The Paradox of Transfers: Distribution and the Dutch Disease. *

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Abstract

We develop a new model of international trade with non-homothetic preferences whereby within-country income distribution affects the pattern of trade and economic growth. Alternative forms of foreign transfers, such as foreign aid and remittances, interact with the income distribution in dissimilar manners, which in turn generates differences in spending patterns, production patterns, and the pattern of international trade. In a three sector model with international trade and production we show that while remittances foster economic growth, foreign aid can cause economic stagnation. A production shift to the sector with less long-run growth potential is known as the Dutch disease and in our model the disease is triggered by within-country income differences and the form of the foreign transfer. We empirically verify these hypotheses with data from a panel covering the years 1991-2009 while controlling for the issues of omitted variable bias and the possible endogeneity of foreign aid and remittances.

JEL Classification: F11, F24, F35, D31

Keywords: International Trade, Inequality, Foreign Aid, Remittances, Dutch Disease

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1 Introduction

In this paper we analyze how within-country income inequality can affect economic outcomes and we use this analysis to compare differing forms of foreign transfers such as official development assistance (ODA) and remittances. Foreign transfers alter consumption, production, and patterns of international trade and, crucially, the transfer's effect depends on the recipient's pre-transfer income. We show that ODA may cause a reduction in manufacturing output, but remittances generate an increase in production and in economic growth. This distinction is important for two reasons. First, the literature often fails to distinguish these two types of transfers, and, therefore, often considers remittances and ODA to have similar effects. Second, although ODA receives the majority of the analysis, remittances are a larger source of income than ODA for many developing countries.

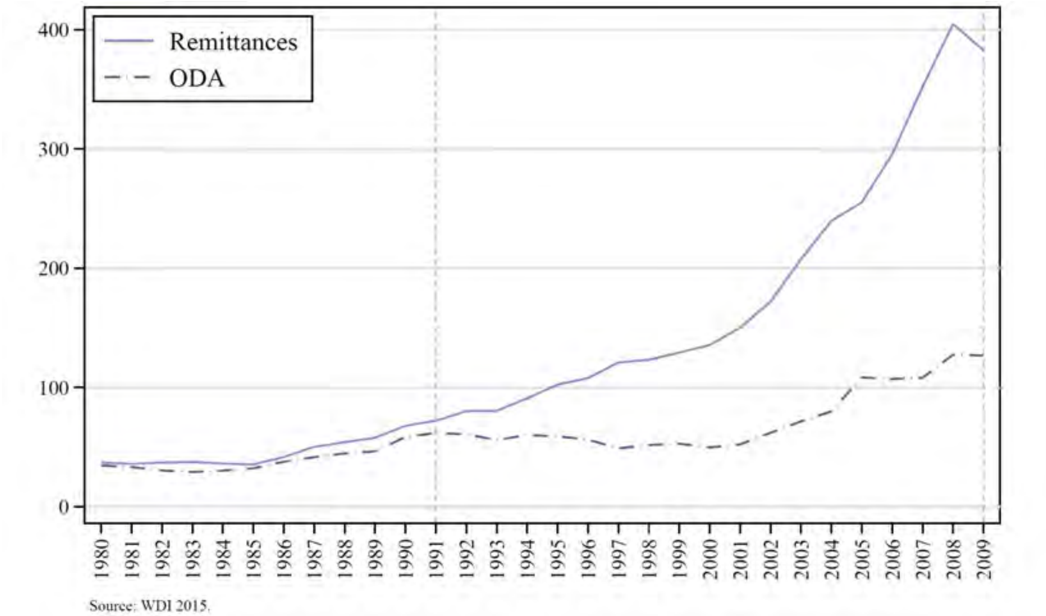
The most common types of foreign transfers are ODA and remittances. There is a large literature (to be discussed below) that questions the efficacy of ODA in fostering economic growth. For example, the initial good fortune of a foreign transfer could cause an appreciation of the real exchange rate that, in turn, reduces competitiveness of the manufacturing sector. This international trade related aspect of a foreign transfer is known as the Dutch disease. Remittances are generally considered equal to foreign aid in causing the disease. In this paper we show that this apparent similarity is false: they engender different spending behaviour and different economic outcomes. Whereas aid may cause a Dutch disease effect, remittances generate growth.

Foreign aid and remittances are both an important component of national income for many developing countries. Official development assistance (ODA) was equal to at least 10 percent of national income for 27 countries in 2013 and remittances were equal to at least 10 percent of GDP for 23 countries in the same year.[1] Figure 1 shows the global inflow of international transfers in billions of US dollars from 1980 to 2009.[2] Interestingly, a country may be a large recipient of aid or remittances, but not both. In 2013 only three countries were in the top twenty recipients of both ODA as a percent of gross national income (GNI) and remittances as a percent of GDP.

[1] The 27 countries that received ODA equal to at least 10 percent of their GNI in 2013 can be ranked from Tuvalu at 48.3 percent to Niger at 10.3 percent of GNI. The countries that received remittances equal to at least 10 percent of their GDP in 2013 are led by Tajikistan at 49.6 percent of GDP and in 23rd place is Nicaragua at 10 percent of GDP.

[2] The dotted vertical lines correspond to the time period we use in our empirical analysis. Note that since the early 1990s there has been a surge in remittances compared to ODA. Although our goal is to highlight 1991-2009 for the reader, this trend continued into the 2010's. For example, in 2013, for all recipients combined remittances totaled $410 billion and ODA equaled $160 billion. This divergence may be attributed to an increase in migrants, technological advancements in sending money internationally, or improvements in data collection.

Figure 1: Global Inflow of International Transfers (Billions of US dollars)



We are especially interested in the differential effect of aid and remittances within the same country. Foreign aid is usually given to a government and then transferred to the desired recipient of that aid. There is an extensive literature that suggests that many of these aid payments are fungible and have little effect on the desired group.[3] There is an almost similarly large literature that suggests that foreign aid is worse than fungible and is, in fact, used to prop up corrupt governments and their supporters.[4] Whether aid is fungible and partially serves to reduce the taxes paid by the wealthy, or is used to support cronyism and corruption, aid benefits a wealthier segment of the population that would not normally receive remittances. Remittances, on the other hand, do not pass through a government middleman and are more likely to end up in the hands of the poorer inhabitants of a country.[5] Although it is true that remittances are also sent to middle class recipients and that some aid to governments does eventually find its way to the intended poorer recipient, our key

[3]See, for example, Azam and Laffont (2003), Chatterjee, Giuliano and Kaya (2007), Depetris and Raay (2005), Devarajan, Rajkumar and Swaroop (2007), Gang and Khan (1991), Khilji and Zampelli (1994), McGillivray and Morrissey (2000, 2001), Pack and Pack (1990, 1993), Swaroop, Jha and Rajkumar (2000).

[4]See, for example, Alesina and Weder (2002), Bauer (2000), Coyne and Ryan (2009), Djankov, Montalvo and Reynal-Querol (2006), Easterly (2001, 2006), Younas (2008).

[5]For example, Dinkelman, Kumchulesi, and Mariotti (2020) show that remittances from Malawi nationals working as gold miners in South Africa allowed their poor agrarian families to accumulate capital and move out of the agricultural sector. Furthermore, as shown by Faini (2007) and Niimi, Ozden and Schiff (2010) skilled migrants (who are more likely to come from middle-class families) remit less. In their handbook chapter on migration Foster and Rosenzweig (2008) also consider urban-rural remittances and show that migration along with emigrant remittances can facilitate structural change in rural labor markets.

assumption is simply that recipients of remittances are more likely to have less income than are aid recipients (formally, the distribution of incomes for remittance recipients first-order stochastically dominates the distribution of incomes for aid recipients).

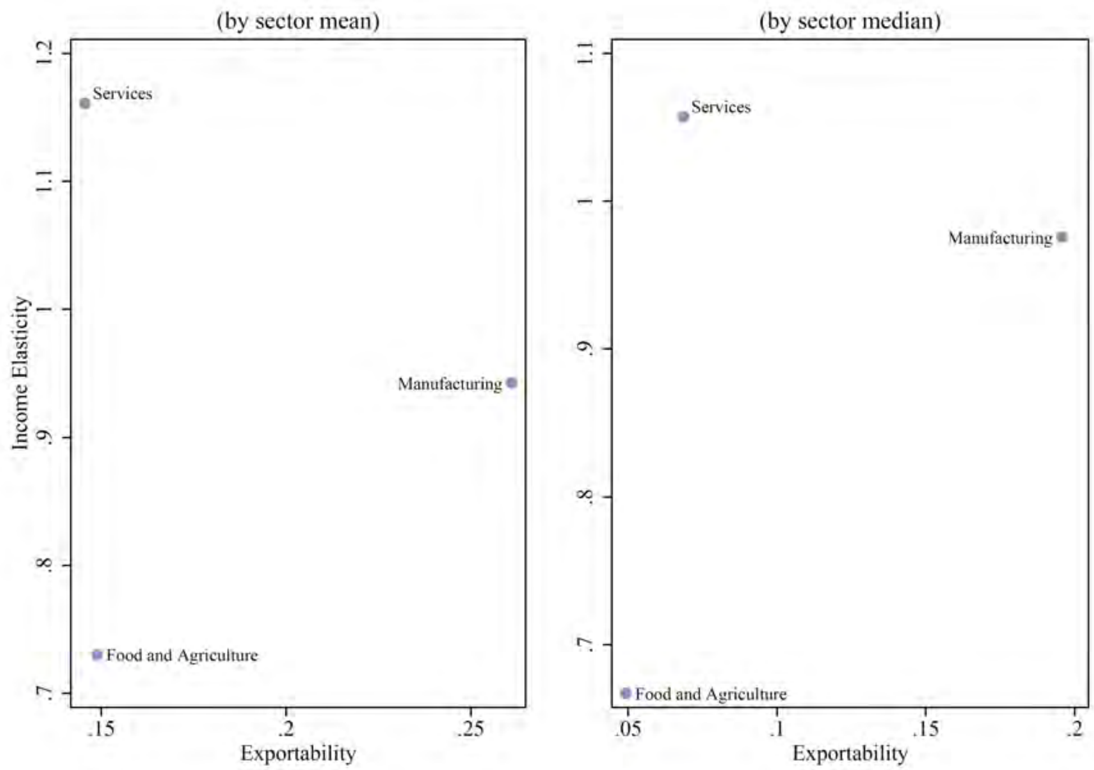
It is this difference in the expected income of aid and remittances recipients that is the starting point for our analysis. If the marginal propensity to consume out of a foreign transfer depends on the individual's initial level of income, then foreign transfers that are given to different segments of the population could generate very different outcomes. Hence, studying the average consumer may tell us little about the spending pattern of individual consumers. This observation is especially relevant in developing countries or those where a larger share of the population lives below the poverty level.

For this assumed difference in the recipients of aid and remittances to affect economic outcomes we adopt a framework that captures the following ideas. First, consumption patterns change with income. In particular, the marginal propensity to consume services is increasing in income. Second, services are less tradable than manufactured goods. Examples of these non-tradable services are housekeeping, childcare, lawn care, nannies, butlers, chauffeurs, private security forces, the staff to service a large estate, or the financial expertise necessary for laundering misdirected foreign aid payments. Poor people often do not purchase these services in the market and, therefore, have a lower income elasticity of demand for these services than do wealthier people. Third, manufactured goods have a fixed cost in production, a love of variety in consumption and a non-prohibitive trade cost, therefore, individual firms matter and these firms will prefer to locate in the larger market.

Putting these ideas together we show that a foreign transfer which is given to poorer people increases the relative demand for manufactured goods and also manufacturing production in the recipient economy. If the transfer is given to wealthier people, then it either increases manufacturing output by a smaller amount than does a transfer to poorer people or, if services production exhibits decreasing returns to scale and their demand increases sufficiently, then (through the consequent increase in labor devoted to the services sector) the transfer reduces manufacturing production. In this case, the transfer generates an increased reliance on imported manufactured goods and a consequent reduction in the growth of manufacturing.

