnr	45	45	45	45	45	45	45	42	45	45
F	7.435	6.369	24.23	3.193	4.659	8.230	6.668	12.33	5.000	3.705
F_p	8.00e-09	8.23e-08	0	0.000460	6.00e-06	1.62e-09	4.18e-08	0	2.40e-06	9.38e-05
ar2p	0.864	0.111	0.736	0.145	0.431	0.554	0.211	0.283	0.846	0.619
hansenp	0.257	0.395	0.932	0.175	0.481	0.567	0.419	0.212	0.424	0.389

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

New Variables: D.ProdMan = Growth rate of the labor productivity of the manufacturing sector, ...

7. Discussion

Overall, the models, applied to analyze the effect of commodity price rises on sectorial value added in different sectors, provide relative similar results. Yet the baseline model and the extended model diverge in that the effect of commodity price changes on the relation of tradable to non-tradable sectors switched from significant (baseline model) to insignificant (extended model). Apart from that, the results of all models highlight, that manufacturing and construction are the two sectors that are most affected by changes in commodity prices. At the same time, other tradable and non-tradable sectors (except for trade services in some specifications) do not experience significant changes. This is an interesting result as the more aggregated view at the manufacturing to services ratio (widely used as proxy for tradable to non-tradable sectors) would suggest that tradable sectors generally decline in relation to non-tradable sectors. The more disaggregated view at the different sectors points however out that this effect is mainly concentrated on the manufacturing and construction sector. It raises the question in how far these two sectors differ from other tradable, respectively non-tradable sectors.

One possible explanation why construction is affected positively by increases in commodity prices is based on that a considerably large part of commodity revenues is spent by the government. Governments obtain commodity revenues via taxes, royalties and state-owned companies and thereby benefit from the commodity price boom (Gómez Sabaíni et al. 2015). Generally, governments tend to spend large shares of their expenditure in the construction and government services sectors (Ricci et al. 2008). Therefore, it does not surprise that higher revenues from commodity windfalls are channeled through the government towards the construction sector. This argumentation does however not explain why there is no positive effect of rising commodity prices on the government services sector. Another possible explanation for the positive reaction of the construction sector comes from political sciences: when a commodity price boom takes place, the population expects to benefit from this boom. Therefore, the government might have an incentive to spend parts of the revenues in a way that the population strongly perceives the benefits (Gupta and Miranda 1991; Paldam 2013). Construction is a very visible sector which creates noticeable changes relatively fast. Therefore, from a populist perspective, the government might favor investments in the construction sector over investments in other sectors, which could be less visible. Apart from that, also private actors can contribute to the upswing of the construction sector. In comparison to other sectors, the construction sector is more sensitive to boom-and-bust cycles as investments in this sector imply relatively high costs (e.g., the construction of a house), which are more likely to be financeable in boom times (Pheng and Hou 2019). During a commodity price windfall, income flows into the country facilitate these high-cost investments in the construction sector.

The question remains why the results indicate that manufacturing is the only tradable sector that suffers from rising commodity prices and not all tradable sectors as the theory of the Dutch Disease would predict. Harding and Venables (2016) explain that manufacturing is more mobile than agricultural production and can therefore move more easily to other countries. This possibility to relocate implies a stronger adverse reaction to commodity price changes. Concerning the results of this study, however, this explanation does not hold. Financial services, business services and transport services, which are the other tradable sectors included in this study, are all likely to have a higher level of mobility than the manufacturing sector, as they need less machines and sophisticated production sites.

A more plausible explanation could be that a larger share of the goods produced by the manufacturing sector is tradable. All observed sectors represent the aggregation of different industries whose products and services are not equally likely to be traded. In the assessment of tradability by Mano and Castillo (2015), the five industries with the highest degree of tradability are all part of the manufacturing sector. Consequently, it could be that manufacturing has a higher degree of tradability than the other tradable sectors and is therefore the only sector that is negatively affected by Dutch Disease effects. Apart from this possible explanation however, the results of this paper highlight, that the tradable sector does not react homogenously to commodity price increases. The model of the Dutch Disease works with the simplified assumption that manufacturing represents the whole tradable sector. This assumption is adopted by empirical studies, which focus almost exclusively on the analysis of the manufacturing sector. Therefore, both, theory and empirics might overestimate Dutch Disease effects. The results for the only sector that is adversely affected are extrapolated to several other sectors which themselves are not negatively affected by rising commodity prices.

In contrast to most of the studies in this field, this paper includes a control group of non-commodity-dependent countries. It should be expected that commodity price increases do not have macroeconomic effects in these countries. The results of this paper show that this holds partly true. The only sector that is consistently and significantly affected by commodity price changes is the construction sector. It’s relative growth rate declines in all models. The theoretical explanation for this result could be that rising commodity prices push the costs of construction materials upwards. That turns construction relatively more expensive and reduces investment in this sector.

8. Conclusion

This paper studies the sectorial differentiated outcomes of commodity price increases over the first 19 years of the 21. century. With the commodity price boom from 2003 to 2013, this period contains the most pronounced increase in commodity prices to date. The main novelty of the paper at hand is that it focuses on ten different economic sectors in low- and middle-income countries. Thereby, it is capable to carry out a more detailed analysis of possible Dutch Disease effects. The results of the paper provide first of all evidence for the existence of Dutch disease effects for a country sample and a time period that have barely been studied so far. Confirming other studies and the theory of the Dutch Disease, in this paper a significant and negative effect of commodity price increases on the growth rate of the manufacturing sector is found. However, the two-step System-GMM estimations point out that out of the four tradable sectors included in the analysis, manufacturing is the only sector that is consistently negatively affected by commodity price increases. The theory of the Dutch Disease would predict this result for all tradable sectors. Additionally, construction (and trade services) is the only out of six non-tradable sectors that benefit significantly from the rise of commodity prices. A comparison of these disaggregated results with more general results of the manufacturing to services ratio demonstrates the importance of taking the disaggregated view into consideration. The commonly used aggregated classifications indicate that the whole tradable sector suffers from Dutch Disease phenomena in the case of a commodity price boom. The sectorial differentiated results however provide the insight that these results might overestimate Dutch Disease effects as the particularly adverse results for manufacturing are extrapolated to other sectors which themselves do not suffer from the Dutch Disease. As most of the literature in the field focuses only on the manufacturing sector, the results of this paper question the reliability of these studies in providing information about Dutch Disease effects on the tradable sector in general. On the other hand, this paper's disaggregated results offer relevant information for policy makers in low- and middle-income countries who want to apply targeted policies to avoid Dutch Disease effects during a commodity price boom. For example, the diversification into tradable sectors that are neither commodities nor manufacturing, as e.g., the so-called industries without smokestacks, can help to avoid Dutch Disease effects in times of commodity price booms. For commodity-dependent countries, a strengthening of these sectors could therefore enable more stable economic development.

