UNIVERSITÀ POLITECNICA DELLE MARCHE

Dipartimento di Scienze Economiche e Sociali

PhD Thesis

International capital flows, comparative advantages and manufacturing growth

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February, 2019

Contents

Abstract

In this dissertation we provide a new evidence on the role of FDIs and remittances in manufacturing industries' specialization and growth. More specifically, we explore a novel transmission mechanism through which the two largest sources of international financial flows might exert their growth-enhancing effect at the micro level. The channel that we explore is the role of FDIs and remittances as alternative sources of finance for financially dependent manufacturing industries. Using data for developed economies, we first estimate empirically the role of FDIs on comparative advantages and specialization. Then, we also examine the relationship between remittances and manufacturing growth in developing and underdeveloped countries. Our results show that FDIs are positively correlated with comparative advantages in financially dependent manufacturing industries. Similarly, we show that except the poverty alleviation effect, remittances matter for manufacturing growth, too. Our findings suggest a positive and statistically significant relationship between remittance inflows and manufacturing growth in financially dependent industries. Two important policy implications may be drawn from our analysis. Policies conducive to easing access and lowering the cost of finance as well as FDI promotion policies targeting more capital intensive industries, would have a positive impact on improving countries' comparative advantages. Finally, channeling remittances towards investments – rather than consumption - in more capital intensive industries, may reduce the external finance gap.

Chapter I

1. Introduction

The recent decades have witnessed the most remarkable features of the world economy - globalization of economic activity, capital mobility and integration of financial markets, as well as increased global trade have been the driving force towards the global economic development and prosperity. Abolition of cross-country capital controls and financial markets liberalization have served as a major impulse for such unprecedented global developments. Cross-border financial flows' growth across developed as well as developing economies has exceeded the growth of international trade and the global GDP.

The benefits of international capital flows in recipient economies were highlighted by a large amount of theoretical and empirical literature to date. Long-term economic benefits of international mobility of capital are unambiguous. Using the world savings, international capital mobility helps in financing the most productive investments and improve access to finance in scarce capital countries. In addition, it also fosters efficiency of domestic financial markets due to exposure to the foreign competition. However, the gains from international capital flows sometimes may be negligible due to several negative consequences such as potential effects on inflation, interest rates, as well as the susceptibility of the hosting economy to external shocks. Moreover, the determinants and the composition of capital flows also matter as different types of capital have different properties regarding the effects on the overall economic growth and prosperity. Thus, international capital movements may also carry potential (short-term) risks. That being said, the gains from international capital movements can be reaped only when preceded with adequate policy reforms aimed at minimizing the risk associated with capital flows.

Trade-offs associated with international capital flows and related concerns have attracted a plethora of both theoretical and empirical literature during the last few decades. However, the majority of the literature focuses on the relationship between the capital inflows and macro performance and almost consensually confirm the positive long-run effects. Here, in this dissertation, we contribute to the relevant literature with a new evidence on the international financial flows and its impact on development and growth. Specifically, our focus will be on the two largest external financial flows, namely foreign direct investments (FDI) and remittances, and their role on the manufacturing industries' specialization and growth. Our emphasis on the above two sources of financial flows stems from two motives: first, FDIs and remittances remain a stable

source of finance for both developed and developing economies and exhibited an ever increasing trend during the last couple of decades; and second, considering the long-term positive effects of international financial mobility, there is a room for policy instruments as far as FDI and remittance inflows are concerned.

Our empirical analysis provides a new evidence on the role of FDIs and remittances in manufacturing industries. More specifically, we explore a novel transmission mechanism through which the two largest source of financial flows exert their growth-enhancing effect at the micro level. In other words, here we will analyze the role of FDIs and remittances as alternative sources of finance for financially dependent manufacturing industries. In order to examine if the "external source of finance" channel is at work, we first estimate empirically the impact of FDIs on comparative advantages and specialization - as evidenced by export flows - in developed economies, namely OECD member countries. The reason why we concentrate only on the OECD economies is three-fold: first, the largest share of the global FDIs is directed to developed countries; second, OECD economies account for three-quarters of the world trade, and lastly, there is lack of industry level FDI time series data for developing countries. In this part we will focus on the role of FDIs as a source of finance on comparative advantages by exploiting heterogeneous financial dependence across manufacturing industries. The underlying hypothesis is that foreign affiliates will bring capital as well as transfer the know-how and technology into host countries. Moreover, as the literature suggest, the presence of foreign firms have positive effects on recipient countries' exports. Therefore, we expect a positive correlation between the FDI inflows and comparative advantages in industries that rely heavily on external finance.

Using a similar approach, next we investigate the impact of remittance inflows on manufacturing value added growth in manufacturing industries with different levels of dependence on external finance. Here the focus is on developing and underdeveloped economies as the largest share of global remittances is absorbed by these two categories. In relative terms, remittance inflows in some developing countries exceed twenty percent of their GDP. Assuming the altruistic motives of remitting and considering the countercyclical nature of remittances with respect to recipient economies, except to their role as hand-to-mouth transfer, remittances may serve also as "external source of finance" to more financially dependent industries in developing and underdeveloped

economies. As in the case of FDIs, we expect a strong positive correlation of remittances and growth in those industries that rely more on external finance.

To the best of our knowledge, the existing literature to date have not examined neither FDIs nor remittances as alternative sources of finance for financially dependent industries. Therefore, our work provides a modest contribution to different streams of the literature such as financial development and growth, FDI - host economies, and remittance and development literature.

Results from our empirical analysis show that FDIs are positively correlated with manufacturing comparative advantages in financially dependent manufacturing industries. Similarly, using a large panel of low, lower-middle and upper-middle income countries, we show that except the poverty alleviation effect, remittances matter for manufacturing growth, too. In contrast to the Dutch disease theory, our findings convey the following message; there is a positive and statistically significant relationship between remittance inflows and manufacturing growth in financially dependent industries. Results in both empirical analysis are robust when controlling for different country as well as industry level indicators.

Finally, our findings have policy implications and suggest that policies conducive to easing access and lowering the cost of finance as well as FDI promotion in more capital intensive manufacturing industries (i.e. those in more need for external finance) would improve country's comparative advantages. A second important implication deriving from our empirical work suggest that policies to channel remittances towards investments (rather than consumption) in more capital intensive manufacturing industries, may reduce the external finance gap.

The rest of the dissertation is organized as follows. The second chapter provide an analysis of the literature related to FDI, remittances and financial dependence. The next two chapters investigate empirically the FDI-comparative advantage link and the role of remittances on manufacturing growth, respectively. The last part concludes.

Chapter II

2. Literature review

In this part we provide a thorough analysis of the relevant literature which consist of three different fields. The first section focuses on the literature related to FDI and its role in the host economies from a micro perspective. Then, we cover the remittance-growth literature from with a special emphasis on the home countries perspective. Lastly, we provide an analysis of the literature on the financial sector and micro agents with a particular emphasis on the financial dependence of manufacturing industries.

2.1. FDI, specialization and comparative advantages

The existing literature on this topic encompasses different streams. First, we narrowly cover both theoretical and empirical work related to international trade patterns and specialization. Then, we focus on FDI literature, primarily on the determinants of FDI and the impact of foreign firms' presence in host countries.

According to traditional trade theories, trade between countries occurs due to the differences in existing comparative advantages. Countries specialize only in those goods or services which can be produced at the lowest opportunity cost. Nevertheless, the theory of comparative advantages has been one of the most debated concept in international trade theory and it has attracted a lot of attention and empirical work to date. Ricardian model and its subsequent extensions have been the workhorse of a vast empirical literature over the last couple of decades.[1] However, the data shows that trade also take place between similar countries in terms of factor endowments. This inconsistency led to the new trade theories which recognize also other potential sources of trade such as economies of scale, technological know-how, etc. The emergence of the new theories triggered a vast amount of empirical work aimed at assessing the role of new determinants in international trade patterns. While country's endowments (i.e. physical and human capital) play an important role, they do not solely determine what a country can be good at. Hausmann et al. (2007) demonstrate theoretically the differences in the specialization patterns of similar countries. They highlight the importance of complementary elements in specialization patterns with

[1] Recently, Alviarez (2018) shows that Ricardian comparative advantage is relevant in determining the aggregate level and the sectoral allocation of multinational production and trade.

empirical support for their model and show that the exporting goods associated with higher productivity levels grow faster. Differences in efficiencies across firms also determine the aggregate trade flows (Eaton et al., 2011). By studying the network of relatedness between products, Hidalgo et al. (2007) show that countries change specialization patterns over time. According to them, the most qualitative and complex products are located in a densely connected areas while lower income products - are located in less connected periphery. In order to upgrade their export structure more quickly, countries tend to specialize in goods close to those they are currently specialized in ("nearby" goods).

Further, Proudman and Redding (2000) provide an evidence of large mobility in terms of international specialization patterns. In other words, they show that instead of having a systematic increase of (revealed) comparative advantages in particular industries, they remain almost unchanged over time.

Geography, among others, is also being considered as an indicator through which trade influence income and growth. Frankel and Romer (1999) investigate the impact of international trade on standards of living (measured by country's income per capita) using geographic characteristics as instruments to identify the direction of causation. Nevertheless, they suggest that geography provide limited amount of information about the trade-income nexus. The fact that geography has a role in economic activity has been broadly supported. The literature on the gravity model of international trade has validated that geography is a significant component of trade.[2]

The role of technology also been stressed as a strong determinant of specialization since countries' productivity levels vary across industries. Eaton and Kortum (2002) highlight the importance of geography and technology using data on bilateral trade flows and examine how these two different features jointly determine the patterns of specialization.[3]

Another strand of literature that identify and categorize the sources of comparative advantages that countries have. Theoretical contribution of Costinot (2009) highlights the importance of the quality of labor as well as institutions as the main sources of comparative advantages in more complex

[2] See for example Frankel et al. (1995), Frankel (1997);

[3] Similarly, international trade data is used in a multi-sector framework by Levchenko and Zhang (2016) to examine the evolution of sector-level total factor productivity over time and its consequences on trade patterns and welfare.

industries. Extending the model of Eaton and Kortum (2002) to explain trade flows, Chor (2010) consider comparative advantages as a function of both institutions and industry characteristics. In this model countries specialize in industries in which production needs can be meet at best. The role of institutions is also emphasized by Costinot et al. (2015) where they attempt providing an answer to what is the optimal trade policy with respect to comparative advantages. The paper suggest that uniform trade taxation across imported products and weakly decreasing subsidies in comparative advantages sectors would maximize the overall domestic welfare.

An important branch of literature that we consider in this paper is also the relationship between foreign direct investments and growth. Much of the existing literature emphasize the relationship between FDI and aggregate performance or seek to identify the determinants of FDI flows (mainly) from the recipient countries' perspective. The traditional determinants such as skilled workforce, low labor costs, market potential in recipient country, etc., have been identified as the most common determinants attracting the FDI flows. Apart from the above factors, method of privatization and other transition specific aspects play important role in determining the flows of FDI (Carstensen and Toubal, 2004). The role of institutions has also been acknowledged when it comes to attraction of FDI. There is a new stream of the literature that focuses on the determinants of FDI inflows, with a special emphasis on institutions. Trade openness, political rights, economic freedom and even EU membership, have a positive and substantial role on FDI inflows, argues Tintin (2013). Harding and Javorcik (2011) examine the effects of investment promotion efforts on actual inflows of the U.S.' FDIs. Their findings suggest that investment promotion leads to higher FDI inflows mainly in developing countries. Assuming that there is a room for policy makers in changing the directions of country's trade patterns, in a very recent empirical analysis, using a panel data for 73 low and medium income countries for a 25 year period, Harding et al. (2016) estimate the relationship between FDI promotion practices and country's export structure. They show that promotion activities as a tool for attracting foreign multinationals contributed to increasing countries' comparative advantage position as measured by the Balassa RCA.

Direction of causation (one or possibly two-way causality) remain the most challenging part in the literature involving FDI and aggregate components such as GDP or even local level indicators such as infrastructure. In an attempt to shed some light on causality issue, Chan et al. (2014) indicate that the GDP growth directly influences FDI inflows, in both the short and over the long

run. There is a large amount of literature, albeit new, that analyses the role of FDI in host countries via different channels whether at country level or firm level data. The literature on the existence of spillovers of FDI inflows associated with the entry of foreign affiliates is somewhat divisive. At the firm level, positive spillovers are usually defined as any kind of productivity increase, improved access to international markets, the emergence of high-tech products or even development of new products. Rodrik (1999) pointed out that claims about positive spillovers from FDI are barely supported by empirical evidence. In one hand, a large amount of literature finds a positive correlation between the presence of foreign firms and the overall productivity of local firms in host countries (Karpaty and Kneller, 2011; Greenaway et al 2004; etc.).[4] On the other hand, another stream of literature finds no association or to some extent negative impact of the foreign capital in domestically owned firms (Konings, 2001; Aitken and Harrison, 1999). However, most of the relevant literature have provided evidence on the existence of positive spillovers.