Some evidence to justify the first two assumptions of our model is given in Figure 2. We see there that services are more income elastic and have a lower export ratio measure than manufactured goods. The export ratio index is the one we use in our empirical section and is calculated as the ratio of exports to value added in each industry. A lower index indicates that for a given sector either exports are small, or the value added is large, or both. The income elasticity data are from Caron, Fally and Markusen (2014), estimated using the Global Trade Analysis Project (GTAP) database averaged over the available years of 2004,

Figure 2: Income Elasticity and Export Ratio: A Negative Correlation



2007, 2011 and 2014 and for the countries and industries listed in Table 7 and Table 8 of the appendix.[6]

The most important element of our model is our representation of non-homothetic preferences which permits a meaningful analysis of within-country differences in the marginal propensity to consume out of a foreign transfer. It has been common in economic models to assume that the marginal (and average) propensity to consume a good are not dependent on income. These constant income shares, that result from the assumption of homothetic preferences, are frequently employed in the economics literature. Although they have several nice mathematical properties they are repeatedly contradicted by the empirical evidence. From Stone's (1954) seminal work on expenditures and Deaton and Muellbauer's (1980) classic survey of consumer behaviour through Hunter and Markusen's (1988) groundbreaking work that demonstrates its importance in explaining the pattern of trade, the data continually confirm that preferences are non-homothetic and that consumption bundles do change with income.

[6] An implied result of our framework is that poorer people are more trade dependent than are the wealthy. Put another way, internationally traded goods make up a larger portion of the consumption bundle of poorer people. This result is substantiated empirically in a recent paper by Fajgelbaum and Khandelwal (2016).

We incorporate non-homothetic preferences in a three sector international trade model and we establish the following results. First, we show that remittances generate an increase in manufacturing output. Second, foreign aid generates either a reduction in manufacturing output or a smaller increase than does remittances.

In taking our model to the data we look at the change in the value added in manufacturing over the period from 1991 to 2009. We use a panel of industries and countries and consider the annual growth of each industry in each country as our dependent variable. In this way we can include fixed effects for each country, each industry, and each year in order to reduce omitted variable bias.

To mitigate the potential endogeneity of aid or remittances we combine two different methods. The first method was developed by Rajan and Zingales (1998) and later used by Rajan and Subramanian (2011) for the analysis of foreign aid's effect on growth. The idea is that not all industries are affected equally by Dutch disease effects. In particular, some industries are more sensitive to changes in the real exchange rate. This method suggest two ways of dividing the industries into more or less export-sensitive groups. First, we use the fact that an increase in the real exchange rate will be more harmful in industries with lower profit margins, such as homogeneous product industries, and we classify these industries as more sensitive. Second, because developing countries would not have the means to subsidize a no longer competitive export industry (even though most countries could restrict imports, not all could afford to subsidize exports), we classify typical manufactured goods from poorer developing countries as more sensitive. We then interact our dummy variable for the export sensitivity of each industry with remittances and with aid to analyze their effect on manufacturing value added to see if the effect is more pronounced in these more sensitive industries. Our second method to attenuate any possible remaining endogeneity is to construct instruments for aid and for remittances that are based on donor, and not recipient, country characteristics.

Our empirical results lend credence to our hypothesis on the difference between aid and remittances. The estimated coefficients on ODA and remittances have the predicted signs throughout and are significant in most of our empirical estimations.[7]

In this paper we contribute to several distinct literatures. The adverse effects of international transfers was first considered when Keynes (1929) and Ohlin (1929) debated the possible results of German war reparations. More recently, Corden and Neary (1982), van Wijnbergen (1985, 1986), and Krugman (1987) have shown that a foreign transfer may generate an appreciation of the real exchange rate which can cause specialization in the sector with less

[7]Specifications using the first measure of export sensitivity generally produce more significant results.

long-run growth potential (a Dutch disease) in the recipient country.[8]

We add to the Dutch disease literature by showing that the presence of the disease depends on the distribution of the windfall and the income of the recipient and, therefore, we establish that evidence of the disease depends on the form of the transfer.[9]

There is also a large literature (referenced in footnote (3) and footnote (4)) on the effects of ODA. An excellent overview is provided by Rajan and Subramanian (2008) and, more recently, by Dreher and Langlotz (2020) who also find that aid has a negative effect on exports despite its insignificant effect on growth. We add to these literatures by considering ODA and remittances in the same analysis, distinguishing between them, providing a theoretical justification for their differing effects, and empirically verifying our theory.

The role of income on growth through its effect on demand is stressed by Herrendorf, Rogerson, and Valentinyi (2014) who show that poor countries consume and produce more manufactured goods and that services only become important as a country becomes more wealthy. Diao, McMillan, and Rodrik (2017) also consider non-homothetic preferences in a model of growth and argue that the differing patterns of structural change across Africa and Asia were in part determined by their original income level and consequent consumption patterns. Our research complements the above by suggesting that structural change, growth, and convergence may be determined not only by the average level of income across countries but also by the distribution of income within a country.

Recent work that introduces non-homothetic preferences into a model of international trade with cross-country differences includes Matsuyama (2000), Fieler (2011), Fajgelbaum, Grossman and Helpman (2011), Markusen (2013), Caron, Fally and Markusen (2014), and Simonovska (2015). Whereas this literature is considered with average income differences across countries we show how within country income distribution can affect patterns of international trade.[10] In this way our paper is closest to Behzadan, Chisik, Onder, and Battaile

[8]The term "Dutch disease" was first used in the Economist magazine (1977) to describe a slowdown in manufacturing output in the Netherlands stemming from an appreciation of the Dutch guilder (after oil was found in the North Sea). Corden and Neary (1982) were the first to provide a non-monetary explanation of this disease. We consider the Dutch disease to be an international trade phenomenon, whereby an appreciation of real exchange rate causes the "sick" country to become an importer of goods with better long-run growth potential. It differs from a closed economy phenomenon such as the Rybczynski effect or the resource curse (which would correspond to ODA being misused to support corrupt dictators) in that the windfall requires a trading environment to transform itself into a disease.

[9]Jarotschkin and Kraay (2016) study the effect of foreign aid on the real exchange rate for developing countries. They find that, in the short run, aid results in a small and statistically significant depreciation of the real exchange change rate, however, in the medium run this effect overturns to a statistically insignificant real appreciation. Hence, they do not find conclusive evidence of the adverse effects of foreign aid on the recipient countries.

[10]Fajgelbaum and Khandelwal (2016) also consider within-country income differences, however, their focus is different from ours. They establish that the poor consume more tradables and, therefore, gain more from

(2017) who show theoretically and verify empirically that the distribution of natural resource rents can determine whether or not a resource abundant country suffers a Dutch disease. We employ a framework similar to Behzadan and Chisik (2022) who show in a theoretical model, without transfers or natural resource booms, that the pattern of trade can be determined solely by income distribution. The main contribution of our paper is to distinguish between foreign aid and remittances based on the income of the recipient and, especially, to analyze separately their effects on industrial growth. To our knowledge we are the first to consider both transfer types in one setting and yet be able to differentiate them based on how they are distributed.

In the next section we describe the economic environment. In the third section we consider trade and we develop our main propositions on the effect of aid versus remittances. Our empirical estimations are in the fourth section and our conclusions are contained in the fifth section.

2 Economic Environment

We want to isolate the effects of income distribution and transfers on a small country we call Home. This country trades many differentiated manufacturing goods and a numeraire good with the rest of the world in a collection of bilateral relationships and we model one of those relationships.

We adopt and modify a framework first introduced by Behzadan and Chisik (2022). There are three sectors in the economy and the upper-tier utility function is non-homothetic so that poor and wealthy agents have different consumption patterns and differing income expansion paths. One of the sectors is similar to that introduced in Krugman (1980) whereby the monopolistic competition model of Dixit and Stiglitz (1977) is extended to multiple countries and a transport cost. Aid and remittances interact with the income distribution in differing ways, which, through their effects on the different income expansion paths generate different firm location outcomes in the monopolistically competitive sector.

There are L agents in Home and L^* in Foreign (denoted by *) and among the L Home agents $\kappa < 1/2$ are wealthy and $(1-\kappa)$ are poor. Each wealthy agent is endowed with $\theta > 1$ units of effective labor and each poor agent is endowed with $1/\theta$ unit of effective labor. Each Foreign agent is endowed with one unit of effective labor. We set $\theta = (1-\kappa)/\kappa$ so that the total effective labor endowment is the same in both countries. We take $1/\kappa$ as an index of Home income inequality. As κ approaches 1/2, θ approaches unity and there is little inequality. As

trade liberalization.

κ is reduced, θ increases and disparity between the poor and wealthy grows.

Home also receives a transfer, τ, in units of the numeraire good, from the (un-modeled) rest of the world. In order to compare the differing effect of aid and remittances, or more generally, the effect of the recipient's income on the transfer outcome, we parameterize by η as the portion of the transfer that is allocated to the $1-\kappa$ poorer individuals in Home. Our idea is that η is larger for remittances. If remittances are given only to the poor, then $\eta = 1$. If aid is given uniformly, then $\eta = 1 - \kappa$. If the government distributes the aid narrowly to an entrenched elite, then η would approach zero.[11] Labor is the only factor of production and its wage is w. Per capita Home income is given as $Y_A = w\theta + \tau(1-\eta)/\kappa$ for each of the κ affluent agents and $Y_B = w/\theta + \tau\eta/(1-\kappa)$ for the $(1-\kappa)$ less affluent. Since our focus is Home we assume that Foreign income is evenly distributed, they receive no transfer, per capita labor productivity is 1, and per capita income is $Y^* = w^*$.

Preferences in both countries can be represented by the following Stone-Geary type utility function:

$$u\left(d_s, D_M, c_0\right) = (d_s + \gamma)^{\alpha}(D_M)^{\beta}(d_0)^{1-\alpha-\beta} \tag{1}$$

where d_s is consumption of a non-tradable good we call services, D_M is a composite of manufactured goods consumption, and d_0 is consumption of a freely traded numeraire good. If $\gamma = 0$, then these preferences would be homothetic and agents would spend a constant income share $(\alpha, \beta, 1-\alpha-\beta)$ on each of the goods. As will be seen below, with $\gamma > 0$ services become a luxury good so that the marginal propensity to consume services is increasing in income. Stone-Geary preferences are more commonly depicted with $\gamma < 0$ so that it determines a subsistence level of the good.[12] The more common depiction does not allow for a consideration of within-country income distribution because all agents must achieve the subsistence level of the good and, therefore, all have the same marginal propensity to consume each good. That is, the share of additional income allotted to each good is the same for all agents regardless of their initial income. Our luxury good version, with $\gamma > 0$, allows some agents to purchase no services in the market and allows us to make meaningful statements about within-country income distribution.

The services sector may consist of household services, transportation services, childcare or

[11] Aid is distributed to a government or regional authority who then disperses it according to their own preferences. Hence, it is unlikely that aid is distributed uniformly.

[12] See Alvarez-Cuadrado and Poschke (2011) for an example. Although empirical work, such as Stone (1954), the extensive literature cited in Deaton and Muellbauer (1980), and Hunter and Markusen (1988), among others has repeatedly shown that preferences are not homothetic, it is still not obvious what is the best functional form for representing non-homothetic preferences. The Stone-Geary function with a subsistence requirement so that $\gamma < 0$ is the most commonly employed. A similar formulation to that used here, with $\gamma > 0$, was used in Behzadan, Chisik, Onder, and Battaile (2017) and Behzadan and Chisik (2022).

elder care, education, socializing with friends or family, playing sports, reading, or taking walks. The parameter, $\gamma > 0$, can be interpreted as the amount of services that can be consumed without being purchased in the market. For example, an individual could prepare their own meals, care for their own children and drive their own car, or they could employ a chef, a nanny and a chauffeur. Our idea is that housekeeping, childcare, lawn care, nannies, butlers, chauffeurs, and financial services are more likely to be purchased by wealthier individuals and these services are less tradable than are manufactured goods. See footnote (6) for some empirical justification.