Apart from some initial thoughts about possible explanations for the differentiated responses of individual sectors within the tradable respectively non-tradable sectors, this paper leaves the question in how far manufacturing and construction are different from other sectors within their respective classification for further research. It would be important to study the reasons for these differentiated results in more detail to achieve a better understanding of the mode of action of the Dutch Disease. The results of this paper point out that the simple differentiation between tradable and non-tradable sectors is not sufficient to explain how sectors react to a commodity windfall.

Furthermore, it would be interesting to further disaggregate the individual sectors to obtain more information about which industries or services are particularly affected by Dutch Disease effects. Ismail (2010) does this for eight different industries within the manufacturing sector, but it would also be promising to obtain more knowledge on the industry level from other sectors.

Bibliography

Abdlaziz, Rizgar Abdlkarim, N A M Naseem, and Ly Slesman. 2018. "Dutch Disease Effect of Oil Price on Agriculture Sector: Evidence from Panel Cointegration of Oil Exporting Countries." *International Journal of Energy Economics and Policy* 8 (5): 10.

Albrieu, Ramiro. 2012. "La Macroeconomía de Los Recursos Naturales En América Latina." In *Los Recursos Naturales Como Palanca Del Desarrollo En América Del Sur: Ficción o Realidad?*, edited by Ramiro Albrieu, Andrés López, and Guillermo Rozenwurcel, 105–53. Montevideo: Red Mercosur. https://www.redsudamericana.org/sites/default/files/doc/Los%20RecursosNaturalesPalancaDesarrollo.pdf.

Alonso, José Antonio, and Carlos Garcimartín. 2013. "The Determinants of Institutional Quality. More on the Debate." *Journal of International Development* 25 (2): 206–26. https://doi.org/10.1002/jid.1710.

Amiri, Hossein, Farzaneh Samadian, Masoud Yahoo, and Seyed Jafar Jamali. 2019. "Natural Resource Abundance, Institutional Quality and Manufacturing Development: Evidence from Resource-Rich Countries." *Resources Policy* 62 (August): 550–60. https://doi.org/10.1016/j.resourpol.2018.11.002.

Amuedo-Dorantes, Catalina, and Susan Pozo. 2004. "Workers' Remittances and the Real Exchange Rate: A Paradox of Gifts." *World Development* 32 (8): 1407–17. https://doi.org/10.1016/j.worlddev.2004.02.004.

Anderson, Soren T., Ryan Kellogg, and Stephen W. Salant. 2018. "Hotelling under Pressure." *Journal of Political Economy* 126 (3): 984–1026. https://doi.org/10.1086/697203.

Anyanwu, Ugochukwu Michael, Amarachukwu Anthony Anyanwu, and Andrzej Cieślik. 2021. "Does Abundant Natural Resources Amplify the Negative Impact of Income Inequality on Economic Growth?" *Resources Policy* 74 (December): 102229. https://doi.org/10.1016/j.resourpol.2021.102229.

Apergis, Nicholas, Ghassen El-Montasser, Emmanuel Sekyere, Ahdi N. Ajmi, and Rangan Gupta. 2014. "Dutch Disease Effect of Oil Rents on Agriculture Value Added in Middle East and North African (MENA) Countries." *Energy Economics* 45 (September): 485–90. https://doi.org/10.1016/j.eneco.2014.07.025.

Arellano, Manuel, and Stephen Bond. 1991. "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *Review of Economic Studies* 58 (2): 277–97.

Arguello, Ricardo, Dora Elena Jiménez Giraldo, Edwin Esteban Torres, and Monica Gasca. 2016. "Dutch Disease, Informality and Employment Intensity in Colombia." *PEP Working Paper Series* 2016 (7). https://doi.org/10.2139/ssrn.3167310.

Bahar, Dany, and Miguel A. Santos. 2018. "One More Resource Curse: Dutch Disease and Export Concentration." *Journal of Development Economics* 132 (May): 102–14. https://doi.org/10.1016/j.jdeveco.2018.01.002.

Balassa, Bela. 1964. "The Purchasing-Power Parity Doctrine: A Reappraisal." *Journal of Political Economy* 72 (6): 584–96. https://doi.org/10.1086/258965.

Behzadan, Nazanin, Richard Chisik, Harun Onder, and Bill Battaile. 2017. "Does Inequality Drive the Dutch Disease? Theory and Evidence." *Journal of International Economics* 106 (May): 104–18. https://doi.org/10.1016/j.jinteco.2017.02.003.

Beverelli, Cosimo, Salvatore Dell'Erba, and Nadia Rocha. 2011. "Dutch Disease Revisited. Oil Discoveries and Movements of the Real Exchange Rate When Manufacturing Is Resource-Intensive." *International Economics and Economic Policy* 8 (2): 139–53. https://doi.org/10.1007/s10368-011-0190-3.

Bjørnland, Hilde C., Leif Anders Thorsrud, and Ragnar Torvik. 2019. "Dutch Disease Dynamics Reconsidered." *European Economic Review* 119 (October): 411–33. https://doi.org/10.1016/j.euroecorev.2019.07.016.