Javorcik (2004) confirms the presence of spillovers from FDI across industries through backward linkages i.e. contacts between foreign firms and their domestic suppliers. Yet, she finds no evidence of spillovers taking place through horizontal and forward linkages.[5] Apparently, an underexplored channel for productivity spillovers is via exports. But, does the increase of exports associated with FDI inflows improves the productivity level of local firms? Empirical trade literature has already established that exporters are more productive than non-exporters. So, if the presence of foreign firms results in more domestic firms exporting, an indirect productivity spillover will result. Based on this premise, Greenaway et al. (2004) have investigated productivity spillovers from the presence of MNEs via exports. Results from this paper confirm export spillovers from MNEs in UK-owned firms.

The export channel seems to have a strong explanatory power on the impact of FDIs on overall growth. Moreover, it is commonly acknowledged fact that the export matter for growth.[6] In fact,

[4] Additionally, using firm level data for Chinese manufacturing firms, Buckley et al. (2002) finds technological and international market access spillover benefits from MNEs.

[5] Horizontal linkage is the contact between the local firms and foreign affiliates in the same industry, while forward linkage channel implies cooperation between local firms and multinational suppliers.

[6] Causality between export growth and industrial development (Chow, 1987); Agricultural exports and its effect on country's economic growth (Dawson, 2005).

it is the qualitative composition of exports that fosters growth more; exports of more complex goods are positively correlated with growth. Supposing that upgrading the structure of exports is high on the policy agenda, especially in developing economies, Harding and Javorcik (2012) estimate the effect of FDI promotion on quality of exports. They argue that sectors prioritized in promotion efforts export more sophisticated products than other sectors.

Finally, there is also a plenty of anecdotal evidence on the positive spillovers associated with FDI. A large number of foreign affiliates in Western Balkans have contributed to better exploitation of existing comparative advantages and export growth. Manufacturing sectors and recently services, were the main target of foreign investors in this region.

2.2. Remittances and growth

Migrants and their role in both host and home countries has been immensely studied to date and it was one of the most popular topics in the development literature. Information and networks were considered as the main channels through which migrants promote their home country's economic welfare, mainly due to their importance in overcoming informal barriers to trade. Bilateral trade between the home and host country is found to be positively correlated with immigration (Head and Ries, 1998). Moreover, Rauch and Trindade (2002) examine the impact of Chinese networks on bilateral trade and show that business and social networks have substantial quantitative impact on trade flows. However, networks and links with their home countries, are not the only channels through which migrants exert their benefits. Migrant remittances constitute an increasingly important mechanism for the transfer of capital and have become a major source of financial flows for underdeveloped as well as developing economies. Nevertheless, the main reasons of remitting center on the family, primarily for consumption purposes. Therefore, most of the literature to date internalize this fact when examine the impact of remittances in home countries. The evidence is mixed; while there is a strand of literature that confirm the positive role of remittances on the overall socio-economic prosperity, some argue that the effects of remittances - mainly based on the Dutch disease theory - are contractionary.

The channels through which the adverse effect of remittances is transmitted are quite similar to those of the foreign aid.[7] A very recent study by Bahadir et al. (2018) using an innovative approach, namely Dynamic Stochastic General Equilibrium (DSGE) model, study remittance inflows at the macroeconomic level and show that depending on the final use, remittances may exert contractionary or expansionary effects. When remittance flows are compensatory transfers their response tend to have a negative effect on economic activity while the opposite occur once remittances accrue to credit-constrained entrepreneurs. The fact that remittances promote the growth of non-tradables at the expense of tradable sectors is well known in the literature. Estimating a two-sector DSGE model to examine the role of remittances on emerging economies, Acosta et al. (2009) finds that any increase in remittance inflows leads to a decline in labor supply as well as increase in demand for consumption of non-tradables.

There are many other studies – in line with these findings – which show that remittances are not growth enhancing. Le (2009) investigates jointly the role of trade, remittances and institutions in economic development. His results confirm the positive impact of institutions and trade - albeit the role of the latter is found to be ambiguous - but a negative effect of remittances on growth. Similarly, Gapen et al. (2009) finds, at best, no positive impact on economic growth from remittances.

There is another narrow stream of recent empirical literature that digs further and question any positive role and even consider remittances as a curse. Some argue that the negative externalities offset any kind of short-run positive effects and actually pose serious development challenges. According to Chami et al. (2005), remittances are not profit driven but rather compensatory transfers. As such, they are negatively correlated with economic growth. Regardless of their nature as hand-to-mouth type of transfers, remittance inflows may have adverse effects on institutional quality of recipient countries – that are similar to those of large natural resources flows. Corruption is one of the main channels through which remittances have a negative impact on institutions as it will become less costly for domestic beneficiaries to bear, argue Abdih et al. (2012).[8]

However, one cannot ignore the positives of remittances, especially their impact on alleviating poverty in underdeveloped as well as developing economies. It is commonly held view that

[7] See Rajan and Subramanian (2008; 2011) for the empirical literature on aid.
[8] Corruption is also found to be positively correlated with remittances in Ahmed (2013)

remittance inflows reduce the level and severity of poverty in domestic countries; there is plentiful empirical research that examine their poverty-mitigating effect. Stable remittances in the form of private transfer have a direct impact on poverty reduction as well as promotion of financial development (Adams and Page, 2005; Gupta et al., 2009). Furthermore, Lim and Basnet (2017) try to isolate the impact of remittances on per capita income within the permanent income hypothesis framework.[9] They show that remittances from short-term migrant workers have positive impact on income.

Financial development in developing countries is positively correlated with remittances while in low-income economies the relationship is not clear (Fromentin, 2017; Cooray, 2012).[10] The level of financial development has been closely analyzed along remittances also due to their potential synergistic effect that may jointly have on economic growth. Mundaca (2009) developed a theoretical framework and tested empirically interrelationship between financial market development and remittances. She finds, among other things, that if channeled through sound financial intermediaries and used for capital investments, remittances have a large and sustained positive effect on the economy. Rather than working as substitutes, remittances complements financial system and its growth-enhancing role in the economy (Bettin and Zazzaro, 2012).

Potential endogeneity is a common issue when assessing the impact on remittances on aggregate indicators. Different approaches have been used in order to deal with weaknesses arising from endogeneity and reverse causality problems. Using a micro-econometric model of the migrant-household behavior, Bettin et al. (2012b) somewhat confirm some of the above findings; financial development is likely to affect positively immigrant's trust on financial institutions.[11] In other words, the amount of transfer is positively correlated with the level of financial development in

[9] Permanent income hypothesis theory is developed by Friedman (1957) and states that permanent increase in income raises consumption - at a level consistent with expected long term income, while transitory income is saved and invested.

[10] Similarly, using aggregate variables, Aggarwal et al. (2011) finds positive and significant association between remittance inflows and financial sector development proxies, namely ratio of bank deposits and credit to GDP. Moreover, Giuliano and Ruiz-Arranz (2009) show that the impact of remittances is higher in shallower financial systems, namely less developed financial markets. They also indicate that remittances appear to be pro-cyclical. In addition, their findings also suggest that there is an investment channel through which remittances exert its impact on growth.

[11] Bettin et al. (2012a) in another model of remittances deal with the endogeneity and reverse causality issues by estimating IV of double-hurdle and Heckit selection models using Limited Information Maximum Likelihood (LIML) technique.

the country of origin; however, they show that the propensity to remit is not affected by financial development.

Motivations and determinants of remittances have also been vastly explored both theoretically and empirically. As far as motivations are concerned, there are two main "competing" theories on remittances, namely altruism and risk sharing (co-insurance motives). The former refers to the hand-to-mouth transfers sent to households with low levels of welfare whereas the latter consist mainly on profit driven investments. Even though there is no consensus on migrants' remitting motives, altruistic incentives prevail in the literature (Agarwal and Horowitz, 2002; Lucas and Stark, 1985). Implicit loan contract is another theory that attempts to explain remitting behaviors. The basic idea of this theory is that families function as an "informal market" where migrants finance non-migrant members' investments in human or physical capital (Poirine, 1997; Adams and Cuecuecha, 2010).[12] Field experiments have also been employed to better understand remitting behaviors (Torero and Viceisza, 2015).

Remittances, albeit in rare cases, have been recently studied also from the migrants' host countries perspective. In this context, Olney (2015) seek to shed light on their potential contractionary effects in the host economies through the demand channel. More specifically, he finds that remittance outflows depress wages of native workers as the consumer base will shrink and that the effect is more prevalent in non-tradeable industries that rely more on domestic consumption. Some attempts have been made also in exploring the effect of remittances on industrial growth with a special emphasis on exports. In contrast to Dutch disease theory, Fayad (2011) finds that remittances contribute to the growth of manufacturing industries via exports as the main transmission channel.[13]

Most of the literature on remittances take into consideration only specific aspects at a certain period while ignoring their overall long-run effects. Due to the contradictory nature of the empirical evidence, a more heuristic approach may provide a clearer and thorough overview of the real

[12] Bansak and Chezum (2009) study also the relationship between emigration, remittances and the educational attainment of migrant's children in the home country.

[13] In order to correct for endogeneity, Fayad (2011) uses different set of instruments – based on economic determinants of remittances (interest rate differentials, growth rate in host countries) as well as non-economic determinants of migration (i.e. geographical distance).

effects of remittances. Gaps on the remittances literature have been identified more than three decades ago by Russell (1986) where he argues that an alternative, comprehensive and much more systemic approach is needed in order to better clarify relationships between determinants and effects of remittances.

2.3. Financial dependence, trade and manufacturing industry

Finance and its importance were subject to many theoretical and empirical contributions during the last century even though there are opposing views as far as the finance-growth relationship is concerned. In one hand, the positive role of the financial system was highlighted more than a century ago; Schumpeter (1911) was one of the first to emphasize the positive role of the financial sector on the growth rate.[14] He argued that a well-functioning financial system spurs the supply side which in turn exerts its growth enhancing effect in the economy. On the other hand, Robinson (1952) argued that the financial system follows the growth of businesses; in other words, it is the economic activity that creates demand for financial services and as a result develop the financial sector. Except the above conflicting views, there are also other streams among economists that either believe that finance-growth nexus is irrelevant and the role of finance is over-stressed (Lucas, 1988) or completely ignore the role of finance because of their skeptical views about any kind of positive impact stemming from the financial development (Chandavarkar, 1992). However, the recent literature tends to acknowledge more the positives of financial development. The importance of financial health and stability has been noted especially after the last financial crisis. Today's literature evidently highlights the ever increasing importance of the stability of financial system and its role as one of the main pillars in the functioning of market economies. Moreover, it has also been stressed that the existing research, both theoretical and empirical, except that have policy implications, is also quite important for shaping the future policy-oriented research (Levine, 2005). Nevertheless, the focus of the literature is shifting towards the study of financial determinants.[15]

In countries with developed financial system, firms benefit through an eased access from multiple sources of finance for their investments. The level of financial development is linked with the

[14] Such views were also supported, among others, by Gurley and Shaw (1955) and Shaw (1973)
[15] Some of the determinants that have been considered so far include, but are not limited to, legal system (La Porta et al., 1997 and 1998), remittances (Aggarwal et al., 2011), trade (Rajan and Zingales, 2003; Law, 2009), etc.

overall countries' economic development; high-income countries have the most developed financial markets.[16] As we have shown in the previous sub-section, there is an extensive literature - both theoretical and empirical - on the role that financial sector plays in nurturing economic development and growth. Financial sector development has been considered by many as the main driver of the economic prosperity and growth (Henderson et al., 2013; Levine, 1997; etc.). However, most of the literature is focused on the direct link between the performance of the financial markets and macro level indicators (i.e. GDP per capita). To our knowledge, channels through which financial sector fosters private sector development have not been sufficiently exploited. In this context, our main interest is on the impact of international capital flows in financially dependent manufacturing industries in both financially developed and less-developed economies.

Financial development has also been considered as one of the main drivers, as the theory suggests, of international trade patterns. A great contribution on the financial markets and international trade theory is given by the work of Kletzer and Bardhan (1987). Extending the Heckscher-Ohlin model by incorporating a financial sector, they demonstrate that financial development play an important role in trade flows; credit market imperfections lead to differences in comparative advantages even between countries with identical technologies and endowments. Nevertheless, it is not a one-way link; trade integration could also increase capital inflows in economies with less developed financial markets. From a financial frictions perspective, in contrast to the classical model of Heckscher-Ohlin-Mundell which consider trade and capital flows as substitutes in capital scarce countries, a new theoretical contribution by Antras and Caballero (2009) provides a different conclusion. In less financially developed countries, trade and capital flows are complements. The return to capital is increased through trade, hence more incentives for capital to flow in such countries.