Manufactured goods preferences exhibit a love of variety and are represented by the following sub-utility function:

$$D_M = \left[\int_0^{N+N^*} d_m(z)^{\frac{\sigma-1}{\sigma}} dz \right]^{\frac{\sigma}{\sigma-1}}. \tag{2}$$

The consumption of good z is $d_m(z)$. The elasticity of substitution between these goods is $\sigma > 1$. The number of manufacturing varieties produced in Home and Foreign are N and N^*, respectively. A Home agent's budget constraint is

$$\int_0^{N+N^*} p_m(z) d_m(z) dz + p_s d_s + p_0 d_0 \leq Y. \tag{3}$$

Foreign is similar. Following Dixit and Stiglitz (1977) we use the expenditure function for the sub-utility function D_M (for one unit of utility) and write it as $P_M = \left(\int_0^{N+N^*} p_M(z)^{1-\sigma} dz \right)^{\frac{1}{1-\sigma}}$ so that $P_M D_M = \int_0^{N+N^*} p_m(z) d_m(z) dz$. Replacing $P_M D_M$ in equation (3) and noting that the utility maximization problem satisfies the conditions for two-stage budgeting, the first-stage maximization of equation (1) subject to (3) yields:

$$\begin{gathered} d_s = Max \left\{ 0,\ \frac{\alpha Y - p_s \gamma (1-\alpha)}{p_s} \right\} \\ D_M = Min \left\{ \frac{\beta Y}{(1-\alpha) P_M},\ \frac{\beta (Y + p_s \gamma)}{P_M} \right\} \\ d_0 = Min \left\{ \frac{Y(1-\alpha-\beta)}{(1-\alpha) p_0},\ \frac{(Y + p_s \gamma)(1-\alpha-\beta)}{p_0} \right\}. \end{gathered} \tag{4}$$

Turning to production we write q_j as the supply of good $j \in \{m, s, 0\}$ and ℓ_j as the labor used in production. Each Home manufacturing good has technology $\ell_m(z) = bq_m(z) + f$. Numeraire goods and Services have technology $\ell_0 = q_0$ and $\ell_s = q_s\chi(q_s)$, where $\chi(q_s)$ is the average productivity of labor in services. Foreign technology is similar. Services may exhibit constant returns to scale so that $\chi(q_s) = \chi$ for all q_s and it would be natural to assume that χ is the same in Home and Foreign. We will also analyze decreasing returns to scale and when $q_s \neq q_s^*$ we would have that $\chi(q_s) \neq \chi(q_s^*)$. Since there will be strictly positive and finite maximum and minimum levels of q_s and q_s^* in any equilibrium, there will be maximum and minimum levels of $\chi(q_s)$ which we denote as $\bar{\chi}$ and $\underline{\chi}$,respectively. No barriers to entry exist in any sector. Resource constraints for Home and Foreign are $L = \int_0^N \ell_m(z)dz + \ell_s + \ell_y$ and $L^* = \int_0^{N^*} \ell_m^*(z)dz + \ell_s^* + \ell_y^*$. Labor supplies are sufficiently large so that numeraire production is positive in both countries.

Free trade and perfect competition in the numeraire equates numeraire prices and since the numeraire is produced with the same constant-returns-to-scale technology in both countries the numeraire price is equal to the wage in both countries. Hence, we have $w = p_0 = p_0^* = w^*$ and we normalize $p_0 = 1$. Perfect competition in services then yields $p_s = w/\chi(q_s) = 1/\chi(q_s)$ and $p_s^* = 1/\chi(q_s^*)$.

These piecewise-connected demand functions in equation (4) all switch from the first to the second component when $Y = \frac{p_S\gamma(1-\alpha)}{\alpha} = \hat{Y}$. In particular, if $Y < \hat{Y}$, then the second component of services demand would be negative. Given that demand must be non-negative, we have that $d_s = 0$ for $Y < \hat{Y}$. Furthermore, if $d_s = 0$, then both D_M and d_0 switch to their first component in the demand functions in equation (4). The following assumption ensures that only rich Home agents and that all Foreign agents purchase services:

$$\bar{\chi}\left[1/\theta + \frac{\tau\eta}{(1-\kappa)}\right] < \frac{\gamma(1-\alpha)}{\alpha} < \underline{\chi}. \tag{5}$$

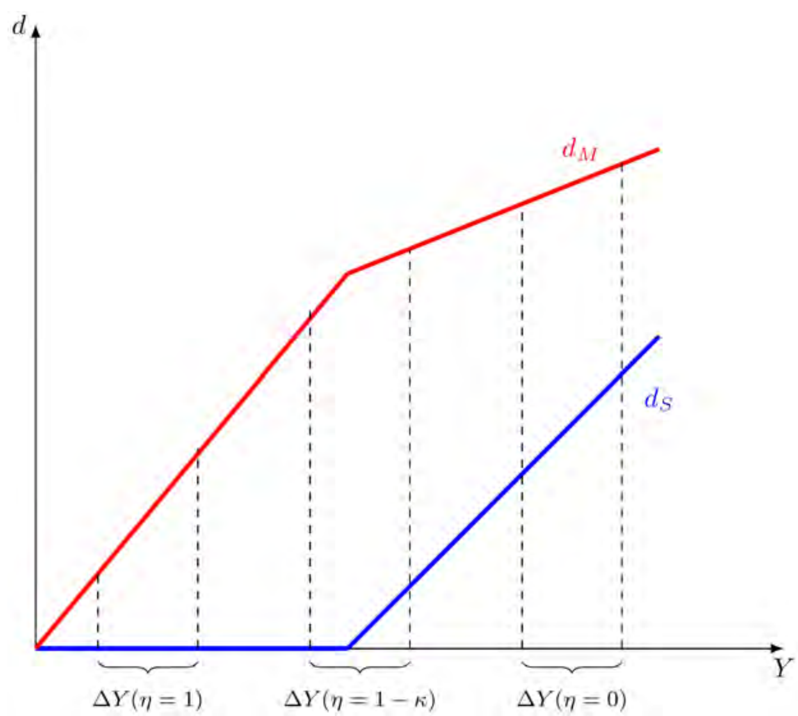
To understand (5) note that since $p_s = 1/\chi(q_s)$ we have $\hat{Y} = \frac{\gamma(1-\alpha)}{\alpha\chi(q_s)}$. So that poor Home agents do not purchase services we assume that their income, Y_B, is less than $\hat{Y}$. This assumption is more easily satisfied if services labor productivity is lower, if services are more of a luxury good (γ is larger), and if the services contribution to utility, α, is smaller. It also requires that services are a luxury item so that γ is not a subsistence level, for if $\gamma \leq 0$, then (5) could not be satisfied. Similarly, we assume that wealthy Home agents purchase services even in the absence of a transfer, which requires that $\theta > \hat{Y}$. We make the stronger assumption that $\hat{Y} < 1 = Y^*$, so that all Foreign agents purchase services.[13] If services exhibit non-constant returns to scale, then $\underline{\chi} < \bar{\chi}$ and we also require that the variation in

[13] Our results do not depend on this assumption. The same results would obtain if $1 < \hat{Y} < \theta$ and no Foreign agents purchase services.

$\chi(q_s)$ is not too large.

From the demand functions in equation (4) we can illustrate the main intuition behind our model in Figure 3 which depicts the income expansion path for manufactured goods and for services. Crucially, these functions both change their slope at the critical income level $\hat{Y}$. A transfer in the form of a remittance in the amount of $\tau = \Delta Y(\eta = 1)$ that is given only to poor people (those with income less than $\hat{Y}$) does not increase their spending on services after receiving the transfer, but does generate a steep increase in their purchase of manufactured goods. Aid that is given uniformly in the amount of $\tau = \Delta Y(\eta = 1 - \kappa)$ generates modest increases in the demands for services and manufactured goods. Finally, moving further to the right, we see the effect of aid that ends up in the hands of a narrow, already wealthy, group in the amount of $\tau = \Delta Y(\eta = 0)$. In this case, aid generates the largest increase in the demand for services and the smallest increase in the demand for manufactured goods.

Figure 3: Effect of Transfer on Demand



3 International Trade

3.1 Aid versus remittances

In this subsection we assume that services production exhibits constant returns to scale. Using equation (4), the equation for Home income, the equilibrium conditions $w = w^* = 1$

and $p_s = 1/\chi = p_s^*$, and equating Home supply and demand for services yields $q_s = d_s = \alpha\chi[1-\kappa+\tau(1-\eta)] - \gamma(1-\alpha)$. Adding the equation for Foreign income allows us to write Home and Foreign expenditures on manufactured goods as

$$P_M D_M = \frac{\beta\left[(1-\alpha)\left[(1-\kappa+\tau(1-\eta))\chi+\gamma\kappa\right]+(\kappa+\tau\eta)\chi\right]}{(1-\alpha)\chi} \qquad P_M^* D_M^* = \frac{\beta(\chi+\gamma)}{\chi} \tag{6}$$

A Home agent's demand for each manufactured good satisfies $d_m(z) = D_M[P_M/p_m(z)]^\sigma$ and a Foreign agent's is $d_m^*(z) = D_M^*[P_M^*/p_m^*(z)]^\sigma$. The price index P_M (the expenditure function for one unit of utility) is a function of Home and Foreign prices and the trade cost which is of the iceberg variety. The per-unit trade cost is $\frac{r-1}{r} > 0$ so that if 1 unit is exported, then $\frac{1}{r}$ arrives in the other country. The Foreign price of variety z that is produced in Home is $p_m^*(z) = rp_m(z)$ and the Home price of a Foreign produced variety is $p_m(z) = rp_m^*(z)$. Home and Foreign price indices are

$$P_M = \left(\int_0^{N+N^*} p_M(z)^{1-\sigma} dz\right)^{\frac{1}{1-\sigma}} = \left(Np_m(z)^{1-\sigma} + N^*(rp_m^*(z))^{1-\sigma}\right)^{\frac{1}{1-\sigma}} \tag{7}$$

$$P_M^* = \left(N(rp_m(z)^{1-\sigma} + N^*p_m^*(z)^{1-\sigma}\right)^{\frac{1}{1-\sigma}}.$$

There are very many manufacturing firms, therefore, each firm treats D_M, P_M, D_M^*, and P_M^* as constants independent of their own choices. Since all Home and Foreign firms have identical technologies, firm profit maximization and free entry result in each producer choosing the same output, $q_m = q_m(z) = q_m^*(z)$, and setting the same price, $\rho = p_m(z) = p_m^*(z)$.