Blundell, Richard, and Stephen Bond. 1998. "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models." *Journal of Econometrics*, no. 87: 115–43.

Bond, Stephen, Anke Hoeffler, and Jonathan Temple. 2001. "GMM Estimation of Empirical Growth Models." *Economics Papers, Economics Group, Nuffield College, University of Oxford* 2001 (W21).

Brahmbhatt, Milan, Otaviano Canuto, and Ekaterina Vostroknutova. 2010. "Dealing with Dutch Disease." *World Bank Economic Premise* 2010 (16): 7.

Cameron, Peter D, and Michael C Stanley. 2017. *Oil, Gas, and Mining*. Washington, D.C.: World Bank Group.

Cashin, Paul, Luis Felipe Céspedes, and Ratna Sahay. 2004. "Commodity Currencies and the Real Exchange Rate." *Journal of Development Economics* 75 (1): 239–68.

Cerutti, Eugenio, and Mario Mansilla. 2008. "Bolivia: The Hydrocarbons Boom and the Risk of Dutch Disease." *IMF Working Papers* 08 (154). https://doi.org/10.5089/9781451870121.001.

Cherif, Reda. 2013. "The Dutch Disease and the Technological Gap." *Journal of Development Economics* 101 (March): 248–55. https://doi.org/10.1016/j.jdeveco.2012.10.010.

Corden, Max. 1984. "Booming Sector and Dutch Disease Economics: Survey and Consolidation." *Oxford Economic Papers* 36 (3): 359–80. https://doi.org/10.1093/oxfordjournals.oep.a041643.

Corden, Max, and Peter Neary. 1982. "Booming Sector and De-Industrialisation in a Small Open Economy." *The Economic Journal* 92 (368): 825–48. https://doi.org/10.2307/2232670.

Cust, James, and Steven Poelhekke. 2015. "The Local Economic Impacts of Natural Resource Extraction." *Annual Review of Resource Economics* 7 (1): 251–68. https://doi.org/10.1146/annurev-resource-100814-125106.

Davis, Graham. 2011. "The Resource Drag." *International Economics and Economic Policy* 8 (2): 155–76. https://doi.org/10.1007/s10368-011-0193-0.

de Vries, Gaaitzen, Linda Arfelt, Dorothea Drees, Mareike Godemann, Calumn Hamilton, Bente Jessen-Thiesen, Ahmet Ihsan Kaya, Hagen Kruse, Emmanuel Mensah, and Pieter Woltjer. 2021. "The Economic Transformation Database (ETD): Content, Sources, and Methods." UNU-WIDER. https://doi.org/10.35188/UNU-WIDER/WTN/2021-2.

Erten, Bilge, and José Antonio Ocampo. 2013. "Super Cycles of Commodity Prices Since the Mid-Nineteenth Century." *World Development* 44 (April): 14–30. https://doi.org/10.1016/j.worlddev.2012.11.013.

Fernández, Cristina, and Leonardo Villar. 2014. "Bonanzas Temporales de Recursos: Una Perspectiva Global." Bogotá: Fedesarollo. https://www.repository.fedesarrollo.org.co/bitstream/handle/11445/2910/LIB_2014_Bonanzas%20temporales_Completo.pdf?sequence=2&isAllowed=y.

Froot, Kenneth, and Kenneth Rogoff. 1994. "Perspectives on PPP and Long-Run Real Exchange Rates." w4952. Cambridge, MA: National Bureau of Economic Research. https://doi.org/10.3386/w4952.

Gala, Paulo, Jhean Camargo, and Guilherme Magacho. 2017. “The Resource Curse Reloaded: Revisiting the Dutch Disease with Economic Complexity Analysis.” *Real World Economics Review*, no. 81.

Gómez Sabaíni, Juan Carlos, Juan Pablo Jiménez, and Ricardo Martner. 2015. *El impacto fiscal de la explotación de los recursos naturales no renovables en los países de América Latina y el Caribe*. Santiago de Chile: CEPAL.

Gruss, Bertrand. 2014. “After the Boom–Commodity Prices and Economic Growth in Latin America and the Caribbean.” *IMF Working Papers* 14 (154).

Gruss, Bertrand, and Suhaib Kebhaj. 2019. “Commodity Terms of Trade: A New Database.” *IMF Working Papers* 19 (21).

Gupta, Sanjeev, and Kenneth M. Miranda. 1991. *Commodity Booms and Government Expenditure Responses*. Washington, D.C: International Monetary Fund.

Harding, Torfinn, and Anthony Venables. 2016. “The Implications of Natural Resource Exports for Nonresource Trade.” *IMF Economic Review* 64 (2): 268–302. https://doi.org/10.1057/imfer.2015.43.

Hausmann, Ricardo, and César Hidalgo. 2011. “The Network Structure of Economic Output.” *Journal of Economic Growth* 16 (4): 309–42. https://doi.org/10.1007/s10887-011-9071-4.

Im, Kyung So, M.Hashem Pesaran, and Yongcheol Shin. 2003. “Testing for Unit Roots in Heterogeneous Panels.” *Journal of Econometrics* 115 (1): 53–74. https://doi.org/10.1016/S0304-4076(03)00092-7.

IMF. 2022. “IMF Primary Commodity Prices.” IMF. 2022. https://www.imf.org/en/Research/commodity-prices.

Ismail, Kareem. 2010. “The Structural Manifestation of the `Dutch Disease’: The Case of Oil Exporting Countries.” *IMF Working Papers* 10 (103). https://doi.org/10.5089/9781455200627.001.

Jahan-Parvar, Mohammad, and Hassan Mohammadi. 2011. “Oil Prices and Real Exchange Rates in Oil-Exporting Countries: A Bounds Testing Approach.” *The Journal of Developing Areas* 45 (1): 309–18. https://doi.org/10.1353/jda.2011.0020.

Kojo, Naoko. 2014. “Demystifying Dutch Disease.” *World Bank Policy Research Working Paper*, no. 6981.