Baldwin (1989) has also linked financial markets with countries' comparative advantages. In his model, in financially developed economies, firms that produce goods subject to demand shocks face lower marginal costs compared to firms in countries with less-developed financial markets. However, the work by Kletzer and Bardhan (1987) remain a solid framework for empirical analysis

[16] The domestic credit provided by financial sector as a share of GDP is higher in developed economies (World Bank, World Development Indicators, 2018)

that seek to shed light on the importance of financial systems in shaping international trade patterns.

There are several channels through which financial development affects the industrial structure of exports and comparative advantages. A more recent literature that provides new evidence on this issue is the work by Beck (2002). Financial sector's role in channeling savings to firms is the focus of his work. He explores both theoretically and empirically cross-country differences in terms of financial development and its role on the international trade patterns. His theoretical model proves that in countries with better financial systems, sectors with high scale economies profits more. These countries are net exporters of the goods being produced in such sectors and therefore have comparative advantages in the same sectors. Using a 30-year panel with 65 countries, he estimates empirically and further support predictions of his model. Results confirm the above; economies with better developed financial markets have much higher share of exports (manufactures) to GDP as well as higher trade balance in manufactured goods.

One of the most influential work examining the performance of industrial sectors and the link with financial markets is the paper "Financial Dependence and Growth" by Rajan and Zingales published in 1998 (hereafter "RZ"). More specifically, they examine whether industrial sectors that are more dependent on external finance develop faster in countries with more developed financial markets. RZ use financial data on the U.S. firms to measure the dependence level on external finance.[17] It should be noted that the financial dependence index developed by RZ is being used (also) in today's literature as a benchmark for demand for external funds in industrial sectors. According to RZ, financial development has a supportive role on the rate of economic growth. This can be explained, partly, by the cost reduction of external finance to highly financially dependent firms. Using a large sample of 41 countries during the 1980s, RZ show that there is a positive correlation between the level of financial sector development and the growth pace of highly financially dependent sectors. Following RZ's contribution, a new stream of empirical literature emerged; financial dependence has been widely employed as an indicator to examine the effect of financial development on trade and capital flows in firms that are highly dependent on external finance. Using RZ financial dependence index, Beck (2003) finds that in countries that enjoy higher level of financial development, industries that rely more on external finance have

[17] Dependence is defined as the share of capital investments financed by external sources.

higher export shares. Lo Turco et al. (2018) further extend the RZ empirical model by incorporating also upstream and downstream sectors' financial dependence level. Specifically, they investigate a new indirect channel through which financial development fosters industry growth: Input-Output (IO) linkages between sectors. Their results suggest that the financial development effect is propagated through IO relations; financial market development affects more those industries that are connected by IO links to financially dependent upstream industries.

Another recent contribution by Alquist et al. (2018) provide a new evidence on the impact of dependence on external finance and the decision of foreign firms to invest in host countries. They show that foreign firms are more likely to fully acquire a local firm in sectors that rely more on external finance or countries with low level of financial sector development.[18] On the other hand, partial acquisitions seem to be less dependent on financial factors. Along the same lines, Manova et al. (2015) provide new micro level evidence on the financial imperfections and international trade patterns. Using Chinese firm-level data they confirm the importance of foreign affiliates in overcoming credit frictions effects. In financially constrained sectors in China, joint ventures and foreign subsidiaries export much more than local. A novel contribution by Antras et al. (2009) demonstrates theoretically and empirically the mechanism generating multi-national corporate activity in foreign markets. External funders, namely financial institutions, have stronger preferences and are more willing to finance projects involving a multi-national firm as the latter have strong incentives to monitor project implementation and therefore ensure that local partners are pursuing value maximization.

Vulnerability of financially dependent firms can be analyzed better during the financial shocks. The last global financial crisis has been extensively analyzed for almost a decade now to confirm well-established predictions on the impact of financial shocks on economic outcomes. The "Great Recession" have had lasting repercussions also on cross-border economic activities. According to the World Trade Organization (WTO), due to the downfall in global demand following the crisis, exports fell by 12% in 2009. Eaton et al. (2016) develop a model to investigate the contribution of different country-specific shocks during the 2008-2009 financial crisis on trade. They argue that

[18] Similarly, Desbordes and Wei (2014) investigate home and destination countries' financial development level and its impact on FDI through direct increase of access to external finance. They show that financial development have a positive impact on greenfield investments, business expansion, as well as mergers and acquisitions.

investment efficiency shocks shift the final consumption away from tradable goods.[19] In order quantify the effect that credit conditions had on international trade during the first years of the crisis, Chor and Manova (2012) use data on U.S. imports and interbank interest rates in countries exporting to the U.S. They basically examine how credit constraints affected trade flows across exporting countries. Results from this empirical work indicate that countries with higher interbank interest rates exported less to the U.S. Additionally, they exploit also variations across sectors and show that the effect is more prominent in financially vulnerable sectors (i.e. sectors that need more external financing). The fact that exports are affected by financial – both internal and external – factors, is also supported by earlier firm level empirical analysis. From a slightly different perspective Amiti and Weinstein (2011) establishes a causal link between the health of banks and exports. Their findings suggest that exports as opposed to domestic sales, are more sensitive to financial shocks. Using data from UK manufacturing firms, Greenaway et al. (2007) show that better financial health is found among (continuous) exporters as opposed to non-exporters. Such findings indicate that reducing the level of financial constraints faced by firms could increase the productivity and the level of exports.

Lastly, using detailed micro level data on Italian manufacturing firms, Minneti and Zhu (2011) find that credit rationing negatively affects the propensity to export.[20] Firms having difficulties in getting credits are less likely to export compared to those being able to obtain credits for their investments. When quantifying the results, they show that probability of exporting is nearly 40% lower for rationed firms and that the negative effect of credit rationing on exports is larger than domestic sales. Credit constraints have been proved to be an important factor of trade flows across countries also in Manova (2008) and Manova (2012). Also Muûls (2015) confirm that credit constraints affect both imports and exports. Less-constrained firms have higher probability of both exporting and importing. When it comes to exports, both intensive and extensive margins are positively associated with credit constraints in terms of products and new destinations, while with imports it the extensive margin of products (i.e. new imported products) that is affected more.

[19] Using a dynamic multisector general equilibrium model of international trade, Eaton et al. (2016) assess the contribution of different types of shocks, namely technology, preferences, and endowments, to the collapse of trade.

[20] Authors use two different measures for credit rationing. Strong credit rationing is being considered if (i) the firm would have liked to obtain more credit at the market interest rates in the previous year (i.e. 2000), and (ii) the firm obtained less credit than actually requested. When (i) applies only, credit rationing is labeled as a "weak".

Chapter III

3. The role of FDI inflows in shaping comparative advantage patterns: an evidence from the OECD economies

3.1. Introduction

Today, policymakers around the globe, especially in developing countries, strive to exploit policy tools to improve the export structure and shape the pattern of specialization and trade. The role of exports in economic development is crucial. Based on the export-led growth hypothesis, one of the main drivers of economic growth and prosperity is growth of exports. At the same time, there is a strong competition in terms of policy making as far as attraction of foreign investments are concerned. Foreign Direct Investments (FDI) are being considered as an important source of development, particularly in emerging economies; most of these countries rely heavily on FDI to address economic imbalances. According to the official data, it is estimated that the value of global FDIs in 2017 was 1.52 trillion US dollars where 43% were directed into developing economies.[21] Moreover, it is commonly acknowledged fact that the presence of foreign affiliates will bring capital, new jobs and also transfer technology and know-how into host countries.

The existing literature on FDI and exports suggest that the presence of foreign firms have positive effects on host countries' exports, ultimately leading to improved or new comparative advantages.[22] Nevertheless, the focus of the recent literature was mainly on other sources of comparative advantages i.e. differences in productivity, institutional sources, and other potential factors that might foster the emergence of new comparative advantages. Financial development has also been considered an important factor for improving countries export structure as well as a precondition for FDI's positive impact on the overall growth (Hermes and Lensink, 2003).

In this paper we argue that FDI can also play an important role as a financial source in manufacturing sectors, especially highly capital intensive ones that rely more on external finance. To our knowledge, there is a lack of literature that examine financial development as the main channel through which FDI exert its positive impact on exports and industry comparative advantages. We fill this gap using the FDI inflow data disaggregated at the industry level in a panel

[21] Investment Trend Monitor, UNCTAD (2018) available at http://unctad.org/en/PublicationsLibrary/diaeia2018d1_en.pdf

[22] See for instance Karpaty and Kneller (2011); Greenaway et al (2004), etc.

for 31 developed economies covering a time span from 2007 to 2016 with a special focus on manufacturing industries, only. Although the data on FDI are gathered from different countries, the same data collection and processing methodology has been applied. Balassa index, namely revealed comparative advantages (RCA), has been constructed using the product level export data for the whole sample which we have extracted from Comtrade database. However, as proposed by French (2017) we construct a gravity based index as an alternative measure to the Balassa index which is used as an industry comparative advantage indicator.

Our results suggest that there is a positive relationship between FDI inflows and the comparative advantages in financially dependent sectors. Results are consistent to different set of fixed effects as well as different specifications and robustness tests.

Finally, the main findings of this paper suggest that there is also room for policy interventions. Investment promotion policy with a focus on manufacturing sectors that rely more on external finance would improve manufacturing comparative advantages. In addition, financial policies aiming at lowering the cost of external finance as well as easing access to finance for manufacturing sectors might have a positive impact on comparative advantages, too.

This chapter is organized as follows. Data description and sources is included in the next section. Section 3.3 describes the empirical approach that have been employed in this paper. Section 3.4 and 3.5 presents the main results and robustness tests respectively. The last section concludes.

3.2. Data and measurement issues

In this paper we make use of different data at different levels of aggregation (i.e. country, industry as well as product level data). In our empirical analysis, we focus on the manufacturing industries for 31 high income economies, namely OECD countries for which we have FDI disaggregated data at industry level.[23] [24] A full list of the countries included in our analysis is reported in the Appendix A.1. The trade data, namely export flows, at 6 digit HS 2007 product level for the period 2007-2016 were collected from the Comtrade database through World Integrated Trade Solution platform.[25] We use export flow data in order to construct our dependent variable, namely the revealed comparative advantage (RCA) index as introduced by Balassa (1965). The index is defined as the ratio of a country's exports in particular product to its total exports divided by the world's share of the same product to total world's exports:

$$RCA_{cpt} = \frac{X_{cpt}/X_{ct}}{X_{pt}^{W}/X_{t}^{W}} \quad (1)$$

where X_{cpt} and X_{ct} represent the exports value of product p at time t in country c and total country c's total exports, respectively; X_{pt}^{W} and X_{t}^{W} denote the world's exports of product p at time t, respectively world's total exports at time t. However, as proposed by Laursen (2015), we use the following adjusted symmetric version of the RCA index in order to deal with the skewness of the Balassa version of RCA.[26]

$$\text{SymRCA}_{\text{cpt}} = \frac{\text{RCA}_{\text{cpt}}-1}{\text{RCA}_{\text{cpt}}+1} \quad (2)$$

At the industry level, we use data at 2-digit NACE Rev. 2 on FDI inflows, and other industry size indicators such as output, value added, and the number of employees. Data on FDI inflows for all OECD countries were obtained from the OECD statistics database.[27] In order to ensure the data

[23] Two countries (Canada and Switzerland) were excluded due to the lack of data while Luxembourg was not incorporated since it is more a service oriented economy.

[24] The reason why we focus on the OECD economies is three-fold: first, the largest share of the global FDIs is directed to developed countries; second, OECD economies account for three-quarters of the world trade, and lastly, there is lack of industry level FDI time series data for developing countries.

[25] http://wits.worldbank.org/WITS/WITS/AdvanceQuery/RawTradeData/QueryDefinition.aspx?Page=RawTradeData

[26] For robustness purposes, several additional definitions of RCA will be used.

[27] https://stats.oecd.org/ (Accessed on September 7, 2017).

quality and accuracy, FDI data have been collected, where available, also from relevant institutions in OECD economies (i.e. central banks). Data collection of FDIs in OECD economies is consistent with the IMF Balance of Payments Manual 6th Edition (BPM6) for FDI data collection and processing.[28] It should be noted that negative flows are defined as reverse investments or disinvestments and this classification apply across the whole sample.