Using (6) and equating Home supply and combined Home and Foreign demand for each Home variety we have

$$\begin{aligned} q_m &= d_m(z) + rd_m^*(z) \\ &= \frac{\beta}{\chi}\left[\frac{\rho^{-\sigma}[(1-\alpha)[(1-\kappa+\tau(1-\eta))\chi+\gamma\kappa]+(\kappa+\tau\eta)\chi]}{(1-\alpha)(P_M)^{1-\sigma}}L + \frac{r(r\rho^{-\sigma})(\chi+\gamma)}{(P_M^*)^{1-\sigma}}L^*\right] \\ &= \frac{\beta}{\chi\rho}\left[\frac{\psi L}{N+N^*R} + \frac{\phi L^* R}{NR+N^*}\right] \end{aligned} \tag{8}$$

where $\psi \equiv \frac{[(1-\alpha)[(1-\kappa+\tau(1-\eta))\chi+\gamma\kappa]+(\kappa+\tau\eta)\chi]}{(1-\alpha)}$, $\phi \equiv \chi + \gamma$, and $R \equiv r^{1-\sigma}$. World demand for a Foreign variety equals Foreign supply, therefore,

$$q_m^* = \frac{\beta}{\chi\rho}\left[\frac{\psi LR}{N+N^*R} + \frac{\phi L^*}{NR+N^*}\right]. \tag{9}$$

Equating (8) to (9) and solving simultaneously yields the ratio of Home to Foreign manufacturing firms as

$$\frac{N}{N^*} = \frac{\psi L/L^* - \phi R}{\phi - \psi RL/L^*}. \tag{10}$$

Equation (10) is similar to equation (25) in Krugman (1980), however, it also contains our additional terms ψ and ϕ, which allow us to analyze how transfers and income distribution affect the relative size of the Home manufacturing industry.[14]

To analyze the effect of transfers and income distribution on Home manufacturing, first note that the key ratio in equation (10) is only defined if $R < (\psi/\phi)(L/L^*) < 1/R$, otherwise either Home or Foreign have no manufacturing firms. So that we can analyze smooth changes in Home's manufacturing industry we will assume that both of the above inequalities are satisfied, therefore, the numerator and denominator of equation (10) are both strictly positive. Second, note that $\frac{\partial(N/N^*)}{\partial\psi} = \frac{\phi L/L^*(1-R^2)}{(\phi-R\psi L/L^*)^2} > 0$ and that $\frac{\partial^2(N/N^*)}{\partial\psi^2} = \frac{[\phi L/L^*(1-R^2)]2RL/L^*}{(\phi-R\psi L/L^*)^3} > 0$. A decrease in Home income inequality, therefore, alters the key ratio (10) in the following manner $\frac{\partial(N/N^*)}{\partial\kappa} = \frac{\partial(N/N^*)}{\partial\psi}\frac{[(1-\alpha)\gamma+\alpha\chi]}{(1-\alpha)} > 0$ so that a more equal income distribution increases the size of Home's manufacturing industry.

To see the effect of transfers on Home manufacturing note that $\frac{\partial(N/N^*)}{\partial\tau} = \frac{\partial(N/N^*)}{\partial\psi}\frac{[(1-\alpha)(1-\eta)+\eta]\chi}{(1-\alpha)} > 0$, $\frac{\partial(N/N^*)}{\partial\eta} = \frac{\partial(N/N^*)}{\partial\psi}\frac{\alpha\chi\tau}{(1-\alpha)} > 0$, and $\frac{\partial^2(N/N^*)}{\partial\tau\partial\eta} = \frac{\partial(N/N^*)}{\partial\psi}\frac{\alpha\chi}{(1-\alpha)} + \frac{\partial^2(N/N^*)}{\partial\psi^2}\frac{[(1-\alpha)(1-\eta)+\eta]\chi}{(1-\alpha)}\frac{\alpha\chi\tau}{(1-\alpha)} > 0$. Hence, manufacturing firms move to Home to take advantage of the now larger Home market generated by the transfer and, crucially, this movement is larger if more of the transfer is given to poorer people. Furthermore, we have that $\frac{\partial^2(N/N^*)}{\partial\tau\partial\kappa} = \frac{\partial^2(N/N^*)}{\partial\psi^2}\frac{[(1-\alpha)(1-\eta)+\eta]\chi}{(1-\alpha)}\frac{[(1-\alpha)\gamma+\alpha\chi]}{(1-\alpha)} > 0$, which indicates that this effect is also greater if Home has a more equal income distribution.We can now state our first proposition.

Proposition 1. *A transfer to Home increases its relative number of manufacturing firms. This increase is larger if more of the transfer is given to low-income people or if Home has a more equal pre-transfer income distribution.*

Proposition 1 suggests why remittances over foreign aid may generate greater manufacturing growth. In addition, for any form of transfer, manufacturing growth is less if the recipient country has worse income inequality. On the other hand, even if the transfer is given only to the wealthy, so that $\eta = 0$, it will still increase manufacturing. There are two reasons for this

[14]Since output is the same for all firms, an increase in this ratio implies growth in Home manufacturing.

result. First, the transfer increases the size of the economy and because it comes from outside of the country it does not reduce the income of poor agents. Second, although the transfer increases the demand for services, it does not affect their price because their production is assumed to be constant returns to scale. Hence, although the composition of demand shifts to services, the demand for manufactured goods also increases as well. Since manufacturing firms locate production in the larger market to save on trade costs, the transfer increases the relative number of Home manufacturing firms.

3.2 Aid versus remittances with a Dutch disease effect

To see how a transfer can cause a Dutch disease effect we now assume that services exhibit decreasing returns to scale. In this case the average productivity of labor in services $\chi(q_s)$ decreases as their output increases. Setting services production equal to demand we have $q_s = d_s = \alpha\chi(q_s)[1-\kappa+\tau(1-\eta)] - \gamma(1-\alpha)$, therefore, $\frac{dq_s}{d\tau} = \frac{\alpha\chi(q_s)(1-\eta)}{1-\alpha[1-\kappa+\tau(1-\eta)]\frac{\partial\chi(q_s)}{\partial q_s}} \geq 0$ which is decreasing in η and is zero if $\eta = 1$. Hence, a transfer increases services output by a greater amount if more of it is given to the wealthy and it will not increase services output at all if given only to the poor.

Solving for the key ratio when there are decreasing returns to scale in services yields

$$\frac{N}{N^*} = \frac{\psi(q_s)L/L^* - \phi(q_s^*)R}{\phi(q_s^*) - \psi(q_s)RL/L^*}. \tag{11}$$

where $\psi(q_s) = \frac{[(1-\alpha)[(1-\kappa+\tau(1-\eta))\chi(q_s)+\gamma\kappa]+(\kappa+\tau\eta)\chi(q_s)]}{(1-\alpha)}$ and $\phi(q_s^*) = \chi(q_s^*) + \gamma$.

Since Foreign does not receive a transfer, q_s^* does not change and we only need to consider the additional effect of q_s on $\psi(q_s)$. We then have $\frac{\partial\psi(q_s)}{\partial q_s} = \frac{[(1-\alpha)\tau(1-\eta)+(\kappa+\tau\eta)}{(1-\alpha)}\frac{d\chi(q_s)}{dq_s} < 0$.

The transfer's total effect is $\frac{d(N/N^*)}{d\tau} = \frac{\partial(N/N^*)}{\partial\psi(q_s)}[\frac{(1-\alpha)(1-\eta)+\eta}{(1-\alpha)}\chi(q_s) + \frac{(1-\alpha)\tau(1-\eta)+(\kappa+\tau\eta)}{(1-\alpha)}\frac{d\chi(q_s)}{dq_s}\frac{dq_s}{d\tau}]$. If the transfer is given only to the poor, then $\eta = 1$, $\frac{dq_s}{d\tau} = 0$, and the product of the last three terms in the square brackets is zero, therefore, the transfer increases the relative amount of Home manufacturing. If the transfer is given only to the wealthy, then $\eta = 0$ and the product of the last three terms is negative. Furthermore, the first term in brackets is minimized and, therefore, for certain parameter values $\frac{\partial(N/N^*)}{\partial\tau} < 0$. Hence, there is a critical level of η denoted as $\hat{\eta}$ such that if $\eta < \hat{\eta}$, then a foreign transfer can generate a Dutch disease effect. We summarize this argument in our second proposition.

Proposition 2. *If production of services exhibits decreasing returns to scale, then: (i) a foreign transfer only to the poor must increase the size of the recipient country's manufacturing industry; (ii) there exists a critical level of the percent of the transfer given to the* *poor, $\hat{\eta}$, such that for $\eta < \hat{\eta}$, a foreign transfer reduces the size of the recipient country's manufacturing industry.*

The Dutch disease described in Proposition 2 may also be accompanied by a decrease in Home welfare, especially for the poor agents. Using equation (1) and the first components of the demand equations (4) welfare of the poor agents can be expressed $U_{poor}(Y, P_M, p_0) = \gamma^\alpha(\frac{\beta Y}{(1-\alpha)P_M})^\beta(\frac{Y(1-\alpha-\beta)}{(1-\alpha)p_0})^{1-\alpha-\beta}$. The transfer affects both income, Y, and the price index, P_M. The Dutch disease in Home, which is evidenced by firms relocating to Foreign to take advantage of the relatively larger market for manufactured goods generates an increase in the Home price index as the relative number of Home firms decreases.[15] If the transfer is given mostly to the wealthy, then the change in income, Y, for the poor is small and the increase in P_M is larger so that the transfer could decrease their welfare. Using the second components of the demand equations (4) a related expression could be derived for the wealthy agents, but it would also be a function of the price of services, p_s. It is interesting to note that if the transfer is given mostly to the poor, the wealthy (as well as the poor) would see an increase in welfare because of the consequent decrease in the Home price index.

The Dutch disease is often considered to be caused by an increase in the real exchange rate, which is, in effect, the ratio of the expenditure weighted price indices for non-tradables over tradables. Since the poor and wealthy Home agents are on different parts of the income expansion path we require separate expenditure functions for each type, therefore, deriving a formula for the real exchange rate in our framework is complicated and beyond the scope of this paper. Still, we note that as the wealthy receive more transfer they spend more on services which increases the price of, and the expenditure share on, the non-tradable services. Hence with decreasing returns to scale a transfer mostly to the wealthy is suggestive of an increase in the real exchange rate. On the other hand, as manufacturing moves to Foreign the home price index for manufactured goods would increase, which suggests that the initial increase in the real exchange rate would be tempered by the firm relocation effect.

Propositions 1 and 2 along with our assumption that remittances flow to poorer people and that the average beneficiary of foreign aid is wealthier, provide our main predictions: Remittances increase manufacturing output, foreign aid may decrease or increase output depending on the returns to scale in services and the average income of the recipient, and even if foreign aid increases manufacturing it will increase it by a lesser amount than do remittances.

[15] To see this result formally denote $\bar{N}$ as the total number of manufacturing firms and then rewrite equation (7) as $P_M = \rho(N + (\bar{N} - N)\tau^{1-\sigma})^{\frac{1}{1-\sigma}}$. Taking the derivative with respect to N yields $\frac{\partial P_M}{\partial N} = \frac{1}{1-\sigma}\rho(N + (\bar{N} - N)\tau^{1-\sigma})^{\frac{\sigma}{1-\sigma}}(1 - \tau^{1-\sigma}) < 0$.

4 Empirical Testing

When taking our model to the data we use the fact that a single manufactured good encompasses horizontal and vertical integration across several regions and that differing goods have differing prices. The corresponding predictions should then be on the value added in the manufacturing sector. We can then state our three hypotheses as follows: (1) foreign aid generates a reduction in the value added in the manufacturing sector; (2) remittances generate an increase in the value added in the manufacturing sector; (3) the difference between the effect of remittances and aid on the value added in the manufacturing sector is positive.

Two potential drawbacks to any cross-country regression and especially one that attempts to measure the causal effect of aid or remittances on growth are endogeneity and omitted variable bias. In order to reduce the omitted variable bias we exploit the panel nature of our data and consider the growth of each industry in each country over time as our dependent variable. In this way we can include fixed effects to capture the average variation in each country, in each industry, and in each year.