Koopman, Robert, Zhi Wang, and Shang-Jin Wei. 2014. “Tracing Value-Added and Double Counting in Gross Exports.” *American Economic Review* 104 (2): 459–94. https://doi.org/10.1257/aer.104.2.459.

Korhonen, Iikka, and Tuuli Juurikkala. 2009. “Equilibrium Exchange Rates in Oil-Exporting Countries.” *Journal of Economics and Finance* 33 (1): 71–79. https://doi.org/10.1007/s12197-008-9067-x.

Krugman, Paul. 1987. “The Narrow Moving Band, the Dutch Disease, and the Competitive Consequences of Mrs. Thatcher.” *Journal of Development Economics*, no. 27: 41–55.

Lama, Ruy, and Juan Pablo Medina. 2012. “Is Exchange Rate Stabilization an Appropriate Cure for the Dutch Disease?” *International Journal of Central Banking* 8 (1): 42.

Lartey, Emmanuel K. K. 2011. “Financial Openness and the Dutch Disease.” *Review of Development Economics* 15 (3): 556–68. https://doi.org/10.1111/j.1467-9361.2011.00627.x.

Liebenthal, Andrés, Roland Michelitsch, and Ethel I. Tarazona. 2005. *Extractive Industries and Sustainable Development: An Evaluation of the World Bank Group Experience*. Washington, DC: World Bank : International Finance Corp. : Multilateral Investment Guarantee Agency.

López, Andrés. 2012. “Los Recursos Naturales y El Debate Sobre La Industrialización En América Latina.” In *Los Recursos Naturales Como Palanca Del Desarrollo En América Del Sur: Ficción o Realidad?*, edited by Ramiro Albrieu, Andrés López, and Guillermo Rozenwurcel, 23–48. Montevideo: Red Mercosur. https://www.redsudamericana.org/sites/default/files/doc/Los%20RecursosNaturalesPalancaDesarrollo.pdf.

Magud, Nicolás, and Sebastián Sosa. 2010. “When and Why Worry About Real Exchange Rate Appreciation?” *IMF Working Papers* 10 (271).

Mano, Rui C, and Marola Castillo. 2015. “The Level of Productivity in Traded and Non- Traded Sectors for a Large Panel of Countries.” *IMF Working Paper* 15 (48).

Martin, Will, and Devashish Mitra. 2001. “Productivity Growth and Convergence in Agriculture versus Manufacturing.” *Economic Development and Cultural Change* 49 (2): 403–22. https://doi.org/10.1086/452509.

Matsen, Egil, and Ragnar Torvik. 2005. “Optimal Dutch Disease.” *Journal of Development Economics* 78 (2): 494–515. https://doi.org/10.1016/j.jdeveco.2004.09.003.

Mehlum, Halvor, Karl Moene, and Ragnar Torvik. 2006. “Institutions and the Resource Curse.” *The Economic Journal* 116 (508): 1–20. https://doi.org/10.1111/j.1468-0297.2006.01045.x.

Meller, Patricio, Dan Poniachik, and Ignacio Zenteno. 2013. “América Latina y la bendición de los recursos naturales.” In *Recursos naturales y diversificación exportadora. Una mirada de futuro para América Latina*, 15–72. Vitacura: Cieplan.

Mien, Edouard, and Michaël Goujon. 2021. “40 Years of Dutch Disease Literature: Lessons for Developing Countries.” *Comparative Economic Studies*, November. https://doi.org/10.1057/s41294-021-00177-w.

Mohammadi, Hassan, and Mohammad Jahan-Parvar. 2012. “Oil Prices and Exchange Rates in Oil-Exporting Countries: Evidence from TAR and M-TAR Models.” *Journal of Economics and Finance* 36 (3): 766–79. https://doi.org/10.1007/s12197-010-9156-5.

Murshed, Syed Mansoob, and Leandro Antonio Serino. 2011. “The Pattern of Specialization and Economic Growth: The Resource Curse Hypothesis Revisited.” *Structural Change and Economic Dynamics* 22 (2): 151–61. https://doi.org/10.1016/j.strueco.2010.12.004.

Newfarmer, Richard S., Finn Tarp, and John Page, eds. 2018. *Industries without Smokestacks: Industrialization in Africa Reconsidered*. WIDER Studies in Development Economics. Oxford, United Kingdom: Oxford University Press.

Nülle, Grant, and Graham Davis. 2018. “Neither Dutch nor Disease?—Natural Resource Booms in Theory and Empirics.” *Mineral Economics* 31 (1–2): 35–59. https://doi.org/10.1007/s13563-018-0153-z.

Page, John. 2020. “Industries without Smokestacks - Firm Characteristics and Constraints to Growth.” *Africa Growth Initiative Working Paper*, no. 23. https://www.brookings.edu/wp-content/uploads/2020/02/BI_Framework_2_200131.pdf.

Paldam, Martin. 2013. “The Political Economy of Dutch Disease: A Survey.” In *Constitutional Economics and Public Institutions*, by Francisco Cabrillo and Miguel Puchades-Navarro, 179–96. Edward Elgar Publishing. https://doi.org/10.4337/9781781003978.00020.

Pheng, Low Sui, and Lau Shing Hou. 2019. “The Economy and the Construction Industry.” In *Construction Quality and the Economy*, by Low Sui Pheng and Lau Shing Hou, 21–54. Management in the Built Environment. Singapore: Springer Singapore. https://doi.org/10.1007/978-981-13-5847-0_2.

Poncela, Pilar, Eva Senra, and Lya Paola Sierra. 2017. "Long-Term Links between Raw Materials Prices, Real Exchange Rate and Relative de-Industrialization in a Commodity-Dependent Economy: Empirical Evidence of 'Dutch Disease' in Colombia." *Empirical Economics* 52 (2): 777–98. https://doi.org/10.1007/s00181-016-1083-7.

Rajan, Raghuram G., and Arvind Subramanian. 2008. "Aid and Growth: What Does the Cross-Country Evidence Really Show?" *Review of Economics and Statistics* 90 (4): 643–65. https://doi.org/10.1162/rest.90.4.643.