The main explanatory variable in our model is the value of FDI inflows in respective manufacturing industries. However, for comparative purposes, we have normalized the FDI inflows by dividing them with an industry size indicator, namely the industry output. All industry size variables are extracted from UNIDO – Industrial Statistics Database (INDSTAT 2).[29] It should be noted that FDI data for the OECD sample as well as UNIDO industry size indicators were available at ISIC Revision 3 and Revision 4 respectively. However, such data were converted into corresponding 2-digit respective codes at NACE Revision 2 level using official UNSTAT correspondence tables.[30] [31]

As we consider FDIs as complementary source of finance, our main explanatory variable will be an interaction of FDI inflows normalized by the industry output and the financial dependence on external finance of that particular industry. This interaction allows to capture differences on the effect of FDI inflows in industries with different financial dependency levels. The data on financial dependence on external sources is obtained from Rajan and Zingales (1989).[32] The firm's dependence in external finance is computed at the firm level using a large U.S. dataset and is defined as follows:

$$Dependence\ on\ external\ finance = \frac{Capital\ expenditures - Cash\ flow\ from\ operations}{Capital\ expenditures} \quad (3)$$

To summarize the dependency level across firms in the same industry, RZ use industry median, rather than other central tendency measures, in order to eradicate the effect of outliers in the data. Using the RZ financial dependence index in our model implicates the following assumptions. First,

[28] IMF's Balance of Payments and International Investment Position Manual is available at https://www.imf.org/external/pubs/ft/bop/2007/pdf/bpm6.pdf.
[29] https://www.unido.org/researchers/statistical-databases
[30] https://unstats.un.org/unsd/cr/registry/regot.asp?Lg=1
[31] Detailed description of UNIDO industry variables is provided in Appendix A.2.
[32] RZ index has been extensively used in the finance-growth literature (see for instance Beck and Levine, 2002; Korszner et al., 2007, etc.).

assuming that the U.S. financial markets are frictionless, firms in the U.S. should not face financial constraints. Therefore, the actual demand for external finance of the U.S. firms' reflects the real dependence on external sources for capital expenditures. In addition we also assume that the (technological) needs of external finance are common across countries in the same industries.

Table 1. Financial dependence index

Description	NACE Rev. 2 - Division[33]	External finance dependence
Food products	10	0.14
Beverages	11	0.08
Tobacco products	12	-0.45
Textiles	13	0.40
Wearing apparel	14	0.03
Leather and related products	15	-0.14
Wood and of products of wood and cork, except furniture	16	0.28
Paper and paper products	17	0.18
Reproduction of recorded media	18	0.20
Coke and refined petroleum products	19	0.19
Chemicals and chemical products	20	0.21
Basic pharmaceutical products and preparations	21	1.49
Rubber and plastic products	22	0.68
Other non-metallic mineral products	23	0.15
Manufacture of basic metals	24	0.06
Fabricated metal products, except machinery and equipment	25	0.24
Computer, electronic and optical products	26	1.02
Electrical equipment	27	0.77
Machinery and equipment	28	0.45
Motor vehicles, trailers and semi-trailers	29	0.35
Other transport equipment	30	0.46
Manufacture of furniture	31	0.24
Other manufacturing	32	0.47

Source: Rajan and Zingales (1998)

In our estimations we also control for macro level time-varying indicators, such as the GDP per capita, number of population, and the share of domestic credit to country's GDP. Such variables

[33] The original index is available at 3-digit level ISIC Rev. 2 codes; however, we for comparative purposes, we use the corresponding 2-digit NACE Rev.2 codes.

have been collected from the World Bank – World Development Indicators.[34] In addition, different country's financial system characteristics were also extracted from Global Financial Development Database.[35] Finally, additional time-invariant industry level characteristics are also interacted with FDI inflows as a robustness checks. Specifically, we use *capital intensity* and *skill intensity* indexes from Ma, Tang and Zhang (2014) as well as *complexity index* of Krishna and Levchenko (2013).[36] The table with summary statistics of the variables included in our model is provided in the Appendix A.3.

[34] http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators
[35] http://www.worldbank.org/en/publication/gfdr/data/global-financial-development-database
[36] Capital intensity is defined as capital stock per worker while skill intensity and R&D intensity are defined as ratio of non-production workers to total employment respectively firm's R&D employment share. Complexity index refers to the number of inputs used in the production process.

3.3. Empirical approach

This study focuses on the relationship between FDI and the revealed comparative advantages patterns in 31 developed countries, namely OECD economies. The empirical approach here to some extent, albeit in an innovative way, follows Harding et al. (2016). Instead of investment promotion practices we use actual FDI inflows at the industry level. Moreover, our main purpose is to confirm the role of FDI as a complementary source of external finance. Therefore, we test this by interacting our key explanatory variable, namely industry FDI inflows, with an external financial dependence indicator. The baseline specification in our model is depicted as follows:

$$RCA_{cst} = \alpha + \beta\left(\frac{FDI_{cst-1}}{Output_{cst-1}}\ x\ FinDep_s\right) + \gamma\left(\frac{FDI_{cst-1}}{Output_{cst-1}}\right) + \eta_{st} + \theta_{ct} + \varepsilon_{cst} \quad (4)$$

where, RCA_{cst} denotes the aggregated revealed comparative advantages at the industry level of country *c* in industry *s* at time *t*. FDI_{cst-1} and $Output_{cst-1}$ is the actual FDI inflows respectively the level of output at 2-digit NACE sector *s* in country *c* in the period *t-1*. $FinDep_s$ is the external finance dependence calculated at industry level. Finally, η_{st} and θ_{ct} are industry-year fixed effects and country-year fixed effects. Inclusion of country-year fixed effects allow us to control for the average differences in unobservable predictors across countries over time. Industry-year fixed effects will account for the industry variations over time taking place across countries. Since the FDI inflows may take some time to exhibit their effect on the level of exports, in the above specification lagged FDI values have been used. It should be noted that U.S. has been dropped from the OECD sample to avoid potential estimation bias arising from the fact that RZ's financial dependence index is calculated using the financial data from the U.S. manufacturing firms. While Canada and Switzerland were removed from the sample due to the lack of data on industry size (i.e. industry value added and output), Luxemburg was dropped since it is more service oriented economy.

The baseline specification in equation (4) is estimated using ordinary least squares (OLS) with Huber-White correction for heteroscedasticity (robust standard errors). Here the coefficient β captures the revealed comparative advantage evolution resulting from FDI inflows across manufacturing industries with different dependency levels on external finance.

It should be noted that recently the RCA has been criticized as the best measure of comparative advantage. In order to minimize the measurement error, Costinot et al (2012) propose a theoretically consistent alternative to the Balassa index, namely a regression based index which uses disaggregated bilateral trade flows. Similarly, French (2017) suggest that instead of aggregated data across importers, bilateral trade flows would allow to isolate the effects of comparative advantages from other market-specific effects of trade distortions. As an alternative to the original Balassa index which however would be an appropriate measure in a world with frictionless trade, he proposes other measures (including regression based index of Costinot et al., 2012) which would better capture industry comparative advantages in the presence of trade barriers. Therefore, following French (2017) we employ an index which decomposes disaggregated trade flows multiplicatively as follows:

$$X_{cps} = \Phi_{cp}\, \Phi_{ps}\, \Phi_{cs} + \varepsilon_{cps} \tag{5}$$

where X_{cps} is the industry *s'* export flows from exporter *c* to partner (importer) *p*, while Φ_{cp}, Φ_{ps} and Φ_{cs} denote importer-exporter, importer-industry and exporter-industry fixed effects respectively. According to French (2017), the values of Φ_{cs} are equivalent to the industry revealed comparative advantages, which he refers to as the gravity-based CA. The equation (5) is estimated using a Poisson pseudo-maximum likelihood estimator.[37]

[37] Fally (2015) shows that Poisson pseudo-maximum likelihood estimator with fixed effects imposes the same adding-up constraints as the gravity-based index.

3.4. Results

The table below report results from the equation (4), our baseline specification, which show a positive correlation between lagged values of FDI inflows and comparative advantages in more financially dependent industries. Both, symmetric version and the gravity-based RCA, yields similar results in terms as far as the sign of the coefficient is concerned while they differ in terms of magnitude. The columns 2, 3, 6 and 7 show the results from the same specification but with country and country-industry clustered standard errors.

Table 2. Results from OLS regression in the baseline specification

VARIABLES	Symmetric RCA				Gravity-based RCA			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FDI_{cst-1}/Out_{cst-1}*$FinDep_s$	0.320**	0.320*	0.320**	0.320**	0.623**	0.623**	0.623**	0.657**
	[0.130]	[0.162]	[0.132]	[0.144]	[0.266]	[0.270]	[0.255]	[0.311]
FDI_{cst-1}/Out_{cst-1}	-0.133*	-0.133	-0.133*	-0.142*	-0.271*	-0.271	-0.271	-0.323*
	[0.075]	[0.091]	[0.079]	[0.084]	[0.162]	[0.170]	[0.169]	[0.191]
Fixed Effects								
Country	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	No
Sector	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	No
Year	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	No
Country-year	No	No	No	**Yes**	No	No	No	**Yes**
Sector-year	No	No	No	**Yes**	No	No	No	**Yes**
SE cluster		Country	Country-sector			Country	Country-sector	
Observations	1,623	1,623	1,623	1,623	1,623	1,623	1,623	1,623
R-squared	0.191	0.191	0.191	0.207	0.593	0.593	0.593	0.603

Note: Robust standard errors are reported in parenthesis;
*** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

Considering the existence of potential endogeneity in our model, we interpret the above results in terms of the variation of comparative advantages explained by industry FDI inflows. Taking results from the baseline specification with country, time and industry fixed effects, we see that FDI inflows explain around eleven percent of the variation of comparative advantages in industries with the highest level of dependence on external finance. [38]

[38] The variation is calculated using plotted values of the financial dependence level across industries in the estimated sample of the baseline specification (Appendix A.4a and A.4b.) and from the between standard deviations of both dependent variable and the FDI inflows normalized by the industry output; The standard deviation (between) of the dependent variable is 1.3984 while for normalized industry FDI inflows is 0.12883. After obtaining these statistics, calculation is done as follows: (0.12883 x 1.2 / 1.3984)*100 = 11.05%.

We further the baseline specification to control for different country as well as sector size indicators (table 3). First, we include country, year and sector fixed effects individually then as interactions. Results are consistent using different set of fixed effects and controlling for different macro level indicators such as per capita GDP, population and the share of exports to GDP. In addition, we control for the sector size variables, namely the industry value added share and labor productivity. Inclusion of the above yields more or less the same results. Although the magnitude of the coefficients is somewhat smaller, the sign and significance does not change.

Table 3. Results from OLS regression in the extended specification

VARIABLES	Symmetric RCA			Gravity-based RCA		
	(1)	(2)	(3)	(4)	(5)	(6)
FDI_{cst-1}/Out_{cst-1}*$FinDep_s$	0.321**	0.303*	0.317*	0.632**	0.597*	0.660*
	[0.130]	[0.165]	[0.174]	[0.265]	[0.344]	[0.378]
FDI_{cst-1}/Out_{cst-1}	-0.133*	-0.099	-0.105	-0.276*	-0.187	-0.227
	[0.075]	[0.066]	[0.076]	[0.162]	[0.154]	[0.184]
$Log(GDP/cap)_{ct-1}$	-0.014	0.013		0.125	0.188	
	[0.192]	[0.161]		[0.542]	[0.486]	
$Log(Population)_{ct-1}$	0.052	-0.634		0.457	-1.459	
	[1.236]	[1.014]		[3.339]	[2.909]	
$ExportShare_{ct-1}$	0.248	0.030		1.831	1.199	
	[0.518]	[0.402]		[1.400]	[1.179]	
$ValueAdd\_Share_{cst-1}$		5.783***	5.898***		13.802***	13.977***
		[0.304]	[0.303]		[0.815]	[0.813]
$Labour\_prod_{cst-1}$		0.017	0.036		0.043	0.095
		[0.029]	[0.031]		[0.078]	[0.085]
Fixed Effects						
Country	**Yes**	**Yes**	No	**Yes**	**Yes**	No
Sector	**Yes**	**Yes**	No	**Yes**	**Yes**	No
Year	**Yes**	**Yes**	No	**Yes**	**Yes**	No
Country-year	No	No	**Yes**	No	No	**Yes**
Sector-year	No	No	**Yes**	No	No	**Yes**
Observations	1,623	1,505	1,505	1,623	1,505	1,505
R-squared	0.191	0.443	0.470	0.593	0.690	0.704

Note: Robust standard errors are reported in parenthesis;
*** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

Contrary to what one would expect, the coefficient on labor productivity is insignificant in all specifications when controlling for all country and industry size indicators. However, once we exclude the size indicator the coefficient on productivity of labor becomes highly significant.