We use two methods to reduce the potential endogeneity of aid and remittances. The first method was developed by Rajan and Zingales (1998) and later used by Rajan and Subramanian (2011), hereafter referred to as RS, to consider the effect of aid on growth. This method uses the fact that not all industries are affected equally by changes in the real exchange rate. First, any reduction in competitiveness resulting from an appreciation of the exchange rate is more likely to be felt in industries with lower profit margins such as homogeneous product industries. Second, the government of a developing country would not have the resources necessary to support a no longer profitable export. These two ideas suggest a measure of the exportability of each industry (based on the amount of differentiation in an industry and the likelihood of being a developing country export) and we then interact these derived dummy variables with remittances and with aid.[16]

Although isolating the effect of aid and remittances on the growth of the most export-sensitive industries reduces the possibility of reverse causality (unless the growth of all industries and sectors of the economy are perfectly correlated) there still may exist some bias

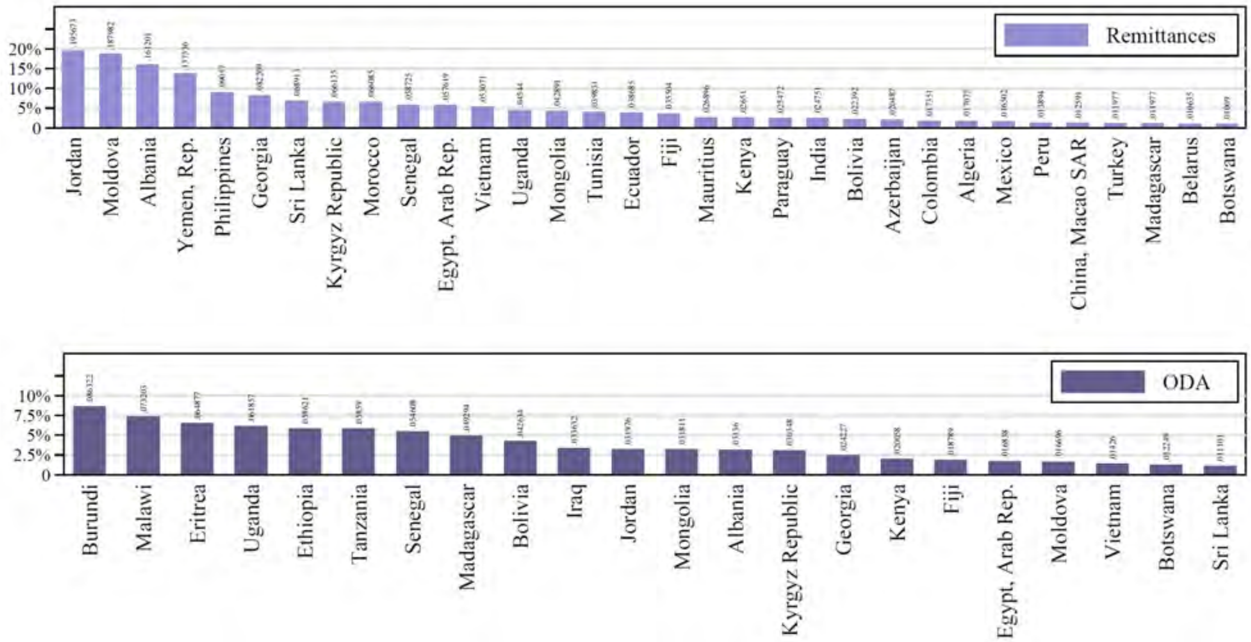
[16]The data we report in Figure 2 suggests an alternative method to test the predictions in our paper whereby we make explicit use of the income elasticity for each good. However, the Global Trade Analysis Project (GTAP) database which would permit an estimation of industry income elasticities across countries only provides data in three to four year intervals starting in 2004 rather than the annual data from 1991 to 2009 that we use. This alternative approach would not only significantly reduce our number of observations, it would also change our analysis to that of much longer-term effects instead of the annual changes we estimate. Although, we expect that the annual effects we estimate would exist, and possibly be magnified in later years, such long-term effects would co-exist with too much statistical noise to be accurately identified in the data.

due to endogeneity. As a result, our second method is to make use of valid instruments for aid and for remittances. In constructing instruments to reduce any remaining possible endogenous variable bias we look for factors that are determined by the donor and not the recipient of the transfer. To this end we use the fact that the amount of remittances a country receives is correlated with the number of emigrants from that country. Emigrant outflows from a country could still be endogenous to the growth in manufacturing, therefore, we use the total stock of immigrants in the world (other than the country in question) which is correlated with the emigrants from our country of interest but bears little relationship to their manufacturing productivity. As an instrument for aid we construct a "supply-push aid" instrument as introduced in Temple and Van de Sijpe (2017). In particular, we measure the average portion of each donor's aid received by each recipient country, over the years 1980 to 1990, which is before the start of our sample time period. This fraction is then multiplied by each donor's total yearly foreign aid to derive a valid instrument for each recipient's received aid in each year.

4.1 Data

In estimating our model we consider the annual changes of the value added in the manufacturing sector over the nineteen year period from 1991 to 2009. For this time period we have data on manufacturing value added for 23 industries and up to 56 countries. We also construct a measure of exportability using export data in each industry. Table 6 and Table 7 in the appendix list the industries and countries in our sample. The manufacturing value added and exports data is from INDSTAT4 UNIDO (2015) revision 3, at the 3- and 4- digit ISIC code level. The data are then aggregated at the 2-digit level in order to obtain the main industry divisions as indicated by International Standard Industrial Classification revision 3. The nominal manufacturing value added is then converted to the real value added using the U.S. producer price index (PPI) with a base year of 2010. Data on PPI are from the OECD data base. Foreign aid is measured by Official Development Assistance (ODA) disbursements (constant 2015 US$) from the OECD Development Assistance Committee (DAC) database and it is later divided by GDP (constant 2005 US$). Additionally, data on remittances and GDP are from the World Bank 2015 WDI. Figure 4 lists the recipients of these two types of international transfers as a percent of GDP, for a sub-sample of recipients with an average transfer above 1% of their GDP. As noted earlier, the overlap between these two sets of countries is very small, especially when considering the major recipients in our sample.

Figure 4: Transfers as Percent of GDP (1991-2009 average)



In addition, we construct an instrument for remittances using the global stock of immigrants. The data are obtained from the United Nations for 1991 to 2009 and we perform the aggregation (as will be explained below) using all available countries in this dataset. Table 5 provides the summary statistics for all observed and constructed variables used in our estimations.[17]

4.2 Fixed Effects Estimation

We begin our empirical analysis by estimating variations of the following fixed effects regression:

$$\begin{aligned} growth_{ijt} = \beta_0 + \beta_1 share_{ij90} + \beta_2 \left(exportability_i \cdot aid_{jt}\right) \\ + \beta_3 \left(exportability_i \cdot remittance_{jt}\right) + \delta_i + \delta_j + \delta_t + \varepsilon_{ijt} \end{aligned} \tag{12}$$

where i indexes industry and j indexes country and t indexes year. Our dependent variable $growth_{ijt}$ is the annual growth rate of the value added in industry i and country j, measured by $\left(log\left(valueadded\right)_{ijt+1} - log\left(valueadded\right)_{ijt}\right)$. The variable $share_{ij90}$ is the share of industry i in national manufacturing value added at the beginning of the decade which

[17]The raw panel-data has 24,472 observations including some missing data. The major source of this missing data in our panel is the variable "growth". When it comes to the estimations, the missing values are dropped and we are left with a strongly balanced panel containing 8,189 or 8,179 observations depending on what specification we use. The list of the countries provided in Table 7 are those that remain in the estimations after dropping these missing values.

captures the industry-country variations. If there exists learning-by-doing or other forms of industry-wide dynamic economies of scale, then larger industries will continue to grow larger and we would expect the coefficient of the share variable to be positive. On the other hand, convergence theory would predict a negative coefficient. Although there are compelling theoretical justifications for conditional convergence of countries, it is less clear that industries would converge over time.[18] The variable aid_{jt} is the ratio of country j's foreign aid to its GDP. Likewise, $remittance_{jt}$ is the ratio of country j's remittance inflow to its GDP. The three fixed effects are δ_i for industry, δ_j for country, and δ_t for year.

The *exportability* variable is an industry characteristic and captures how sensitive an industry is to changes in the relative value of exports. We evaluate this measure of sensitivity for our sample using a method similar to that of RS and then interact two different forms of it in our estimations. The first, *exportability*1, is a dummy variable which is 1 for those industries in which the ratio of the value of exports to value added is higher than the median of all industries and is 0 otherwise. This ratio is computed with respect to the average of all countries in the sample and is, therefore, not country specific. Industries with a high ratio have a lower profit margin and could be considered as more homogeneous industries. The second measure which includes fewer industries, *exportability*2, is a dummy variable that is 1 for textiles, wearing apparel, leather products, and footwear and is 0 otherwise. These industries are the most common manufactured exports for poorer developing countries. A list of the industries and the value of each sensitivity measure for each industry is contained in Table 6 in the appendix.

Our coefficients of interest are β_2 and β_3. In particular, we expect that $\beta_3 > 0 > \beta_2$ and that these two coefficients are significantly different from one another. The results of estimating equation (12) are reported in Table 1.[19]

Columns (1) to (3) include fixed effects estimation results using *exportability*1 whereas those of *exportability*2 are presented in columns (4) to (6). Moreover, in columns (1) and (4), we

[18] Although convergence theory in general suggests countries with lower initial levels of GDP grow faster, one should approach this idea with caution when it comes to growth within industries. Studying labor productivity growth, Rodrik (2011) finds evidence of unconditional convergence in the manufacturing sector for 1999-2007. Our study is different from Rodrik's in that we use the growth of value added in each industry in the manufacturing sector rather than the labor productivity. Therefore, we expect that value added includes the return to all inputs including labor and as such we don't expect to find the exact results as Rodrik's when it comes to convergence. In addition, rather than looking at the effect of the composition of manufacturing among different industries, by including the initial value added in each unique industry in 1990 that is just outside of the period of our study, we are controlling for common factors that vary by industry and country to isolate the effects of transfers on the growth of the value added in that specific industry.

[19] In all of our econometric estimations the results were very similar whether we included aid and remittances separately or simultaneously. For parsimony of presentation we present only the results for the simultaneous estimations.

Table 1: Fixed Effects Estimation

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Initial share	0.056***	0.056***	0.056***	0.056***	0.056***	0.056***
	(0.010)	(0.010)	(0.011)	(0.011)	(0.010)	(0.011)
Remittances × Exportability 1	0.419***	0.404***	0.273**			
	(0.128)	(0.145)	(0.122)			
Aid × Exportability 1	-1.251***	-1.228**	-0.395			
	(0.462)	(0.486)	(0.543)			
Remittances × Exportability 2				0.384**	0.387**	0.284**
				(0.154)	(0.176)	(0.135)
Aid × Exportability 2				-1.109	-0.966	-0.568
				(0.731)	(0.772)	(0.600)
Observations	8,189	8,176	8,189	8,189	8,179	8,189
R-squared	0.043	0.090	0.197	0.043	0.090	0.197
Country FE	YES	YES	NO	YES	YES	NO
Industry FE	YES	NO	YES	YES	NO	YES
Year FE	YES	NO	NO	YES	NO	NO
Industry_year FE	NO	YES	NO	NO	YES	NO
Country_year FE	NO	NO	YES	NO	NO	YES
Wald test p-value	0.0021	0.0046	0.2682	0.0713	0.1200	0.2077

Notes: Dependent variable is annual growth rate of manufacturing value added. Foreign aid and remittances are measured as percentages of GDP. Clustered standard errors are in parentheses. A lower *p-value* indicates that β_2 and β_3 are more likely to be statistically different. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

apply industry, country, and year fixed effects separately, whereas in columns (2) and (5) industry and year fixed effects are combined in order to account for the year and industry characteristics jointly. Similarly, since we are not using aid or remittances as separate variables due to the endogeneity concern, in columns (3) and (6) we use a compound country-year fixed effect to consider the simultaneous variations coming from these two dimensions.