Reisinezhad, Arsham. 2020. "The Dutch Disease Revisited: Theory and Evidence." *Paris School of Economics Working Paper* 2020 (74).

Ricci, Luca Antonio, Gian Maria Milesi-Ferretti, and Jaewoo Lee. 2008. "Real Exchange Rates and Fundamentals: A Cross-Country Perspective." *IMF Working Paper* 08 (13).

Robinson, James A., Ragnar Torvik, and Thierry Verdier. 2006. "Political Foundations of the Resource Curse." *Journal of Development Economics* 79 (2): 447–68. https://doi.org/10.1016/j.jdeveco.2006.01.008.

Roodman, David. 2009a. "A Note on the Theme of Too Many Instruments." *Oxford Bulletin of Economics and Statistics* 71 (1): 135–58. https://doi.org/10.1111/j.1468-0084.2008.00542.x.

———. 2009b. "How to Do Xtabond2: An Introduction to Difference and System GMM in Stata." *The Stata Journal: Promoting Communications on Statistics and Stata* 9 (1): 86–136. https://doi.org/10.1177/1536867X0900900106.

Roser, Max, and Esteban Ortiz-Ospina. 2013. "Income Inequality." *Our World in Data*, December. https://ourworldindata.org/income-inequality.

Samuelson, Paul A. 1964. "Theoretical Notes on Trade Problems." *The Review of Economics and Statistics* 46 (2): 145. https://doi.org/10.2307/1928178.

Siliverstovs, Boriss, and Dierk Herzer. 2007. "Manufacturing Exports, Mining Exports and Growth: Cointegration and Causality Analysis for Chile (1960–2001)." *Applied Economics* 39 (2): 153–67. https://doi.org/10.1080/00036840500427965.

Spatafora, Nikola, and Andrew Warner. 1999. "Macroeconomic and Sectoral Effects of Terms-of-Trade Shocks: The Experience of the Oil-Exporting Countries." *IMF Working Papers* 99 (134).

Stijns, Jean-Philippe. 2003. "An Empirical Test of the Dutch Disease Hypothesis Using a Gravity Model of Trade." *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.403041.

The Growth Lab At Harvard University. 2019. "International Trade Data (SITC, Rev. 2)." Harvard Dataverse. https://doi.org/10.7910/DVN/H8SFD2.

Torvik, Ragnar. 2001. "Learning by Doing and the Dutch Disease." *European Economic Review* 45 (2): 285–306. https://doi.org/10.1016/S0014-2921(99)00071-9.

UNCTAD. 2021. *State of Commodity Dependence 2021*. Geneva: United Nations.

Usui, Norio. 1997. "Dutch Disease and Policy Adjustments to the Oil Boom: A Comparative Study of Indonesia and Mexico." *Resources Policy* 23 (4): 151–62. https://doi.org/10.1016/S0301-4207(97)00023-8.

van der Ploeg, Frederick. 2011. "Natural Resources: Curse or Blessing?" *Journal of Economic Literature* 49 (2): 366–420. https://doi.org/10.1257/jel.49.2.366.

van der Ploeg, Frederick, and Anthony Venables. 2013. "Absorbing a Windfall of Foreign Exchange: Dutch Disease Dynamics." *Journal of Development Economics*, no. 103 (July): 229–43. https://doi.org/10.1016/j.jdeveco.2013.03.001.

van Wijnbergen, Sweder. 1984a. “The `Dutch Disease’: A Disease After All?” *The Economic Journal* 94 (373): 41–55. https://doi.org/10.2307/2232214.

———. 1984b. “The `Dutch Disease’: A Disease After All?” *The Economic Journal* 94 (373): 41. https://doi.org/10.2307/2232214.

Appendix A

Table 5: List of countries included in the dataset

Country	Region	Classification	Country	Region	Classification
Argentina	LAC	UMIC	Malaysia	EAP	UMIC
Bangladesh	SA	LIC	Mauritius	SSA	UMIC
Bolivia	LAC	LMIC	Mexico	LAC	UMIC
Botswana	SSA	UMIC	Morocco	MENA	LMIC
Brazil	LAC	UMIC	Mozambique	SSA	LIC
Burkina Faso	SSA	LIC	Myanmar	EAP	LIC
Cambodia	EAP	LIC	Namibia	SSA	LMIC
Cameroon	SSA	LIC	Nepal	SA	LIC
Chile	LAC	UMIC	Nigeria	SSA	LIC
China	EAP	LMIC	Pakistan	SA	LIC
Chinese Taipei*	EAP	-	Peru	LAC	LMIC
Colombia	LAC	LMIC	Philippines	EAP	LMIC
Costa Rica	LAC	UMIC	Republic of Korea	EAP	UMIC
Ecuador	LAC	LMIC	Rwanda	SSA	LIC
Egypt	MENA	LMIC	Senegal	SSA	LIC
Ethiopia	SSA	LIC	Singapore*	EAP	HIC
Ghana	SSA	LIC	South Africa	SSA	UMIC
Hong Kong*	EAP	HIC	Sri Lanka	SA	LMIC
India	SA	LIC	Tanzania	SSA	LIC
Indonesia	EAP	LIC	Thailand	EAP	LMIC
Israel*	MENA	HIC	Tunisia	MENA	LMIC
Japan*	EAP	HIC	Turkey	ECA	UMIC
Kenya	SSA	LIC	Uganda	SSA	LIC
Laos	EAP	LIC	Viet Nam	EAP	LIC
Lesotho	SSA	LIC	Zambia	SSA	LIC
Malawi	SSA	LIC			

Source: Elaboration by the author; Data from World Bank World Development Indicators.
Note: Countries with an asterisk are not included in the analysis. The income classification is taken from the base year 2000.