The consistency of results from the baseline specification remain also when using longer lags (i.e. 2nd and 3rd) of explanatory variables (table 4).[39]

Table 4. Results from OLS regression in the extended specification – longer lags

VARIABLES	Gravity-based RCA			
	(1)	(2)	(3)	(4)
	2nd lag	2nd lag	3rd lag	3rd lag
$FDI_{cs\tau}$ /$Out_{cs\tau}$*$FinDep_{s}$	1.105**	1.142**	1.097**	1.070*
	[0.472]	[0.503]	[0.520]	[0.570]
$FDI_{cs\tau}$ /$Out_{cs\tau}$	-0.320	-0.308	-0.353	-0.324
	[0.241]	[0.258]	[0.314]	[0.333]
$Log(GDP/cap)_{c\tau}$	0.042		-0.193	
	[0.671]		[0.905]	
$Log(Population)_{c\tau}$	-2.673		1.083	
	[4.718]		[7.787]	
$ExportShare_{c\tau}$	1.041		0.886	
	[1.910]		[3.273]	
$ValueAdd\_Share_{cs\tau}$	13.718***	13.868***	13.158***	13.481***
	[0.943]	[0.971]	[1.149]	[1.206]
$Labour\_prod_{cs\tau}$	0.029	0.098	0.106	0.126
	[0.102]	[0.115]	[0.135]	[0.151]
Fixed Effects				
Country	**Yes**	No	**Yes**	No
Sector	**Yes**	No	**Yes**	No
Year	**Yes**	No	**Yes**	No
Country-year	No	**Yes**	No	**Yes**
Sector-year	No	**Yes**	No	**Yes**
Observations	1,208	1,208	894	894
R-squared	0.677	0.691	0.664	0.674

Note: Robust standard errors are reported in parenthesis; *** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

Next, we use three other definitions of the dependent variable. From a policy perspective, the promotion of FDI inflows is expected to create new comparative advantages. Therefore, we first replace symmetric version with the *new revealed comparative advantages* variable aggregated at the industry level. More specifically, a new RCA is a dummy taking values 1 only if there is an increase in RCA from less than one in the previous year to higher than one in the present year. The

[39] See Appendix A.7 for the same estimates using Symmetric version of RCA as dependent variable.

second definition used to check the consistency of results is the log of industry RCA. Since we are interested to account for both country and sector specific changes over time, in the following estimations we will focus mainly on country-year and industry-year fixed effects.[40] In addition, they also yield higher R-squared indicating a better explanatory model of the specification. The growing importance of global value chains somehow challenges the use of RCA on gross exports as an indicator of country's comparative advantages. In order to take into account net exports, we further calculate the gravity based index in the equation (5) with imports included.[41] Results are pretty much the same as with the original gravity-based revealed comparative advantages (columns 5 and 6 in table 5).

Table 5. Additional alternative RCA definitions

VARIABLES	New RCA		Log (RCA)		Gravity-based RCA with imports	
	(1)	(2)	(3)	(4)	(5)	(6)
FDI_{cst-1}/Out_{cst-1}*$FinDep_s$	0.340**	0.329**	0.704*	0.723*	0.619*	0.653*
	[0.163]	[0.164]	[0.401]	[0.415]	[0.366]	[0.387]
FDI_{cst-1}/Out_{cst-1}	-0.287*	-0.266*	-0.270	-0.262	-0.202	-0.190
	[0.155]	[0.153]	[0.178]	[0.181]	[0.177]	[0.181]
$ValueAdd\_Share_{cst-1}$	-0.578**	-0.615**	13.325***	14.739***	12.161***	13.627***
	[0.224]	[0.253]	[0.756]	[0.798]	[0.732]	[0.802]
$Labour\_prod_{cst-1}$		-0.016		0.122		0.077
		[0.019]		[0.084]		[0.082]
Fixed Effects						
Country	No	No	No	No	No	No
Sector	No	No	No	No	No	No
Year	No	No	No	No	No	No
Country-year	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Sector-year	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Observations	689	645	1,623	1,505	1,623	1,505
R-squared	0.357	0.333	0.415	0.453	0.659	0.675

Note: Robust standard errors are reported in parenthesis;
*** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

As expected, using different RCA variables does not make any difference in terms of the coefficient sign on the main predictor variable – it is positive and significant at 5% respectively 10% level. It implies that regardless of the definition of the RCA there is always a positive

[40] Country-year fixed effects are supposed to take into account specific changes i.e. monetary or fiscal policies that apply across the board. On the other hand industry-year fixed effects will control for shocks affecting particular sectors.

correlation between the lagged FDI inflows in financially dependent sectors and comparative advantages in OECD countries.

3.5. Robustness checks

In this section we present few sensitivity checks to investigate the robustness of the results presented in the previous section. We begin with the inclusion of several time-invariant industry characteristics in the baseline specification, namely capital intensity, complexity, and skill intensity of the industry. Each one of these indicators is interacted with the FDI inflow in respective countries and is included in the model individually. As the results from the table table 6 show, coefficient on the main explanatory variable does not change while none of the coefficients of the above indicators are significant.[42] Such results imply that the positive correlation between FDIs and comparative advantages is robust when checking for different industry characteristics.

Table 6. FDI, comparative advantages and industry characteristics

VARIABLES	Gravity-based RCA		
	(1)	(2)	(3)
$FDI_{cst-1}/Out_{cst-1}*FinDep_s$	0.708*	0.684*	0.736*
	[0.399]	[0.389]	[0.383]
FDI_{cst-1}/Out_{cst-1}	0.296	0.250	8.354
	[0.563]	[0.380]	[6.708]
$ValueAdd\_Share_{cst-1}$	13.967***	13.961***	13.951***
	[0.812]	[0.813]	[0.814]
$Labour\_prod_{cst-1}$	0.097	0.098	0.095
	[0.085]	[0.085]	[0.085]
$Skill\_Intensity_s * FDI_{cst-1}/Output_{cst-1}$	-0.890		
	[1.013]		
$Capital\_Intensity_s * FDI_{cst-1}/Output_{cst-1}$		-0.004	
		[0.003]	
$Log(Complexity)_s * FDI_{cst-1}/Output_{cst-1}$			-1.708
			[1.329]
Fixed Effects			
Country	No	No	No
Sector	No	No	No
Year	No	No	No
Country-year	**Yes**	**Yes**	**Yes**
Sector-year	**Yes**	**Yes**	**Yes**
Observations	1,505	1,505	1,505
R-squared	0.704	0.704	0.704

Note: Robust standard errors are reported in parenthesis;
*** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

[42] The same estimates for symmetric version of RCA are provided in Appendix A.5.

It is a commonly accepted wisdom that the level of development of the financial sector matter for the overall economic development and growth. Based on this premise - in addition to the above industry level indicators - we check also for country's financial development indicators. Specifically, in our specification we include six different financial depth variables listed in the table 7 below. This additional robustness check is run with each of these variables individually in our baseline specification. As expected, our main results remain unaffected while all financial depth indicators' coefficients are positive and significant (table 8).[43] These results are in line with Alfaro et al. (2004) who argue that countries with well-established financial markets gain more from FDIs.

Table 7. Definition of financial depth indicators

No.	Variable	Definition
1	Domestic credit to private sector (% of GDP)	Domestic credit to private sector refers to financial resources provided to the private sector, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises.
2	Stock market capitalization to GDP (%)	Total value of all listed shares in a stock market as a percentage of GDP.
3	Outstanding domestic private debt securities to GDP (%)	Total amount of domestic private debt securities (amount outstanding) issued in domestic markets as a share of GDP. It covers data on long-term bonds and notes, commercial paper and other short-term notes.
4	Deposit money banks' assets to GDP (%)	Total assets held by deposit money banks as a share of GDP. Assets include claims on domestic real nonfinancial sector which includes central, state and local governments, nonfinancial public enterprises and private sector. Deposit money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits.
5	Private credit by deposit money banks and other financial institutions to GDP (%)	Private credit by deposit money banks and other financial institutions to GDP.
6	Mutual fund assets to GDP (%)	Ratio of assets of mutual funds to GDP. A mutual fund is a type of managed collective investment scheme that pools money from many investors to purchase securities.

Source: Global Financial Development Database, World Bank

[43] Table in Appendix A.6. include results from the same specification using Symmetric RCA as dependent variable

Table 8. FDI, comparative advantages and financial depth

VARIABLES	Gravity-based RCA					
	(1)	(2)	(3)	(4)	(5)	(6)
FDI_{cst-1}/Out_{cst-1}*$FinDep_s$	0.734*	0.718*	0.731*	0.748*	0.758*	0.670*
	[0.395]	[0.389]	[0.385]	[0.405]	[0.401]	[0.386]
FDI_{cst-1}/Out_{cst-1}	-0.245	-0.240	-0.286	-0.248	-0.250	-0.231
	[0.187]	[0.185]	[0.186]	[0.189]	[0.188]	[0.184]
$ValueAdd\_Share_{cst-1}$	13.850***	13.739***	13.092***	13.862***	13.839***	13.373***
	[0.804]	[0.833]	[0.793]	[0.791]	[0.794]	[0.773]
$Labour\_prod_{cst-1}$	0.097	0.107	0.147*	0.093	0.093	0.075
	[0.085]	[0.086]	[0.087]	[0.085]	[0.085]	[0.084]
DC_{ct-1}/GDP_{ct-1}*$FinDep_s$	0.003**					
	[0.001]					
$Stock_{ct-1}/GDP_{ct-1}$*$FinDep_s$		0.004*				
		[0.002]				
$Debt\_Sec_{ct-1}/GDP_{ct-1}$*$FinDep_s$			0.003**			
			[0.002]			
$Deposit_{ct-1}/GDP_{ct-1}$*$FinDep_s$				0.005***		
				[0.001]		
$PC\_Deposit_{ct-1}/GDP_{ct-1}$*$FinDep_s$					0.004***	
					[0.001]	
$Mutual\_Fund_{ct-1}/GDP_{ct-1}$*$FinDep_s$						0.004***
						[0.001]
Fixed Effects						
Country-year	Yes	Yes	Yes	Yes	Yes	Yes
Sector-year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,505	1,505	1,412	1,505	1,505	1,505
R-squared	0.706	0.705	0.697	0.707	0.707	0.711

Note: Robust standard errors are reported in parenthesis;
*** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

Our last robustness check explore the possible existence for reverse causality by controlling for the FDI lead values (first lead) in the main specification. The results support previous findings as far as the sign and significance of our main regressor is concerned. Coefficients on lead values are not significant while lagged FDI inflows remain positive and highly significant (Table 9).[44]

[44] Appendix A.7. provide the same test with Symmetric RCA.

Table 9. Reverse causality test

VARIABLES	Gravity-based RCA	
	(1)	(2)
$FDI_{cst-1}/Out_{cst-1}*FinDep_s$	1.770***	1.769***
	[0.564]	[0.656]
FDI_{cst-1}/Out_{cst-1}	-0.421	-0.378
	[0.290]	[0.335]
$FDI_{cst+1}/Out_{cst+1}*FinDep_s$	-0.050	0.022
	[0.270]	[0.267]
FDI_{cst+1}/Out_{cst+1}	-0.033	-0.110
	[0.159]	[0.156]
$Log(GDP/cap)_{ct-1}$	0.062	
	[0.660]	
$Log(Population)_{ct-1}$	-0.907	
	[4.204]	
$ExportShare_{ct-1}$	1.331	
	[1.836]	
$ValueAdd\_Share_{cst-1}$	14.134***	14.218***
	[0.911]	[0.941]
$Labour\_prod_{cst-1}$	0.023	0.086
	[0.097]	[0.107]
Fixed Effects		
Country	**Yes**	No
Sector	**Yes**	No
Year	**Yes**	No
Country-year	No	**Yes**
Sector-year	No	**Yes**
Observations	1,180	1,180
R-squared	0.701	0.713

Note: Robust standard errors are reported in parenthesis; *** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

3.6. Final remarks

This chapter investigate the role of foreign direct investments on the comparative advantages by exploring external finance channel in manufacturing sectors in developed economies. Instead of different proxies that existing, albeit scarce, literature use for industry level FDIs, we have utilized actual FDI inflows disaggregated at industry level for all manufacturing sectors. The use of actual industry FDI inflows allow us to better analyze its relationship with host country comparative advantages. Nevertheless, the purpose of this study was to examine the function of FDI inflows as an external source of finance for financially dependent sectors. In other words, our goal was to determine whether the positive correlation with comparative advantages is higher in industries that are more dependent on external finance. In order to employ this approach, sector FDI inflows were interacted with a sector financial dependence index constructed by Rajan and Zingales (1998).

According to our results, there is a clear evidence that FDI inflows are positively correlated to country's comparative advantage positions in highly dependent sectors on external finance. Apart from common industry spillovers generated from FDIs as the traditional literature suggest, the results in this paper reveal a new aspect of FDIs as a complementary source of finance in financially vulnerable manufacturing industries. The OLS coefficients on the main explanatory variable are positive and significant in all specifications. The sign and the significance remain unchanged using different comparative advantage definitions as well as different sets of fixed effects. Furthermore, our findings on the positive relationship of FDI inflows with comparative advantages are robust to the inclusion of different country level as well as country-sector variables. We started our robustness analysis with various sector characteristics which have been added individually in the main specification. Specifically, we included sector complexity, capital, R&D, and skill intensity indicators. None of them yielded significant results while the positive relationship between our main regressor and the dependent variable remain unaffected. The robustness of our model is further confirmed when controlling for country specific financial development variables, namely financial depth indicators, which were included individually in our empirical model. All of them were positive and significant while our initial results remained consistent.

In order to check for the potential existence of reverse causality, lead values of FDI inflows interacted with financial dependence index were incorporated in the model. The lead value was not statistically significant while the lagged value remain positive and significant.