Using the exportability measure of type one, we find that remittances have a positive and significant effect on the growth of those industries that are more sensitive to exports. In other words, a one percentage point increase in remittances to GDP in the most export-sensitive industries, results in about 0.4 percentage point faster growth relative to that of the least export-sensitive industries. On the other hand, more foreign aid reduces the pace of growth in the highly exportable industries by 1.2 percentage points. When the second type of exportability measure is used in the estimations the positive effects of remittances are smaller by 0.1 percentage point resulting from a fewer number of industries. More specifically, when countries receive a one percentage point increase in remittances (relative to GDP), the clothing and footwear industries grow about 0.3 percentage point faster compared to other less sensitive industries (where $exportability2 = 0$). At the same time, a one percentage point increase in the ratio of aid to GDP has no significant impact on the growth in the value added of these export sensitive industries.

Furthermore, to test whether these two coefficients (i.e. β_2 and β_3) are statistically distinct, we test the following null hypothesis using the Wald test:

$$H_0: \ \beta_2 - \beta_3 = 0$$

The Wald test p-values presented in Table 1 indicate that we can reject the equality hypothesis at the 1 percent level when the homogeneity measure of exportability is used, and at the 10 percent when the second type is considered. In other words, β_2 and β_3 are statistically different especially when we consider more exportable industries in the analysis. This implies that the impact that higher remittance inflows have on the manufacturing sector is distinct from that of foreign aid. Thus, in our sample of countries, we have found significant evidence that on average, unlike foreign aid, higher remittances have not resulted in any Dutch disease effects during the period from 1991 to 2009. Note as well that the coefficient on the initial share is always positive and significant. This could suggest that larger industries grow larger over time, which may result from agglomeration effects or learning-by-doing.

Overall, our findings from the fixed effects estimation confirm that increased remittances have generated growth of the manufacturing sector, specifically in industries whose exports are more sensitive to changes in the real exchange rate. On the other hand, larger foreign aid inflows have had a negative effect on those same industries. Hence, we have found indications that foreign aid, but not remittances, can generate a Dutch disease effect.

4.3 Instrumental Variable Estimation

In order to claim the relations we found in the previous section are truly causal, in this section we seek to remove any possible reverse causality between aid and remittances and the growth of value added in industries. For instance, if aid is systematically directed to low-growth industries or if remittances are directed to high growth industries, then aid and remittances would not be exogenous and our fixed effects estimation could still pick up an effect that measures correlation rather than causation. Although any potential endogeneity arising from poorly directed transfers would be somewhat controlled for by our exportability dummy variables, and also the use of simple and compound fixed effects which reduce the omitted variable bias originating from one-dimensional and two-dimensional variations, we still choose to construct instruments for remittances and foreign aid and further use a 2-stage least squares (2SLS) estimator to account for any possible remaining endogeneity or reverse causality problems.

In dealing with the endogeneity of foreign aid, we construct a valid instrument that originates from the donor's characteristics. Most of the suggested instruments for aid throughout the aid and growth literature are subject to criticism because the proposed instruments are still correlated with the error term and their exogeneity is not well-established. In a recent study, Temple and Van de Sijpe (2017) propose an instrument that exploits exogenous shocks to the supply of aid to the recipient countries. In order to minimize the endogeneity coming from the recipient's characteristics, we use a similar method and define a "supply-push" instrument for aid. This instrument measures the aid recipients would have received if they had kept their previous shares of donor budgets. It also helps to isolate changes in aid solely due to variations in donor budgets, not domestic conditions.

In this approach the total amount of aid received by a recipient j is re-defined as the summation of aid supplied by each donor d. The aid amount donated by each donor to a recipient j, is the sum of aid contributions they provide to all recipients during a specific year (i.e D_{dt}), times the share of recipient j in donor d's supply of aid, a_j^d. As a result, this new measure of aid for recipient j is given by:

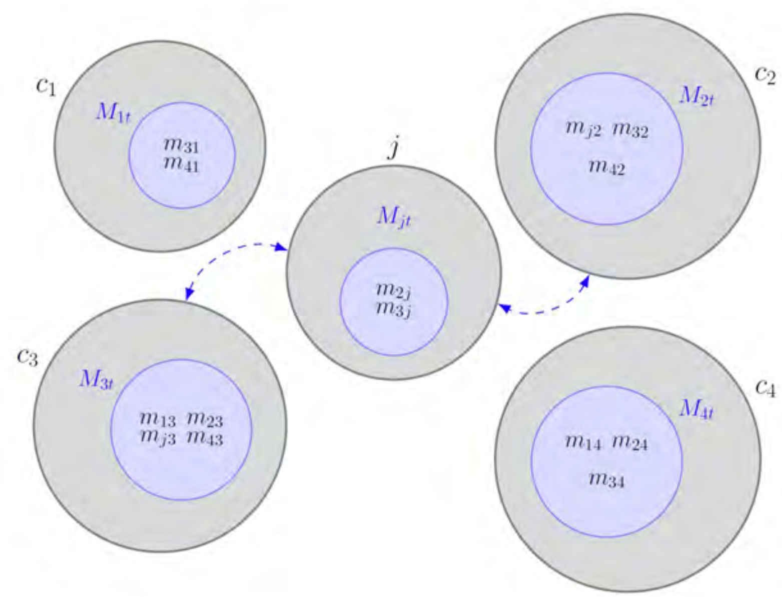
$$aid_{jt}^S = \sum_{d=1}^{N} a_j^d D_{dt} \tag{13}$$

where $N = 29$ is the total number of donors listed in Table 7. Note that a_j^d is an initial share and thus calculated as an average over 1980-1990 that is outside of the period under study (i.e. 1991-2009) in order to minimize contemporaneous correlation with the error term. This instrument makes use of the assumption that the share of each recipient in the donor's aid budget remains constant over time. This is a reasonable assumption as there is not a large time variation for this calculated share in our dataset.

It should be noted that this "supply-push" instrument for aid combines the lagged composition of the bilateral distribution of the aid (i.e. the "initial share", a_j^d) and the exogenous portion of the incoming aggregate aid from a donor. In order to reduce the contemporaneous correlation with the error term, the share is calculated for 1980-1990. As such, this share initiates right before the time period of our study and gives us an understanding of the position of each recipient in a given donor's priority of aid donations. Additionally, in line with the literature (Temple and Van de Sijpe (2017)) we calculate this initial share as an average over 1980-1990. Thus, the exogeneity of the instrument for each recipient originates from the donor's characteristics (rather than the recipient's), that is an aggregate level of aid donated by the donor interacted with how each donor prioritizes the recipients in their donations.

In addition to controlling for the endogeneity of foreign aid, we make use of the donor's characteristics to construct our instrument for remittances. Accordingly, $immigrants_{jt}$ defines our proposed instrument for remittances and measures the stock of immigrants (as a percent of population) in all countries other than country j (the recipient) at any time t. Our instrumentation strategy stems from two observations: first, since remittance inflows to a recipient country (country j) originate from the outflows of emigrants from that country, the stock of immigrants in the world (country j excluded) is highly correlated with the amount of remittances country j receives. Thus, our constructed variable is not only relevant but also a relatively strong instrument. Second, our instrument is directly originating from the characteristics of the host countries and is less likely to be endogenous to the growth of the manufacturing industries in the recipient country. Although in general the validity of an instrument is not directly testable, Figure 5 illustrates the logic by which our instrument for remittances is constructed.

Figure 5: Illustration of the Variation Used in the Instrument for Remittances



In this diagram we consider five countries, one of which is the targeted recipient of remittances (i.e. country j). M_{ct} represents the stock of immigrants in country c in a given time t. Each M_{ct} consists of the stock of immigrants from the origin i and therefore can be expressed as the summation of immigrants in country c from all possible origins (i.e. $M_{ct} = \sum_i m_{ic}$ where $i = 1, 2, 3, 4, and\, j$). It is important to note that the UN dataset provides aggregated immigrants data for the time period of our analysis. Consequently, we do not observe m_{ic}

but we can expect that in any given year M_{ct} in a host country *may* have some immigrants from country j. For instance, country j in Figure 5 exchanges immigrants with c_2 and c_3 only. As such, M_{2t} and M_{3t} contain emigrants from country j along with emigrants from all others countries they have immigration ties with. This diagram is a small scale of the data set we work with and shows that a recipient does not necessarily have immigration ties with all countries in the sample. As such, the stock of immigrants in a country with no ties to country j, shall have very little to do with the manufacturing growth in country j (i.e. is more likely to be exogenous).

It is worth mentioning that all these measures are in terms of *stocks* rather than *inflows* or *outflows*. In other words, our focus is on a fraction of the population in the remittance-sending country as opposed to the outflow of emigrants from the remittance-receiving country. As such, we expect that the endogeneity of our proposed variable with respect to the domestic measures of economic activity within the remittance-receiving country should be minimized. However, this fraction of population in the host countries is properly narrowed down to preserve the correlation with the amount of remittances received by the origin and thus creates a relevant measure for our instrument.

Accordingly, the proposed exogenous variation that is used in constructing our instrument for remittances is $immigrants_{jt} = M_{1t} + M_{2t} + M_{3t} + M_{4t}$. Equation (14) mathematically expresses this constructed variable in its general form using the actual data.

$$\begin{aligned} immigrants_{jt} &= \sum_{-j \in W} immigrantsin_{-jt} \\ &= \sum_{c \in W-j} M_{ct} \end{aligned} \tag{14}$$

where W is the set of all countries in the UN dataset.

We conduct a 2SLS estimation on equation (12) using $immigrants_{jt}$ interacted with $exportability_i$ as our instrumental variable. Also, we construct three additional instruments from our constructed $immigrants_{jt}$ variable. The first accounts for nonlinearity in the relationship between our measure of immigrants and the amount of remittances received, and is $[exportability_i \cdot immigrants_{jt}]^2$. The next instrument adjusts by the relative size of country j in the initial year of 1990 to consider the effectiveness of the number of people who have immigrated from country j elsewhere, in terms of the amount of remittances they have sent back home, and is written as $(exportability_i \cdot immigrants_{jt}) \cdot \left(\frac{population_{j90}}{population_{-jt}}\right)$. By including the adjusted measure of immigrants as a separate instrument, we are picking up the differential effect that a recipient's size (relative to all other countries) might have on the amount of remittances received. The third additional instrument addresses a possible nonlinearity in this second relationship and is $\left[(exportability_i \,.\, immigrants_{jt}) \,.\, \left(\frac{population_{j90}}{population_{-jt}}\right)\right]^2$.

Table 2 presents the results of the first-stage of our IV estimation. In the first stage, aid and remittances interacted with exportability are regressed on our measures of immigrants and of supply-push aid (aid^S_{jt}) both interacted with exportability measures, and the initial share of the industry. The results in panels A and B show that the instruments are strongly correlated with aid and remittances. As expected the results of the first stage estimation indicate that with more immigrants in other countries, there would be more remittances received by the recipient country. The coefficient on the adjusted instrument also implies that, on average, for smaller countries this effect is larger. We also obtain robust findings when we use different types of exportability measures.