Appendix B

Table 6: Im-Pesaran-Shin Unit Root Test

Variable	t-bar	t-tilde bar	Fixed-N exact critical values			z-tilde-bar	p-value
			1%	**5%**	**10%**		
gdpgr	-3.4862	-2.6023	-1.820	-1.730	-1.690	-10.7729	0.0000
D.Institutions	-4.2575	-2.7316	-1.820	-1.730	-1.690	-12.3331	0.0000
D.openn	-4.1611	-2.9548	na	na	na	-13.1241	0.0000
D.govcons	-4.5280	-2.9986	na	na	na	-13.4935	0.0000
comprgr	-4.3096	-3.0232	na	na	na	-14.5063	0.0000
relmangr	-3.7218	-2.7752	-1.820	-1.730	-1.690	-12.3038	0.0000
relutigr	-4.6172	-3.0362	-1.820	-1.730	-1.690	-14.6146	0.0000
relconsgr	-4.0145	-2.8504	-1.820	-1.730	-1.690	-12.9697	0.0000
reltradesvgr	-4.0627	-2.8914	-1.820	-1.730	-1.690	-13.3327	0.0000
reltranspsvgr	-4.2977	-2.9404	-1.820	-1.730	-1.690	-13.7669	0.0000
relfinsvgr	-4.0933	-2.8143	-1.820	-1.730	-1.690	-12.6502	0.0000
relrealestgr	-4.2756	-2.8986	-1.820	-1.730	-1.690	-13.3964	0.0000
relbussvgr	-3.6394	-3.6394	-1.820	-1.730	-1.690	-10.9180	0.0000
relgovsvgr	-3.9497	-2.8394	-1.820	-1.730	-1.690	-12.8721	0.0000
relothersvgr	-4.2226	-2.9008	-1.820	-1.730	-1.690	-13.4159	0.0000
D.ProdMan	-3.7159	-2.6334	-1.820	-1.730	-1.690	-11.0484	0.0000
D.ProdUti	-4.5927	-2.9871	-1.820	-1.730	-1.690	-14.1804	0.0000
D.ProdCons	-3.9493	-2.7499	-1.820	-1.730	-1.690	-12.0794	0.0000
D.ProdTradesv	-3.4914	-2.6064	-1.820	-1.730	-1.690	-10.8091	0.0000
D.Prodtranspsv	-3.6848	-2.6966	-1.820	-1.730	-1.690	-11.6076	0.0000
D.ProdBussv	-3.5305	-2.5966	-1.820	-1.730	-1.690	-10.7224	0.0000
D.ProdFinsv	-4.1423	-2.8420	-1.820	-1.730	-1.690	-12.8953	0.0000
D.ProdGovsv	-4.0858	-2.8387	-1.820	-1.730	-1.690	-12.8663	0.0000
D.ProdOthersv	-4.1264	-2.8276	-1.820	-1.730	-1.690	-12.7673	0.0000

Source: Elaboration by the author. Number of panels: 46, number of periods: 19. H0: All panels contain unit roots, Ha: Some panels are stationary. Panel means: Included, Time trend: Not included. For D.openn and D.govcons Ethiopia, Lesotho, Malawi, Myanmar and Zambia were temporarily excluded from the sample to conduct the unit root test.

Appendix C

Table 7: Robustness checks for model 1

VARIABLES	(1) man_serv_gr	(2) trade_nontrade_gr	(3) relmangr	(4) relbussvgr	(5) relfinsvgr	(6) reltranspsvgr	(7) relutigr	(8) relconsgr	(9) reltradesvgr	(10) relrealestgr	(11) relgovsvgr	(12) relothersvgr
L.man_serv_gr	0.206***											
	(0.071)											
comprgr	0.161**	0.198**	0.281**	-0.177	-0.274	0.050	0.099	-0.579***	-0.174	0.371	-0.064	-0.298
	(0.073)	(0.095)	(0.132)	(0.227)	(0.243)	(0.133)	(0.568)	(0.159)	(0.144)	(0.360)	(0.281)	(0.244)
comdep	-0.005	-0.340*	-0.068	-1.578**	-0.747	0.556	-0.262	1.786***	0.398	-1.743*	-0.240	-1.289
	(0.125)	(0.193)	(0.391)	(0.641)	(1.008)	(0.394)	(0.926)	(0.564)	(0.280)	(0.991)	(0.429)	(1.119)
1.comdep#c.comprgr	-0.200***	-0.207**	-0.354***	0.251	-0.044	-0.049	-0.165	0.474***	0.259*	0.073	0.112	0.050
	(0.067)	(0.099)	(0.105)	(0.206)	(0.273)	(0.160)	(0.561)	(0.143)	(0.146)	(0.423)	(0.225)	(0.238)
L.comprgr	-0.060	-0.112	0.039	0.065	-0.405	-0.161	0.311	-0.126	0.092	-0.034	0.437	0.400
	(0.089)	(0.104)	(0.207)	(0.343)	(0.346)	(0.128)	(0.383)	(0.259)	(0.175)	(0.219)	(0.553)	(0.487)
1.comdep#cL.comprgr	0.062	0.124	-0.034	0.341	0.055	0.154	0.709	0.034	0.013	-0.241	-0.583	-0.360
	(0.086)	(0.100)	(0.198)	(0.308)	(0.328)	(0.149)	(0.607)	(0.252)	(0.170)	(0.245)	(0.461)	(0.375)
gdpgr	0.118***	0.145***	0.245***	0.015	-0.025	-0.022	-0.288**	0.583***	0.037	-0.208	-0.157	-0.019
	(0.035)	(0.051)	(0.079)	(0.138)	(0.191)	(0.077)	(0.128)	(0.168)	(0.086)	(0.144)	(0.213)	(0.175)
LIC	0.036	-0.054	0.197	0.899	0.942	-0.162	0.893	0.068	-0.428	0.902	1.118**	-0.539
	(0.155)	(0.253)	(0.482)	(0.784)	(1.290)	(0.265)	(1.214)	(0.803)	(0.388)	(1.152)	(0.489)	(0.811)
LMIC	-0.166	-0.205	-0.159	0.970	-0.194	-0.544	-0.077	-0.032	-0.609*	1.419*	0.825	-0.564
	(0.156)	(0.237)	(0.368)	(0.673)	(0.832)	(0.421)	(1.339)	(0.809)	(0.353)	(0.754)	(0.516)	(0.618)
L.trade_nontrade_gr		0.107**										
		(0.050)										
L.relmangrp			0.168***									
			(0.061)									
L.relbussvgrp				0.105								
				(0.090)								
L.relfinsvgrp					-0.036							
					(0.065)							
L.reltranspsvgrp						-0.048						
						(0.088)						
L.relutigrp							-0.026					
							(0.036)					
L.relconsgrp								0.014				
								(0.058)				
L.reltradesvgrp									0.089*			
									(0.046)			
L.relrealestgrp										-0.132*		
										(0.072)		
L.relgovsvgrp											-0.007	
											(0.072)	
L.relothersvgrp												-0.102*
												(0.051)
Observations	870	870	870	870	870	870	870	870	870	870	870	870
Number of idnr	46	46	46	46	46	46	46	46	46	46	46	46
F	11.52	7.679	13.92	9.791	10.11	3.118	4.665	8.127	4.714	11.71	6.688	3.008
F_p	0	1.55e-09	0	0	0	0.000363	2.76e-06	6.08e-10	2.39e-06	0	1.42e-08	0.000531
ar2p	0.279	0.964	0.245	0.165	0.537	0.0881	0.306	0.138	0.986	0.333	0.700	0.490
hansenp	0.769	0.499	0.127	0.230	0.530	0.186	0.248	0.944	0.819	0.585	0.945	0.201