Our findings are consistent with the previous literature on FDI and its impact on exports and may have policy implications, too. Investment promotion in manufacturing sectors with particular emphasis to those in more need for external finance would lead to improved country's comparative advantages. Furthermore, policies conducive to easing access and lowering the cost of external finance for manufacturing industries, might positively affect the growth of manufacturing exports. In order to deal with potential endogeneity issue in our model, exploring further advanced econometric techniques as well finding suitable instruments that would enable us to further explore the FDI-comparative advantages relationship have been left for future work.

Chapter IV

4. Impact of remittances on manufacturing growth. Are remittances a complementary source of external finance?

4.1. Introduction

Remittances as one of the largest external financial flows have played a crucial role in alleviating poverty in low and middle-income countries. It is estimated that remittances are the second largest source of international financial flows after foreign direct investments. In relative terms, remittance inflows in some countries exceed twenty percent of their GDP.[45] According to the World Bank (2018), the amount of worldwide officially recorded remittances reached $613 billion in 2017 where $466 billion or 67 percent of total remittances were directed to low and middle income economies. Moreover, remittance inflows are a more stable form of foreign exchange as any other source of international capital flows such as FDIs or aid.[46] Most importantly, they also may serve as a complementary source of capital for many financially constrained small businesses that have limited access to the formal financial sector.

Most of the literature to date have studied the impact of remittances on the aggregate level focusing on their impact on poverty alleviation and economic growth. There are two opposing streams in the literature as far as remittance growth-enhancing effects are concerned; one that acknowledges the positive impact (Gupta et al., 2009; Lim and Basnet, 2017) and another one which highlights contractionary effects of remittances (Lartey et al., 2008; Acosta et al., 2009; Le, 2009). Regardless of the above conflicting views, the literature have 'unanimously' established the poverty reduction effects of remittances. However, the role of remittances in the private sector in recipient countries remain underexplored. In this paper, we try to explore a new (supply side) channel through which remittances may exert their growth enhancing effects in the private sector in the developing world. Specifically, we will examine the role of remittances as a source of external finance in manufacturing industries. Assuming that financial markets are less developed in low income and middle-income countries, we expect that higher level of remittances will result in higher growth rates of manufacturing industries in these economies. Since we examine the 'external source of

[45] For more detailed information see the latest data on Remittances available at the World Bank data portal https://data.worldbank.org

[46] Acosta et al. (2009) argue that the magnitude and the growth rate of remittances surpassed the inflow of official aid as well as private capital in many developing countries

finance' channel, the positive correlation between remittances and manufacturing is expected to be confirmed in (highly) financially dependent industries (i.e. more capital intensive industries).

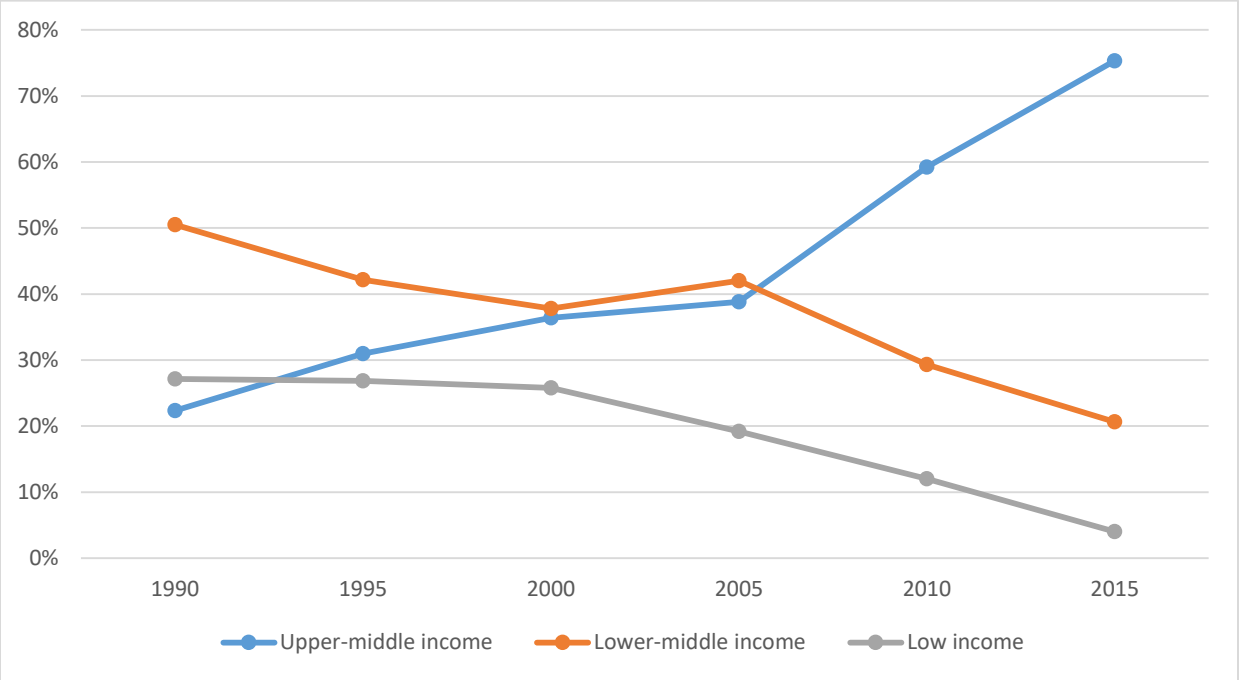
In order to observe the above relationship, we have utilized country and industry level data for a panel of 46 countries through over a 25-year period (from 1990 to 2015). Our results confirmed the above hypothesis; in contrast to the Dutch disease theory, we show that there is a positive and statistically significant correlation between the level of remittances and growth rate of manufacturing industries. The positive relationship is evident in financially dependent industries which confirms the complementary role of remittances as an external source of finance for highly capital intensive industries. Lastly, findings from our empirical analysis suggest policy implications. In less financially developed countries where the access to external finance is limited for the private sector in general, incentives to channel remittances into investments (rather than consumption) may fill the gap of external finance and promote manufacturing growth

This chapter is structured as follows. Section two provides a detailed description of the data used in our empirical model. Methodology and econometric approach is elaborated in the section three. Results are discussed in section four while the last section six concludes.

4.2. Data and variables

In this chapter we use a panel of 46 countries, namely upper-middle income, lower-middle income, and low income economies, for the period 1990-2015.[47] [48] The analytical classification of the World's economies based on estimates of gross national income (GNI) per capita, specifically World Bank's Atlas methodology, is used to group countries into the above mentioned income categories.[49] Since the GNI per capita fluctuates over years, countries may not be in the same income category throughout the whole sample. Figure 1 illustrate the evolution of our sample according to countries' income categories. In order to assign each country a single income category, we take the most frequent one (i.e. the mode) during the sample period.[50]

Figure 1. Sample structure by income level



Source: World Bank (2018)

[47] Data on remittances come from the IMF's Balance of Payment Statistics database.
[48] We test our baseline specification also with the inclusion of High income countries
[49] Detailed description of the methodology is available at https://datahelpdesk.worldbank.org/knowledgebase/articles/378832-the-world-bank-atlas-method-detailed-methodology
[50] The list of countries in all income categories is presented in the Appendix B.1.

Data on remittances were collected from the World Bank remittance database. Here the remittance inflows are defined as per IMF's Balance of Payment 6th Edition (BPM6) and consist on: (i) workers' remittances, recorded under the heading "current transfers" in the current account of the balance of payments; (ii) compensation of employees such as wages, salaries, and other benefits of border, seasonal, and other nonresident workers, and (iii) migrants' transfers.[51]

In our specification the value of remittances is normalized by respective countries' GDP in the corresponding year. Our variable of interest is the growth rate of firms' value added aggregated at industry level, namely 2-digit level according to ISIC-Revision 3, for all manufacturing industries. The value added is defined as the value of output less the value of input. Items included in inputs consist of: (i) value of materials and supplies for production (including cost of electricity and all fuels); and (ii) cost of services received (payments for repair and maintenance work, commission work, etc.).[52] Other industry level variables include also other size indicators such as the industry output, number of employees, wages and gross fixed capital information. All these industry level variables are extracted from the UNIDO database.[53] [54]

As we are looking for a supply side channel through which remittances might exert their growth enhancing effect, we interact the value of remittances (normalized by the value of GDP) with the dependence on external finance index of each manufacturing industry in Rajan and Zingales (1998).[55] Basically we check whether remittances complements resources of external finance of financially dependent manufacturing industries. Table 10 provides corresponding financial dependence index for each industry.

[51] Remittances are defined as per IMF's manual is provided in Ratha (2003); IMF's BPM6 is available at https://www.imf.org/external/pubs/ft/bop/2007/pdf/bpm6.pdf;

[52] The definition of UNIDO variables is provided in Appendix A.2. However a more detailed explanation of such variables is provided in *UNIDO Industrial Statistics Database User's Guide (INDSTAT-2 and INDSTAT-4 ISIC Rev. 3 and Rev.4)*

[53] Divisions 16 and 23, namely "Manufacture of tobacco products" and "Manufacture of coke, refined petroleum products and nuclear fuel" respectively, have been dropped from the sample due to the high control and government support in these two industries.

[54] Those variables that have monetary values were converted into USD using the official yearly average conversion rates provided by UNIDO.

[55] A detailed explanation about the financial dependence index is provided in the previous chapter

Table 10. Financial dependence index calculated at ISIC 3 – Division level

Description	ISIC Rev. 3 - Division	External finance dependence
Manufacture of food products and beverages	15	0.11
Manufacture of textiles	17	0.16
Manufacture of wearing apparel; dressing and dyeing of fur	18	0.03
Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	19	-0.11
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	20	0.28
Manufacture of paper and paper products	21	0.17
Publishing, printing and reproduction of recorded media	22	0.20
Manufacture of chemicals and chemical products	24	0.62
Manufacture of rubber and plastics products	25	0.69
Manufacture of other non-metallic mineral products	26	0.11
Manufacture of basic metals	27	0.25
Manufacture of fabricated metal products, except machinery and equipment	28	0.24
Manufacture of machinery and equipment n.e.c.	29	0.45
Manufacture of office, accounting and computing machinery	30	1.01
Manufacture of electrical machinery and apparatus n.e.c.	31	0.77
Manufacture of radio, television and communication equipment and apparatus	32	1.04
Manufacture of medical, precision and optical instruments, watches and clocks	33	0.96
Manufacture of motor vehicles, trailers and semi-trailers	34	0.39
Manufacture of other transport equipment	35	0.39
Manufacture of furniture; manufacturing n.e.c.	36	0.24

Source: Rajan and Zingales (1998)

In addition, for the purpose of robustness checks, we will also use additional proxies for financial system development. Specifically, we make use of indicators in the World Bank - Global Financial Development Database which includes measures of depth, access, efficiency, as well as stability of financial systems. In our model we include indicators that measure the depth of the financial system, listed in the table 11.

Table 11. Financial depth indicators

Indicator	Short definition
Private credit by deposit money banks to GDP (%)	The financial resources provided to the private sector by domestic money banks as a share of GDP. Domestic money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits.
Deposit money banks' assets to GDP (%)	Total assets held by deposit money banks as a share of GDP. Assets include claims on domestic real nonfinancial sector which includes central, state and local governments, nonfinancial public enterprises and private sector. Deposit money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits.
Private credit by deposit money banks and other financial institutions to GDP (%)	Private credit by deposit money banks and other financial institutions to GDP.
Stock market capitalization to GDP (%)	Total value of all listed shares in a stock market as a percentage of GDP.
Stock market total value traded to GDP (%)	Total value of all traded shares in a stock market exchange as a percentage of GDP.
Outstanding domestic private debt securities to GDP (%)	Total amount of domestic private debt securities (amount outstanding) issued in domestic markets as a share of GDP. It covers data on long-term bonds and notes, commercial paper and other short-term notes.

In our specifications we include different time varying control variables at different levels of aggregation. From the World Bank Development Indicators we have extracted data on foreign direct investments, aggregated at country level, as well as GDP in current USD and the number of population. Additionally, we make use of exchange rates data in order to check for the potential existence of the Dutch disease effect stemming from the remittance inflows. Specifically, time series on nominal effective exchange rates (NEER), obtained from Darvas (2012) are included in our specification. NEER is the geometrically weighted average of the nominal bilateral exchange rate between the each country and its trading partner. It is measured as the foreign currency price of one unit of domestic currency. The increase of NEER implies the exchange rate appreciation of the country under study. In addition to the above country level variables, trade flows, namely imports and exports data aggregated at 3-digit level (ISIC, Revision 3) collected from the Comtrade database are also included in our empirical model.[56]

[56] Summary statistics of all variables included in our empirical model are provided in Appendix B.2.