Table 2: IV First Stage Estimation

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Panel A – dependent variable is Aid × Exportability						
Initial Share	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Supply-Push Aid × Exportability1	7.845***	7.870***	8.388***			
	(1.094)	(1.124)	(1.149)			
Immigrants × Exportability1	0.164***	0.161**	0.198***			
	(0.059)	(0.066)	(0.069)			
(Immigrants × Exportability1)^2	0.351**	0.343**	0.466***			
	(0.136)	(0.155)	(0.173)			
Adjusted Immigrants × Exportability1	-0.158**	-0.155**	-0.203**			
	(0.066)	(0.072)	(0.082)			
(Adjusted Immigrants × Exportability1)^2	-0.384*	-0.369	-0.600**			
	(0.204)	(0.223)	(0.291)			
Supply-Push Aid × Exportability2				7.778***	7.811***	7.886***
				(0.918)	(0.969)	(0.922)
Immigrants × Exportability2				0.203***	0.196**	0213***
				(0.070)	(0.082)	(0.073)
(Immigrants × Exportability2)^2				0.469***	0.455**	0.504***
				(0.176)	(0.212)	(0.185)
Adjusted Immigrants × Exportability2				-0.208**	-0.199**	-0.221**
				(0.079)	(0.093)	(0.084)
(Adjusted Immigrants × Exportability2)^2				-0.631**	-0.601*	-0.693**
				(0.261)	(0.312)	(0.284)
R-squared	0.7066	0.7148	0.7650	0.5906	0.6029	0.6083
Panel B – dependent variable is Remittances × Exportability						
Initial Share	0.000**	0.000***	0.000***	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Supply-Push Aid × Exportability1	1.719	1.459	1.672			
	(2.801)	(2.890)	(2.884)			
Immigrants × Exportability1	2.080***	2.074***	2.467***			
	(0.615)	(0.570)	(0.562)			
(Immigrants × Exportability1)^2	4.345***	4.308***	5.439***			
	(1.338)	(1.264)	(1.226)			
Adjusted Immigrants × Exportability1	-2.634***	-2.638***	-3.108***			
	(0.686)	(0.623)	(0.638)			
(Adjusted Immigrants × Exportability1)^2	-6.566***	-6.534***	-8.428***			
	(1.979)	(1.831)	(1.850)			
Supply-Push Aid × Exportability2				0.791	0.606	0.779
				(2.325)	(2.479)	(2.352)
Immigrants × Exportability2				2.311***	2.301***	2.426***
				(0.567)	(0.541)	(0.552)
(Immigrants × Exportability2)^2				4.999***	4.952***	5.332***
				(1.285)	(1.271)	(1.241)
Adjusted Immigrants × Exportability2				-2.966***	-2.959***	-3.107***
				(0.625)	(0.589)	(0.617)
(Adjusted Immigrants × Exportability2)^2				-7.986***	-7.925***	-8.566***
				(1.723)	(1.668)	(1.715)
R-squared	0.7216	0.7334	0.7737	0. 5909	0.6030	0.6086
Hansen-Sargan Test ($\chi^2(3)$ *p-value*):	0.7795	0.5980	0.5055	0.3144	0.3139	0.4211

Notes: Foreign aid and remittances are measured as percentages of GDP. Fixed effects used in columns (1) – (6) are consistent with those in Table 4. Clustered standard errors are in parentheses. The high Hansen-Sargan over-identification p-values imply that the validity of the instruments cannot be rejected. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

About sixty to seventy percent of the variation in both remittances and aid is explained by the stock of immigrants in other countries and the constructed measure of supply of aid.[20] Moreover, to test the relevance of the set of our instruments, we report the critical values for various weak IV tests including Cragg-Donald and the Kleibergen-Paap Wald F test, Sanderson and Windmeijer (2016), along with the Stock and Yogo (2005) critical values and report the results in Table 3.

Table 3: Weak Identification Test

Test Statistics and Critical Values	(1)	(2)	(3)	(4)	(5)	(6)
Panel A – Wald F-statistic						
Cragg-Donald	664.456	635.003	886.372	850.766	784.707	908.749
Kleibergen-Paap	11.766	10.553	11.884	13.854	10.863	15.227
Panel B – Sanderson-Windmeijer multivariate F test of excluded instruments						
Aid × Exportability	15.56	14.77	16.25	20.80	18.82	21.26
Remittances × Exportability	34.89	49.68	8.15	6.51	7.72	7.29
Panel C – Stock and Yogo critical values						
5% Maximal IV Relative Bias	13.97					
10% Maximal IV Relative Bias	8.78					
20% Maximal IV Relative Bias	5.91					
30% Maximal IV Relative Bias	4.79					
10% Maximal IV Size	19.45					
15% Maximal IV Size	11.22					
20% Maximal IV Size	8.38					
25% Maximal IV Size	6.89					

Notes: Columns (1) – (6) in Panel A and B, refer to their corresponding regressions in Table 4. Sanderson-Windmeijer calculates the statistics for F(4, 54). In the calculation of the Stock and Yogo critical values, standard errors are assumed to be iid. Stock and Yogo critical values are the same for all specifications.

The Sanderson and Windmeijer F-test has been reported to address the concerns of heteroskedasticity and clustering as we use a fixed effects estimation clustered at the country level. Although the Stock and Yogo weak IV test assumes *iid* errors, we still provide its

[20] The inclusion of "*immigrants*" and/or "*adjusted immigrants*" along with "*aid supply-push*" generates very similar results for foreign aid in terms of both the magnitude and the significance, specifically when the first type of exportability interaction is considered where more industries are included. However, for remittances despite the expected direction of the results, the statistical significance is lower than $\alpha = 10\%$. The magnitude is either the same as the original results, or 1 to 2 percentage points different depending on which compound fixed effects is used in the estimation. We still use the set of the instruments as described in the text for one main reason; We suspect non-linearity in how the "*stock of immigrants*" explains "*remittances*" due to the different types of emigrants departing their origin country. For instance, temporary workers are more likely to send more money back home compared to the high-skilled workers or those who have fewer ties to their origin country. Since destination countries usually admit a combination of these immigrant classes with proportions that may vary by time, we do not expect that the "*stock of immigrants*" explains "*remittances*" linearly. As such, we include the square terms in the set of instruments we use in our IV analysis. Moreover, as reported in Table 2, the Hansen-Sargan over-identification p-values imply that the validity of our instruments as a group cannot be rejected.

results to the reader as a means of comparison among the results generated by the other weak IV tests. As reported in this table, the test statistics are all above the 1 percent critical values indicating that the group of our instruments passes the weak IV tests and can be interpreted as providing independent sources of exogenous variation for the endogenous regressor. Furthermore, as indicated in Table 2 our instruments as a group, pass the Hansen's over identification test indicating the validity of the instruments cannot be rejected.[21]

In the second stage, "fitted remittances" and "fitted aid" replace the measures of remittances and aid that were previously used in our main regression. Table 4 presents the results of the second stage using both types of exportability measures. We find that the estimated coefficient on remittances is of the expected sign and robust when the first type of exportability is used and more industries are taken into consideration. Interestingly, the estimated coefficients on the interaction of remittances, are similar to the fixed effects case in terms of their magnitude and only about 0.2 higher when we consider the interaction with more exportable industries of the first type in the estimation. In fact, in this case the estimated coefficients on remittances do not change drastically compared to our fixed effects estimation, suggesting that much of the endogeneity concerning remittances is resolved by using a fixed effects estimation and a specification in which each industry is affected differently by changes in the real exchange rate. When the second type of exportability is considered, however, the effects are diminished in our 2SLS specification. Additionally, by using the instrumental variable approach for both aid and remittances we do not find significant evidence of aid generating a Dutch disease effect.[22]

[21] As indicated in Table 3, our set of instruments pass various weak IV tests. Since we have more instruments than endogenous variables, we employ the Hansen-Sargan over-identification test to test the validity of all the instruments used in our estimation. In such a case, a higher p-value implies that the null joint hypothesis of validity of all instruments cannot be rejected. Therefore, the Hansen-Sargan p-values reported in Table 2 imply that the validity of the instruments as a group cannot be rejected.

[22] In Table 9, Table 10, Table 11 and Table 12 we repeat our estimations using five-year averages of the data as well as one-year lag of the transfers to detect any longer-term effects. The results suggest that the effects of transfers on the manufacturing growth dissipate statistically. Despite finding the expected direction of changes in the majority of the specifications, the statistical significance drops. This can be attributed to the lower number of observations as indicated in the tables. Therefore, we propose that our analysis better showcases the immediate effects of the international transfers rather than the longer-term effects.

Table 4: IV Second Stage Estimation

Variables	(1)	(2)	(3)	(4)	(5)	(6)
dependent variable is annual growth rate of manufacturing value added						
Initial share	0.056***	0.056***	0.056***	0.056***	0.056***	0.056***
	(0.010)	(0.010)	(0.011)	(0.011)	(0.010)	(0.011)
Remittances × Exportability 1	0.452***	0.476***	0.364***			
	(0.154)	(0.149)	(0.091)			
Aid × Exportability 1	-0.873	-0.924	-0.499			
	(0.659)	(0.656)	(0.653)			
Remittances × Exportability 2				0.108	0.099	0.088
				(0.201)	(0.204)	(0.170)
Aid × Exportability 2				-0.447	0.073	-0.204
				(1.160)	(1.189)	(1.159)
Observations	8,189	8,176	8,189	8,189	8,176	8,189
Country FE	YES	YES	NO	YES	YES	NO
Industry FE	YES	NO	YES	YES	NO	YES
Year FE	YES	NO	NO	YES	NO	NO
Industry_year FE	NO	YES	NO	NO	YES	NO
Country_year FE	NO	NO	YES	NO	NO	YES
Wald test p-value	0.0715	0.0555	0.2280	0.6588	0.9837	0.8158

Notes: Foreign aid and remittances are measured as percentages to GDP. Clustered standard errors are in parentheses. A lower Wald test *p-value* indicates that β_2 and β_3 are more likely to be statistically different. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

More importantly, in addition to the causal positive effect of remittances on the growth of more homogeneous exportable industries, we also find that the impact of remittances and foreign aid are statistically distinct at the 5 and 10 percent level, depending on the specification. In particular, although we do not find statistically significant evidence in all cases that aid causes the Dutch disease, we find robust evidence that remittances, but not aid, increase the growth rates of relatively export dependent industries in the manufacturing sector.

These findings suggest that remittances – unlike foreign aid as suggested by the literature – do not result in the Dutch disease. As discussed earlier, the evidence on the effects of foreign aid on growth is mixed. However, our analysis suggests that depending on the set of the industries, although aid may not have a significant effect on the growth of the more exportable industries, the positive effect of remittances on such industries especially when we have a larger set of industries and therefore more observations is evident. Therefore, similar to the literature, on the foreign aid side we find mixed evidence for aid generating the Dutch disease (i.e. either negative or non-significant results despite accounting for endogeneity issues) which we attribute to the inclusion of remittances in our analysis. On the other hand, using *exportability*1 which is directly calculated from our data and leads to higher number of observations, we do find robust results indicating positive and significant effect of remittances on the growth of the more exportable industries. Despite expecting a reduction in the precision of the results due to comparing fewer industries, we include the estimation using *exportability*2 for the purpose of comparison with Rajan and Subramanian (2011) results. As such, we conclude that although the foreign aid results seem to be mixed, remittances results indicate the absence of the Dutch disease with higher precision.

5 Conclusion

We include a simple representation of non-homothetic preferences in an otherwise traditional international trade model and we show that whereas foreign aid may cause a reduction in manufacturing output, remittances generate an increases in production and in economic growth. This distinction is important not only because the literature continually conflates these two types of transfers, but also because remittances are an even larger source of income than aid for many developing countries.

We empirically verify these hypotheses with data on manufacturing value added from a panel of countries and industries covering the years from 1991 to 2009. In our econometric specification we employ the fact that a higher relative price of non-traded to traded goods (an appreciation of the real exchange rate) does not affect all industries in the same way. Industries with lower profit margins (such as homogeneous products) will suffer more from this exchange rate appreciation. We therefore construct two measures of sensitivity for each industry to isolate any additional effect of aid or remittances on industrial growth. Although this sensitivity method should eradicate most of the endogeneity between the transfers and growth, we also provide instruments for aid and remittances by using characteristics of the donors, and not the recipient countries. Despite finding empirical support for our hypothesis that remittances generate faster growth in the manufacturing sector, similar to the majority of earlier research we find that foreign aid either reduces manufacturing growth or has no robust effect.