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

New Variables: LIC = Dummy for low income countries (in base year 2000), LMIC = Dummy for lower middle income countries (in base year 2000).

Table 8: Robustness checks for model 2

VARIABLES	(1) man serv gr	(2) trade nontrade gr	(3) relmangr	(4) relbussvgr	(5) relfinsvgr	(6) reltranspsvgr	(7) relutigr	(8) relconsgr	(9) reltradesvgr	(10) relrealestgr	(11) relgovsvgr	(12) relothersvgr
L.man serv gr	0.102											
	(0.071)											
comprgr	0.103	0.046	0.191	-0.300	-0.361	0.074	0.163	-0.737***	-0.069	0.284	0.207	-0.328
	(0.090)	(0.116)	(0.170)	(0.234)	(0.241)	(0.151)	(0.762)	(0.211)	(0.132)	(0.539)	(0.172)	(0.268)
comdep	-0.039	-0.303*	-0.190	-1.461*	-0.587	0.649	0.064	2.642***	0.307	-3.304**	-0.488	-0.986
	(0.157)	(0.151)	(0.437)	(0.742)	(0.875)	(0.393)	(1.034)	(0.650)	(0.254)	(1.286)	(0.401)	(0.663)
1.comdep#c.comprgr	-0.156*	-0.119	-0.321**	0.299	0.202	-0.046	0.008	0.469**	0.223*	-0.260	-0.094	0.025
	(0.087)	(0.127)	(0.155)	(0.236)	(0.317)	(0.167)	(0.747)	(0.210)	(0.128)	(0.581)	(0.171)	(0.259)
L.comprgr	0.022	-0.040	0.130	-0.105	-0.142	-0.105	-0.065	-0.308	0.071	-0.034	-0.035	-0.105
	(0.103)	(0.105)	(0.252)	(0.328)	(0.304)	(0.155)	(0.356)	(0.266)	(0.148)	(0.282)	(0.194)	(0.217)
1.comdep#cL.comprgr	-0.002	0.128	-0.032	0.332	0.019	0.104	-0.060	0.093	0.072	0.088	-0.146	0.114
	(0.098)	(0.108)	(0.259)	(0.300)	(0.317)	(0.153)	(0.395)	(0.268)	(0.164)	(0.257)	(0.188)	(0.211)
gdpgr	0.083*	0.047	0.235**	-0.118	-0.363**	-0.054	-0.340*	0.657***	0.082	-0.458*	-0.343***	-0.176
	(0.047)	(0.038)	(0.100)	(0.099)	(0.162)	(0.096)	(0.177)	(0.169)	(0.070)	(0.233)	(0.100)	(0.126)
D.openn	0.019	0.038	0.024	0.017	-0.096	-0.025	0.005	0.061	-0.012	0.158	-0.011	0.061
	(0.019)	(0.028)	(0.055)	(0.052)	(0.064)	(0.038)	(0.093)	(0.072)	(0.025)	(0.173)	(0.071)	(0.061)
D.govexp	-0.025	-0.033	0.085	-0.144	0.345	-0.036	-0.216	-0.326	0.010	-0.230	0.439**	-0.274
	(0.057)	(0.064)	(0.184)	(0.302)	(0.322)	(0.160)	(0.554)	(0.275)	(0.138)	(0.307)	(0.197)	(0.175)
D.Institutions	-0.525	-0.373	-0.966	0.228	1.098	-0.218	-2.277	-1.391	3.189*	6.733	0.668	-0.365
	(0.879)	(1.216)	(2.048)	(4.090)	(4.994)	(3.279)	(6.429)	(4.304)	(1.852)	(5.999)	(2.120)	(3.158)
LIC	0.058	-0.152	0.366	-0.053	1.111	-0.091	1.798	-0.206	-0.557	-0.064	1.129*	-0.657
	(0.223)	(0.225)	(0.594)	(0.794)	(1.139)	(0.298)	(1.471)	(0.753)	(0.397)	(1.409)	(0.596)	(0.896)
LMIC	-0.150	-0.068	-0.168	0.862	0.568	-0.255	1.270	-1.159	-0.685*	1.644	0.617	-0.067
	(0.207)	(0.261)	(0.511)	(0.722)	(0.912)	(0.468)	(1.602)	(0.774)	(0.374)	(1.194)	(0.585)	(0.669)
L.trade nontrade gr		0.071										
		(0.055)										
L.relmangr			0.050									
			(0.088)									
L.relbussvgr				0.100								
				(0.081)								
L.relfinsvgr					0.048							
					(0.104)							
L.reltranspsvgr						-0.021						
						(0.064)						
L.relutigr							-0.068**					
							(0.032)					
L.relconsgr								0.062				
								(0.075)				
L.reltradesvgr									0.048			
									(0.051)			
L.relrealestgr										-0.225***		
										(0.081)		
L.relgovsvgr											-0.115	
											(0.134)	
L.relothersvgr												-0.091
												(0.063)
Observations	688	688	688	688	688	688	688	688	688	688	688	688
Number of idnr	45	45	45	45	45	45	45	45	45	45	45	45
F	9.421	6.324	9.888	9.190	17.95	7.998	6.423	5.936	10.46	5.187	7.663	4.936
F p	6.99e-11	4.26e-08	0	1.06e-10	0	1.07e-09	3.37e-08	1.10e-07	0	7.60e-07	2.13e-09	1.50e-06
ar2p	0.445	0.670	0.488	0.0984	0.825	0.0748	0.415	0.539	0.357	0.274	0.838	0.650
hansenp	0.127	0.578	0.127	0.322	0.925	0.417	0.398	0.469	0.875	0.128	0.293	0.481