4.3. Econometric estimation of the model

Most of the empirical literature so far has attempted to explain the role of remittances in a macro framework. The evidence to date is inconclusive regarding the channels and the actual impact that remittances have on the overall economic welfare. In this chapter we will dig further and try to bring new evidence of the impact of remittances on industry growth. More specifically, we present a new channel through which remittances could stimulate the growth of the manufacturing industries. In our model we treat remittances as a complementary source of finance for manufacturing industries. In the previous chapter we have shown that FDIs are positively correlated with the revealed comparative advantages in the manufacturing industries. We expect that also remittances would exert similar growth enhancing effect; the higher the remittance the higher should be the rate of growth in more financially dependent industries on external finance.

In order to capture the effect of remittances on the growth rate of manufacturing industries, we estimate the following:

$$GVA_{cst} = \alpha + \beta\, ln(VA)_{cst0} + \gamma \left(\frac{Rem_{cst0}}{GDP_{cst0}}\right) + \delta \left(\frac{Rem_{ct0}}{GDP_{ct0}}\right) x\ FinDep_s + \eta_t + \theta_{cs} + \varepsilon_{cst} \qquad (1)$$

where GVA_{cst} is the average industry (value added) growth rate over five-year spans while $ln(VA)_{cst0}$ is the natural logarithm of the initial period share of the industry value added. $FinDep_s$ is the RZ index of dependence on external finance calculated at the industry level while coefficient δ captures the external finance role of remittances on manufacturing industries;[57] η_t and θ_{cs} captures time respectively country-industry fixed effects. The former will allow us to control for time invariant unobservables while the latter will control for the average differences in unobservable predictors across countries and industries. We believe that remittances as a potential source of external finance may exert their impact on manufacturing growth after some time. Therefore, rather than examining contemporaneous correlation we allow for some time for remittances to (i.e. using the first lag or longer lags) exercise its role as external source of finance to financially dependent industries.[58] It should be noted that the dependent variable is winsorized

[57] United States have been removed from the sample for the same reason explained in the previous chapter.
[58] Results with longer than one lag in the baseline specification are provided in the Appendix B.4.

in order to get rid of extreme values of value added.[59] Since we will take into consideration only manufacturing industries, dropping outliers would results in excluding some important industries from the estimation. As a result, we have assigned values greater than 99th percentile the value of the 99th percentile value, while the values below the 1st percentile the value of the 1st percentile.

The baseline specification initially is estimated using OLS with the two different definition of the dependent variables, growth rate of value added for the yearly data and the average growth rate across five-year time spans. However, we are aware of the fact that we cannot control for all relevant control variables. Moreover, our data fall into different categories (levels of aggregation) and OLS might not account for all time invariant unobservable factors that potentially affect our dependent variable. Therefore, we switch to a fixed effects framework in order to minimize the omitted variable bias.

Following the baseline specification, we run several robustness checks to test the consistency of our results. First, we control for the trade effect, namely trade flows (both imports and exports) in manufacturing industries. The potential growth effects of trade are well known, so we believe that controlling for such effects would robustify our estimates. Since exporters are more productive than non-exporters, we would expect a positive sign of the coefficient on exports.[60] On the other hand, the impact of imports is not clear; the evidence is ambiguous. In its full specification, our first robustness test take the following form:

$$GVA_{cst} = \alpha + \beta\, ln(VA)_{cst0} + \gamma\left(\frac{Rem_{ct0}}{GDP_{ct0}}\right) + \delta\left(\frac{Rem_{ct0}}{GDP_{ct0}}\right) x\, FinDep_s + \zeta\left(\frac{Imports_{cst0}}{Output_{cst0}}\right) + \psi\left(\frac{Exports_{cst0}}{Output_{cst0}}\right) + \eta_t + \theta_{cs} + \lambda_{ct} + \xi_{st} + \varepsilon_{cst} \quad (2)$$

Here, we include also all possible combinations of fixed effects to control for all country, industry, time, and country-industry specific unobservables.

[59] Winsorization (named after the biostatistician Charles P. Winsor) is a method of dealing with outliers in a distribution of data. It converts the values of data points that are lower (higher) than the lowest (highest) values that are not considered to be outliers by the author.

[60] Melitz (2003) in his model which analyzes the intra-industry effects of international trade, show that exposure to trade induce only the more productive firms to enter export markets. There are also numerous empirical contributions that confirm the above i.e. Bernard and Jensen (1999) find that exporters are ex-ante better performers as opposed to non-exporters and that superior performance persist also ex-post. Similarly, Van Biesebroeck (2005) show that there is a self-selection – most productive firms engage in exporting activities.

In addition to the trade effect, we further control for additional country level factors. More specifically, other alternative sources of (external) finance to manufacturing industries, namely, FDI inflows and domestic credit to the private sector as a share of GDP, will be included in the model. A separate robustness check will be also estimated using different financial development indicators. The negative impact of exchange rate appreciation on manufacturing, particularly in tradable sectors, is well known (Rajan and Subramanian, 2011). Moreover, exchange rate appreciation follows remittance flows causing the Dutch disease effect (Acosta et al., 2009; Amuedo-Dorantes and Pozo, 2004). Therefore, we will also include the nominal effective exchange rate in our specification in order to control for the potential Dutch disease effect of remittances. Having incorporated the above country level variables, our augmented specification is depicted as follows:

$$GVA_{cst} = \alpha + \beta\, ln(VA)_{csto} + \gamma\left(\frac{Rem_{cto}}{GDP_{cto}}\right) + \delta\left(\frac{Rem_{cto}}{GDP_{cto}}\right) x\, FinDep_s + \zeta\left(\frac{Trade_{csto}}{Output_{csto}}\right) + \boldsymbol{X}_{ct0} + \eta_t + \theta_{cs} + \lambda_{ct} + \xi_{st} + \varepsilon_{cst} \quad (3)$$

where $\boldsymbol{X}_{ct0}$ is a vector of time-varying country level variables and $Trade_{cst0}$ is the total trade flows aggregated at industry level at the beginning of each period.

4.4. Results

Our results from the estimated equation (1) are presented in the table 12 for OLS as well as fixed effects (FE) estimations. Both, OLS and FE (columns 1 and 2) confirm our hypothesis – there is a positive correlation between the level of remittance inflows and the growth of manufacturing industries (see Appendix B.4. for longer lags of the baseline specification). Coefficient of our main explanatory variable, namely interaction between the remittance inflows and the financial dependency index is always positive and significant – the impact of remittances on industry growth is higher the higher is the dependency of industrial sectors on external finance.

Table 12. Baseline specification

VARIABLES	Average growth of value added in 5-year spans						Annual growth rate of value added
					Including high income countries	Uncensored version of the dependent variable	
	OLS	FE	FE	FE	FE	FE	FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Log(Value\ added)_{cs}\tau_0$	-0.016***	-0.134***	-0.134***	-0.134***	-0.108***	-0.147***	-0.216***
	[0.002]	[0.011]	[0.016]	[0.011]	[0.007]	[0.013]	[0.009]
$Rem_c\tau_0/GDP_c\tau_0$	-0.430***	-2.232***	-2.232**	-2.232***	-1.249***	-1.675***	-0.674**
	[0.135]	[0.484]	[0.897]	[0.606]	[0.468]	[0.531]	[0.325]
$Rem_c\tau_0/GDP_c\tau_0$ * $FinDep_s$	1.342***	4.730**	4.730*	4.730**	2.934	2.604*	2.069***
	[0.437]	[1.891]	[2.353]	[1.958]	[1.827]	[1.380]	[0.786]
Fixed Effects							
Year	YES	YES	YES	YES	YES	YES	YES
Country -sector	NO	YES	YES	YES	YES	YES	YES
Observations	2,344	2,344	2,344	2,344	4,061	2,337	19,691
R-squared	0.117	0.280	0.280	0.280	0.192	0.343	0.166
Number of id		768	768	768	1,288	767	1,444
SE cluster			Country	Sector			

Note: Robust standard errors are reported in parenthesis;
*** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

The explanatory power seems to be higher in a fixed effect framework' as the R-squared value is higher as opposed to the OLS estimate. Since in our panel we employ data at different levels (i.e. country and industry specific data), errors in different time periods for a given individual (e.g., industry) may be correlated while they are assumed to be uncorrelated. As Moulton (1990) warns, measuring the effect of aggregate data (i.e. country or region) on micro units (i.e. industry or

firms), might lead to standard errors that are biased downwards. Therefore, as a first test, we cluster standard errors both at country as well as industry level in the baseline specification as in Cameron and Trivedi (2010). Columns 3 and 4 show estimation results when clustering countries and industries respectively. Coefficient of the main regressor in both cases is positive and significant, albeit (as expected) with higher standard errors, hence reconfirming positive correlation between remittance inflows and manufacturing growth. Such results are consistent with Bahadir et al. (2018) who show that remittances are expansionary if they are transferred to the financial-constraint entrepreneurs.

Remittances are mostly directed to low and middle-income economies; the World Bank (2018) data shows that officially recorded remittances to those income groups reached as much as 76% of global remittances in 2017. Moreover, considering the low level of financial development in low and middle-income countries we assume that the financial dependence channel is at work mainly in those countries. In order to test this hypothesis, we further include in the sample also high income economies (Table 12, column 7). Results confirm our hypothesis; inclusion of high income countries make the coefficient of our main variable insignificant. Next, we run our baseline specification also with "unwinsorized" (uncensored) version of our dependent variable - the average growth of manufacturing industries. Our results remain consistent; the coefficient on remittance inflows interacted with financial dependence index is positive and significant (Table 12, column 8).[61] We also test our baseline specification using yearly data where the dependent variable is defined as the annual growth rate (first difference) of value added. The main predictor retain the same sign and remain highly significant (Table 12, column 9).

[61] Results with other specifications using uncensored dependent variable are presented in the Appendix B.3

4.4.1. Non-linearity

Before expanding our specification, we want to see if the positive relationship between remittances and manufacturing growth persist. In other words, we check for the non-linearity of the relationship between the two. To do so, we also add the squared version of our main predictor in the baseline specification. We find that there exists a non-linear relationship between remittance inflows and the growth in highly financially dependent manufacturing sectors. The estimated coefficient on the squared variable is negative and significant implying the inverted U-shaped relationship. Diminishing properties of remittances suggest a positive correlation in the initial phase, but a negative one at a later phase (Table 13).

Table 13. Non-linear effects of remittances

VARIABLES	Average growth of value added	
	FE	FE
	(1)	(2)
$Log(Value\ added)_{cst0}$	-0.136***	-0.139***
	[0.011]	[0.006]
Rem_{ct0}/GDP_{ct0}	-4.673***	
	[0.860]	
$Rem_{ct0}/GDP_{ct0} * FinDep_s$	11.651***	3.362**
	[2.974]	[1.415]
$(Rem_{ct0}/GDP_{ct0})^2$	16.984***	
	[5.417]	
$(Rem_{ct0}/GDP_{ct0} * FinDep_s)^2$	-48.707**	-16.515**
	[22.402]	[7.644]
Fixed Effects		
Year	YES	YES
Country - Sector	YES	YES
Country-Year	NO	YES
Sector-Year	NO	YES
Observations	2,344	2,240
R-squared	0.293	0.738
Number of id	768	

Note: Robust standard errors are reported in parenthesis;
*** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

4.4.2. Trade effects

The positive impact of trade on the overall economic growth is well established and is already elaborated in the previous chapter. The following table shows the results from the equation (2) which is the extended baseline specification with the inclusion of trade variables. Columns 1 and 2 from the table below, show the results of the main variables in the presence of trade flows, namely the sum of imports and exports, with different set of fixed effects. First, we include only time and country-industry fixed effects and show that the coefficient of our key explanatory variable is positive and significant at 5 percent level of significance while the coefficient on trade is very low and insignificant. The coefficient is smaller, albeit still significant, also when controlling for all possible combination of fixed effects (column 2). The remaining columns (3, 4, and 5) show results when imports and exports are included separately in the specification and also together. Although the magnitude is negligible, as expected, the sign of the coefficient on industry exports is positive and significant.