Although our empirical strategy is similar to that of Rajan and Subramanian (2011), our panel data is quite different from theirs. In our analysis we make use of all three different dimensions (i.e. country, industry, and year) instead of averaging over years for each decade. As such, we are able to capture more variation in our sample. Additionally, unlike Rajan and Subramanian (2011) who use relative populations and dummy variables for common colony or language, we directly use the bilateral foreign aid data to construct a shift-share instrument for foreign aid. Our instrument has a high power in explaining the underlying variation by foreign aid as suggested by the weak IV tests we implement. Consequently, the statistical significance of the foreign aid results is impacted by both the aforementioned factors as well as adopting a new approach, which involves considering a different sample period and incorporating remittances in our regressions alongside foreign aid to discern their potential impacts on manufacturing growth.

6 Appendix

Table 5: Summary Statistics (1991-2009)

Variables	(1) Number of Observations	(2) Mean	(3) Standard Deviation	(4) Minimum	(5) Maximum
Growth	9,216	0.0402	0.537	-8.201	7.060
Aid to GDP*	23,828	0.0169	0.0255	0	0.230
Remittances to GDP	21,344	0.0339	0.0516	2.90e-07	0.345
Exportability 1	24,472	0.522	0.500	0	1
Exportability 2	24,472	0.130	0.337	0	1
Initial Share	20,520	0.0519	0.977	-16.73	17.37
Stock of Immigrants to GDP**	24,472	-0.0226	0.102	-0.567	0.0301

* Summed over all DAC donors for each recipient. Similar to Temple and Van de Sijpe (2017), summation is over all non-negative values.

** Summed over all countries but the recipient country of the remittances.

Table 6: Description of ISIC Industry Divisions and Measures of Exportability

ISIC Code	Description	Exportability 1	Exportability 2
15	Manufacture of food products and beverages	0	0
16	Manufacture of tobacco products	1	0
17	Manufacture of textiles	1	1
18	Manufacture of wearing apparel; dressing and dyeing of fur	1	1
19	Tanning and dressing of leather; manufacture of luggage, handbags, and footwear	1	1
20	Manufacture of wood and of products of wood and cork, except furniture	0	0
21	Manufacture of paper and paper products	0	0
22	Publishing, printing and reproduction of recorded media	0	0
23	Manufacture of coke, refined petroleum products and nuclear fuel	1	0
24	Manufacture of chemicals and chemical products	0	0
25	Manufacture of rubber and plastics products	0	0
26	Manufacture of other non-metallic mineral products	0	0
27	Manufacture of basic metals	1	0
28	Manufacture of fabricated metal products, except machinery and equipment	0	0
29	Manufacture of machinery and equipment n.e.c.	1	0
30	Manufacture of office, accounting and computing machinery	1	0
31	Manufacture of electrical machinery and apparatus n.e.c.	0	0
32	Manufacture of radio, television and communication equipment and apparatus	1	0
33	Manufacture of medical, precision and optical instruments, watches and clocks	1	0
34	Manufacture of motor vehicles, trailers and semi-trailers	1	0
35	Manufacture of other transport equipment	1	0
36	Manufacture of furniture; manufacturing n.e.c.	0	0
37	Recycling	0	0

Table 7: List of Countries

Recipients			
Albania	Egypt	Malawi	South Africa
Algeria	Eritrea	Malaysia	Sri Lanka
Argentina	Ethiopia	Malta	Syrian Arab Republic
Azerbaijan	Fiji	Mauritius	Tanzania
Belarus	Georgia	Mexico	Trinidad and Tobago
Bolivia	India	Moldova	Tunisia
Botswana	Indonesia	Mongolia	Turkey
Brazil	Iran (Islamic Republic of)	Morocco	Uganda
Burundi	Iraq	Oman	Uruguay
Chile	Israel	Panama	Viet Nam
China	Jordan	Paraguay	Yemen
China, Macao SAR	Kenya	Peru	
Colombia	Korea rep.	Philippines	
Cyprus	Kyrgyzstan	Senegal	
Ecuador	Madagascar	Slovenia	
Donors (DAC Database)			
Australia	Germany	Luxembourg	Spain
Austria	Greece	Netherlands	Sweden
Belgium	Hungary	New Zealand	Switzerland
Canada	Iceland	Norway	United Kingdom
Czech Republic	Ireland	Poland	United States of America
Denmark	Italy	Portugal	
Finland	Japan	Slovak Republic	
France	Korea	Slovenia	

Table 8: GTAP Industries and Sectors

Services		Manufacturing		Food and Agriculture	
Industry Code	Description	Industry Code	Description	Industry Code	Description
atp	Air transport	chm	Chemical products	b_t	Beverages and tobacco products
cmn	Communication	ele	Computer, electronic and optic	c_b	Sugar cane, sugar beet
cns	Construction	fmp	Metal products	cmt	Bovine meat products
ely	Electricity	fsh	Fishing	ctl	Bovine cattle, sheep, and goats
gdt	Gas manufacture, distribution	lea	Leather products	frs	Forestry
ins	Insurance	lum	Wood products	gro	Cereal grains nec
obs	Business services nec	mvh	Motor vehicles and parts	mil	Dairy products
ofi	Financial services nec	nmm	Mineral products nec	oap	Animal products nec
osg	Public Administration	ome	Machinery and equipment nec	ocr	Crops nec
otp	Transport nec	omf	Manufactures nec	ofd	Food products nec
ros	Recreational and other service	otn	Transport equipment nec	omt	Meat products nec
trd	Trade	p_c	Petroleum, coal products	osd	Oil seeds
wtp	Water transport	ppp	Paper products, publishing	pcr	Processed rice
wtr	Water	rpp	Rubber and plastic products	pdr	Paddy rice
		tex	Textiles	pfb	Plant-based fibers
		wap	Wearing apparel	rmk	Raw milk
				sgr	Sugar
				v_f	Vegetables, fruit, nuts
				vol	Vegetable oils and fats
				wht	Wheat
				wol	Wool, silk-worm cocoons

Table 9: Fixed Effects Estimation with 5-year Averages

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Initial share	0.057***	0.057***	0.058***	0.057***	0.058***	0.058***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Remittances × Exportability 1	0.251	0.222	0.238			
	(0.196)	(0.214)	(0.197)			
Aid × Exportability 1	-0.055	-0.044	0.044			
	(0.867)	(0.852)	(0.847)			
Remittances × Exportability 2				0.276	0.324	0.266
				(0.224)	(0.239)	(0.219)
Aid × Exportability 2				0.759	0.740	0.804
				(0.978)	(0.983)	(0.978)
Observations	2,327	2,327	2,327	2,327	2,327	2,327
R-squared	0.118	0.160	0.182	0.118	0.160	0.182
Country FE	YES	YES	NO	YES	YES	NO
Industry FE	YES	NO	YES	YES	NO	YES
Year FE	YES	NO	NO	YES	NO	NO
Industry_year FE	NO	YES	NO	NO	YES	NO
Country_year FE	NO	NO	YES	NO	NO	YES
Wald test p-value	0.7559	0.7876	0.8338	0.6683	0.7138	0.6297

Notes: Dependent variable is the 5-year average growth rate of manufacturing value added. Foreign aid and remittances are measured as percentages of GDP and are calculated as the 5-year average. Clustered standard errors are in parentheses. A lower *p-value* indicates that β_2 and β_3 are more likely to be statistically different. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table 10: IV Second Stage Estimation with 5-year Averages

Variables	(1)	(2)	(3)	(4)	(5)	(6)
dependent variable is the 5-year average growth rate of manufacturing value added						
Initial share	0.057***	0.057***	0.058***	0.058***	0.058***	0.058***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Remittances × Exportability 1	0.266	0.421*	0.229			
	(0.261)	(0.234)	(0.214)			
Aid × Exportability 1	-0.289	-0.428	-0.433			
	(0.935)	(0.902)	(0.909)			
Remittances × Exportability 2				-0.072	0.029	-0.023
				(0.358)	(0.331)	(0.298)
Aid × Exportability 2				-0.517	-0.314	-0.560
				(1.717)	(1.710)	(1.691)
Observations	2,327	2,327	2,327	2,327	2,327	2,327
Country FE	YES	YES	NO	YES	YES	NO
Industry FE	YES	NO	YES	YES	NO	YES
Year FE	YES	NO	NO	YES	NO	NO
Industry_year FE	NO	YES	NO	NO	YES	NO
Country_year FE	NO	NO	YES	NO	NO	YES
Wald test p-value	0.5856	0.3935	0.5075	0.8075	0.8515	0.7651

Notes: Foreign aid and remittances are measured as percentages to GDP and are calculated as the 5-year average. Clustered standard errors are in parentheses. A lower Wald test *p-value* indicates that β_2 and β_3 are more likely to be statistically different. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table 11: Fixed Effects Estimation with Lagged Variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Initial share	0.054***	0.055***	0.055***	0.054***	0.055***	0.055***
	(0.010)	(0.010)	(0.011)	(0.011)	(0.010)	(0.011)
Lagged Remittances × Exportability 1	0.337**	0.340**	0.195*			
	(0.138)	(0.139)	(0.101)			
Lagged Aid × Exportability 1	-1.958*	-1.898*	-0.788			
	(1.075)	(1.113)	(0.526)			
Lagged Remittances × Exportability 2				0.056	0.065	-0.014
				(0.160)	(0.179)	(0.135)
Lagged Aid × Exportability 2				-0.300	-0.316	-0.053
				(0.448)	(0.425)	(0.385)
Observations	7,862	7,849	7,862	7,862	7,849	7,862
R-squared	0.045	0.091	0.205	0.044	0.090	0.205
Country FE	YES	YES	NO	YES	YES	NO
Industry FE	YES	NO	YES	YES	NO	YES
Year FE	YES	NO	NO	YES	NO	NO
Industry_year FE	NO	YES	NO	NO	YES	NO
Country_year FE	NO	NO	YES	NO	NO	YES
Wald test p-value	0.0559	0.0712	0.1024	0.4905	0.4351	0.9286

Notes: Dependent variable is annual growth rate of manufacturing value added. Foreign aid and remittances are measured as percentages of GDP and are lagged by one year. Clustered standard errors are in parentheses. A lower *p-value* indicates that β_2 and β_3 are more likely to be statistically different. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table 12: IV Second Stage Estimation with Lagged Variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)
dependent variable is annual growth rate of manufacturing value added						
Initial share	0.054***	0.054***	0.054***	0.054***	0.055***	0.055***
	(0.010)	(0.010)	(0.011)	(0.010)	(0.010)	(0.011)
Lagged Remittances × Exportability 1	0.236	0.235	0.123			
	(0.195)	(0.188)	(0.127)			
Lagged Aid × Exportability 1	-0.208	-0.045	0.199			
	(0.617)	(0.676)	(0.549)			
Lagged Remittances × Exportability 2				0.001	-0.019	-0.097
				(0.131)	(0.152)	(0.194)
Lagged Aid × Exportability 2				-0.985*	-0.750	-0.743
				(0.503)	(0.615)	(0.454)
Observations	7,862	7,849	7,862	7,862	7,849	7,862
Country FE	YES	YES	NO	YES	YES	NO
Industry FE	YES	NO	YES	YES	NO	YES
Year FE	YES	NO	NO	YES	NO	NO
Industry_year FE	NO	YES	NO	NO	YES	NO
Country_year FE	NO	NO	YES	NO	NO	YES
Wald test p-value	0.5176	0.7090	0.8979	0.0847	0.2799	0. 2384

Notes: Foreign aid and remittances are measured as percentages to GDP and are lagged by one year. Clustered standard errors are in parentheses. A lower Wald test *p-value* indicates that β_2 and β_3 are more likely to be statistically different. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

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