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Robustness checks for model 3

VARIABLES	(1) relmangr	(2) relbussvgr	(3) relfinsvgr	(4) reltranspsvgr	(5) relutigr	(6) relconsgr	(7) reltradesvgr	(8) relrealestgr	(9) relgovsvgr	(10) relothersvgr
L.relmangr	0.065									
	(0.080)									
comprgr	0.185	-0.254	-0.283	-0.009	0.247	-0.538***	-0.115	0.355	0.228*	-0.147
	(0.179)	(0.235)	(0.280)	(0.143)	(0.684)	(0.170)	(0.156)	(0.549)	(0.133)	(0.353)
comdep	-0.399	-1.146	0.593	0.892*	0.408	1.387*	0.393	-3.662**	-0.107	-0.558
	(0.406)	(0.788)	(0.697)	(0.456)	(1.024)	(0.817)	(0.238)	(1.533)	(0.359)	(0.742)
1.comdep#c.comprgr	-0.341**	0.247	0.188	-0.058	-0.023	0.359*	0.278*	-0.342	-0.114	-0.108
	(0.165)	(0.236)	(0.285)	(0.190)	(0.690)	(0.184)	(0.147)	(0.601)	(0.148)	(0.346)
L.comprgr	0.136	-0.060	-0.225	0.010	0.049	-0.197	0.207	-0.077	-0.097	0.018
	(0.301)	(0.352)	(0.304)	(0.142)	(0.353)	(0.380)	(0.139)	(0.320)	(0.215)	(0.261)
1.comdep#cL.comprgr	-0.035	0.258	0.045	0.050	0.007	0.139	-0.094	0.134	-0.159	-0.039
	(0.295)	(0.316)	(0.296)	(0.149)	(0.405)	(0.337)	(0.158)	(0.296)	(0.195)	(0.243)
D.ProdMan	1.008***									
	(0.266)									
D.openn	0.018	0.039	-0.043	-0.019	0.038	0.061	-0.006	0.152	0.035	0.081
	(0.054)	(0.049)	(0.049)	(0.037)	(0.093)	(0.080)	(0.029)	(0.165)	(0.060)	(0.063)
D.govexp	0.040	-0.063	0.171	-0.049	-0.145	-0.188	-0.026	-0.264	0.468**	-0.195
	(0.166)	(0.292)	(0.233)	(0.189)	(0.584)	(0.286)	(0.154)	(0.336)	(0.199)	(0.178)
D.Institutions	-1.688	-0.226	0.371	-0.864	-4.821	-26.171	3.218	3.113	-1.538	-0.955
	(1.923)	(4.489)	(4.613)	(3.204)	(6.012)	(53.265)	(2.206)	(6.912)	(1.853)	(3.232)
LIC	1.426***	-0.092	1.244	0.087	1.884	1.870	-0.334	0.174	0.644	-0.891
	(0.506)	(0.773)	(0.955)	(0.497)	(1.894)	(1.176)	(0.457)	(1.644)	(0.517)	(0.923)
LMIC	0.559	0.271	0.395	-0.110	1.565	0.525	-0.598	1.095	0.153	-0.373
	(0.402)	(0.643)	(0.902)	(0.667)	(1.931)	(0.755)	(0.419)	(1.120)	(0.440)	(0.701)
L.relbussvgr		0.092								
		(0.081)								
D.ProdBussv		0.247								
		(0.340)								
L.relfinsvgr			0.041							
			(0.082)							
D.ProdFinsv			0.487***							
			(0.094)							
L.reltranspsvgr				-0.037						
				(0.069)						
D.ProdTranspsv				1.084***						
				(0.357)						
L.relutigr					-0.075**					
					(0.037)					
D.ProdUti					0.110*					
					(0.055)					
L.relconsgr						0.105				
						(0.245)				
D.ProdCons						3.031				
						(2.423)				
L.reltradesvgr							0.031			
							(0.060)			
D.ProdTradesv							0.813			
							(0.618)			
L.relrealestgr								-0.218***		
								(0.080)		
D.ProdRealest								-0.000		
								(0.001)		
L.relgovsvgr									-0.081	
									(0.113)	
D.ProdGovsv									0.540	
									(0.571)	
L.relothersvgr										-0.078
										(0.070)
D.ProdOthersv										0.441
										(0.267)
Observations	688	688	688	688	688	688	688	634	688	688
Number of idnr	45	45	45	45	45	45	45	42	45	45
F	11.93	10.43	30.61	6.056	3.925	9.573	11.61	8.943	5.605	4.857
F_p	0	0	0	8.15e-08	2.90e-05	5.32e-11	0	4.69e-10	2.53e-07	1.87e-06
ar2p	0.967	0.115	0.711	0.140	0.437	0.442	0.247	0.282	0.795	0.630
hansenp	0.248	0.404	0.910	0.176	0.426	0.516	0.479	0.286	0.522	0.395

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1