Table 14. Remittances, manufacturing growth and trade effect

	Average growth of value added				
VARIABLES	FE	FE	FE	FE	FE
	(1)	(2)	(3)	(4)	(5)
Log(Value added) $_{cst0}$	-0.130***	-0.131***	-0.136***	-0.130***	-0.130***
	[0.011]	[0.008]	[0.012]	[0.011]	[0.008]
Rem_{ct0}/GDP_{ct0}	-1.844***		-1.868***	-1.847***	
	[0.622]		[0.622]	[0.623]	
Rem_{ct0}/GDP_{ct0} * $FinDep_s$	5.695**	1.634*	5.754**	5.683**	1.609*
	[2.649]	[0.922]	[2.650]	[2.650]	[0.921]
$Trade_{cst0}/Output_{cst0}$	0.007	0.000			
	[0.004]	[0.005]			
$Import_{cst0}/Output_{cst0}$			0.005	0.004	-0.004
			[0.005]	[0.005]	[0.006]
$Export_{cst0}/Output_{cst0}$				0.020***	0.027**
				[0.006]	[0.013]
Fixed Effects					
Year	YES	YES	YES	YES	YES
Country-Sector	YES	YES	YES	YES	YES
Country-Year	NO	YES	NO	NO	YES
Sector-Year	NO	YES	NO	NO	YES
Observations	2,033	1,932	2,037	2,033	1,932
R-squared	0.257	0.747	0.268	0.258	0.748
Number if id	710		710	710	

Note: Robust standard errors are reported in parenthesis;

*** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

4.4.3. Competing explanations: financial development, FDI and exchange rate appreciation

In this sub-section, for robustness purposes, we further extend our specification with alternative sources of external finance for the manufacturing industries. Foreign direct investments are the closest candidate to remittances as the largest source of external finance for developing countries. Additionally, we include a proxy for the level of development of the financial system, domestic credit as a share of GDP. In addition to the above two sources, we also control for the nominal effective exchange rate in order to test for the potential Dutch disease effect through which remittances are considered to exert their hindering effect on industry, particularly in tradable sectors (equation 3).

Results from the table 15 (column 1) below confirm that the exchange rate appreciation hinders manufacturing growth when controlling for time and country-industry fixed effects. However, the coefficient on remittances remain intact in terms of its sign and significance. Inclusion of the domestic credit to GDP and FDI in the baseline specification separately does not change our key results; however, the coefficient on the latter, as one would expect, is positive and significant while on the former is not. The positive role of FDI on manufacturing is in line with the vast majority of empirical evidence on the role of FDIs on growth in recipient countries (Greenaway et al 2004; Kneller, 2011; etc.).

Extending the specification with the same set of fixed effects does not harm our results, however, the significance of the nominal effective exchange rate disappears once we control for trade variables as well as alternative sources of external finance variables (columns 4 to 7). The coefficients on FDIs and exports remain always consistent. Next, we repeat the estimation with all fixed effect combinations (see table 15, columns 8 to 11). Although our main explanatory variable remain positive and significant, the significance of other variables, except industry exports, vanishes. Results in the column 11 displays our largest specification which in this case is a good amount of information that can be exploited by the FE estimator since the reported R-squared is relatively high.

Table 15. Remittances, complementary sources of external finance and nominal effective exchange rate

VARIABLES	Average growth of Value added										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
$Log(Value\ added)_{cst0}$	-0.132***	-0.133***	-0.135***	-0.132***	-0.138***	-0.132***	-0.132***	-0.133***	-0.140***	-0.131***	-0.132***
	[0.011]	[0.012]	[0.011]	[0.011]	[0.012]	[0.011]	[0.011]	[0.008]	[0.008]	[0.008]	[0.008]
Rem_{ct0}/GDP_{ct0}	-2.055***	-1.840***	-2.290***	-1.264**	-1.274**	-1.269**	-1.269**				
	[0.479]	[0.510]	[0.469]	[0.637]	[0.637]	[0.637]	[0.637]				
$Rem_{ct0}/GDP_{ct0} * FinDep_s$	4.598**	4.418**	5.055***	5.248**	5.266**	5.240**	5.240**	1.847**	1.829*	1.823*	1.820*
	[1.874]	[1.966]	[1.795]	[2.638]	[2.639]	[2.638]	[2.639]	[0.938]	[0.949]	[0.936]	[0.936]
$Log(NEER)_{ct0}$	-0.001			0.003	0.005	0.004	0.004				
	[0.010]			[0.011]	[0.011]	[0.011]	[0.011]				
$Log(NEER)_{ct0} * FinDep_s$	-0.046**			-0.041	-0.042	-0.041	-0.041	0.025	0.027	0.026	0.026
	[0.019]			[0.026]	[0.026]	[0.026]	[0.026]	[0.023]	[0.023]	[0.023]	[0.023]
$DomCredit_{ct0}/GDP_{ct0}$		-0.001***		-0.002***	-0.002***	-0.002***	-0.002***				
		[0.000]		[0.000]	[0.000]	[0.000]	[0.000]				
$DomCredit_{ct0}/GDP_{ct0} * FinDep_s$		0.001		0.002	0.002	0.002	0.002	-0.001	-0.001	-0.001	-0.001
		[0.001]		[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
FDI_{ct0}/GDP_{ct0}			-0.640***	-0.591**	-0.570**	-0.590**	-0.590**				
			[0.226]	[0.271]	[0.273]	[0.271]	[0.271]				
$FDI_{ct0}/GDP_{ct0} * FinDep_s$			2.453***	2.241**	2.236**	2.239**	2.239**	0.502	0.502	0.497	0.499
			[0.796]	[1.033]	[1.039]	[1.032]	[1.032]	[0.464]	[0.470]	[0.464]	[0.464]
$Trade_{cst0}/Output_{cst0}$				0.002				-0.000			
				[0.005]				[0.005]			
$Import_{cst0}/Output_{cst0}$					0.001		0.000		-0.005		-0.006
					[0.005]		[0.005]		[0.006]		[0.006]
$Export_{cst0}/Output_{cst0}$						0.014***	0.014***			0.025*	0.025*
						[0.005]	[0.005]			[0.013]	[0.013]
Fixed Effects											
Year	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country-Sector	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country-Year	NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES
Sector-Year	NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES
Observations	2,344	2,251	2,344	2,018	2,022	2,018	2,018	1,915	1,922	1,915	1,915
R-squared	0.285	0.284	0.292	0.290	0.301	0.290	0.290	0.753	0.753	0.754	0.754
Number of id	768	747	768	710	710	710	710				

Note: Robust standard errors are reported in parenthesis;

*** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

4.4.4. Controlling for country's financial depth

As an additional robustness check, we perform the baseline specification with additional proxies for financial development, specifically financial depth indicators. We expect financial development to be positively correlated with the growth of manufacturing industries. A seminal paper by Rajan and Zingales (1998) and later Beck (2002), provide evidence that highlights the importance of the financial development in fostering manufacturing growth. Here we have included six different financial depth indicators for which we have data for most of the countries in our sample.[62] The coefficient of remittance inflows interacted with financial dependence index still remain positive and significant after inclusion of financial depth variables (table 16). However, not all of them seem to be relevant when it comes to the growth of the value added in manufacturing industries. *Stock market capitalization to GDP* and *Stock market total value traded to GDP* have positive and significant coefficients confirming the positive relationship between financial depth and firm's growth. Such findings are consistent with the literature on financial markets and growth (Greenwood and Smith, 1997; Durusu-Ciftci et al., 2017).

4.4.5. Remittances in different country's income categories

As explained in the data section, in this chapter we disregarded high income economies in our model and will focus on low, lower-middle and upper middle income countries. As a last check we split the sample into three groups with the above income categories. Results for each sub-sample are presented in the Table 17 with baseline as well as full specification and include the following: (i) low income countries, (ii) low and lower-middle income countries together, and (iii) upper-middle income countries. When using the sub-sample with low income economies, results re-confirm our findings (see columns 1 to 5). Regardless of the inclusion of additional country specific as well as industry specific variables in the specification, in most of the cases the positive correlation between remittance inflows and manufacturing growth is evident in financially dependent industries. Similarly, in almost all specifications results are the same in terms of significance and sign also when merging low income countries with lower-middle

[62] The definition of financial depth indicators is provided in the Data section.

income countries. However, coefficient in our explanatory variable becomes insignificant in the largest specification with all sets of fixed effects with upper-middle income sub-sample.

Table 16. Remittances and financial depth indicators

VARIABLES	Average growth of Value added					
	(1)	(2)	(3)	(4)	(5)	(6)
$Log(Value\ added)_{cst0}$	-0.150***	-0.130***	-0.148***	-0.150***	-0.147***	-0.148***
	[0.015]	[0.022]	[0.014]	[0.014]	[0.015]	[0.014]
Rem_{ct-1}/GDP_{ct0}	-1.874***	-0.525	-1.642***	-1.707***	-1.921***	-1.605***
	[0.578]	[0.719]	[0.552]	[0.546]	[0.593]	[0.555]
Rem_{cto}/GDP_{ct0} * $FinDep_s$	3.116*	4.873**	2.642*	2.560*	3.076**	2.633*
	[1.678]	[2.104]	[1.521]	[1.505]	[1.558]	[1.526]
$StockMarketCap_{ct0}/GDP_{ct0}$	-0.000					
	[0.000]					
$StockMarketCap_{ct0}/GDP_{ct0}$ * $FinDep_s$	**0.001***					
	[0.001]					
$DomPrivDeptSec_{ct0}/GDP_{ct0}$		-0.002**				
		[0.001]				
$DomPrivDeptSec_{ct0}/GDP_{ct0}$ * $FinDep_s$		-0.000				
		[0.003]				
$PrivCreditByDepMoney_{ct0}/GDP_{ct0}$			-0.001***			
			[0.000]			
$PrivCreditByDepMoney_{ct0}/GDP_{ct0}$ * $FinDep_s$			-0.000			
			[0.001]			
$DepMoneyBanks'Asset_{ct0}/GDP_{ct0}$				-0.002***		
				[0.000]		
$DepMoneyBanks'Asset_{ct0}/GDP_{ct0}$* $FinDep_s$				0.001		
				[0.001]		
$StockValueTraded_{ct0}/GDP_{ct0}$					-0.001**	
					[0.000]	
$StockValueTraded_{ct0}/GDP_{ct0}$ * $FinDep_s$					**0.002****	
					[0.001]	
$PrivCreditBankOtherFin_{ct0}/GDP_{ct0}$						-0.002***
						[0.000]
$PrivCreditBankOtherFin_{ct0}/GDP_{ct0}$ * $FinDep_s$						-0.000
						[0.001]
Fixed Effects						
Year	YES	YES	YES	YES	YES	YES
Country-Sector	YES	YES	YES	YES	YES	YES
Country-Year	NO	NO	NO	NO	NO	NO
Sector-Year	NO	NO	NO	NO	NO	NO
Observations	2,030	916	2,227	2,227	2,031	2,227
R-squared	0.332	0.426	0.366	0.368	0.319	0.367
Number of id	684	320	746	746	684	746

Note: Robust standard errors are reported in parenthesis;
*** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

Table 17. Sub-samples according to income level

VARIABLES	Average growth of value added														
	Low income countries					Low and lower-middle income countries					Upper-middle income countries				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Log(Value added) $_{cst0}$	-0.175***	-0.174***	-0.173***	-0.223***	-0.214***	-0.158***	-0.155***	-0.149***	-0.155***	-0.150***	-0.105***	-0.106***	-0.107***	-0.115***	-0.125***
	[0.024]	[0.037]	[0.038]	[0.030]	[0.027]	[0.014]	[0.016]	[0.016]	[0.018]	[0.012]	[0.017]	[0.017]	[0.017]	[0.015]	[0.011]
Rem_{ct0}/GDP_{ct0}	-3.904***	-4.185***	-4.143***	-4.647***		-2.148***	-2.117***	-1.938***	-1.562**		-2.782***	-2.284**	-2.849**	-2.481**	
	[0.790]	[0.874]	[0.858]	[1.163]		[0.544]	[0.526]	[0.529]	[0.778]		[1.039]	[1.090]	[1.193]	[1.248]	
Rem_{ct0}/GDP_{ct0} * $FinDep_s$	5.917**	6.695**	6.835**	6.648*	4.267*	3.890*	3.989**	3.865*	4.655	3.157***	7.315**	7.709**	8.774**	7.736*	-3.140
	[2.924]	[3.267]	[3.287]	[3.883]	[2.328]	[2.158]	[2.002]	[2.067]	[3.390]	[1.102]	[3.667]	[3.904]	[4.026]	[4.092]	[1.956]
$DomCredit_{ct0}/GDP_{ct0}$		-0.002	-0.001	-0.002			-0.002***	-0.002**	-0.002**			-0.001	-0.000	-0.001	
		[0.002]	[0.002]	[0.003]			[0.001]	[0.001]	[0.001]			[0.001]	[0.001]	[0.001]	
$DomCredit_{ct0}/GDP_{ct0}$ * $FinDep_s$		0.004	0.004	0.014	-0.002		0.001	0.001	0.003	-0.003		-0.001	-0.001	0.000	0.001
		[0.010]	[0.010]	[0.009]	[0.007]		[0.002]	[0.002]	[0.003]	[0.002]		[0.002]	[0.002]	[0.002]	[0.001]
FDI_{ct0}/GDP_{ct0}		-1.149	-1.065	-1.513*			-0.550	-0.475	-0.986**			-0.229	-0.153	-0.067	
		[0.984]	[1.027]	[0.901]			[0.347]	[0.363]	[0.441]			[0.277]	[0.281]	[0.346]	
FDI_{ct0}/GDP_{ct0} * $FinDep_s$		3.379	3.052	3.503	0.239		1.611	1.626	2.094	0.362		2.432**	2.218**	1.887	1.321**
		[3.396]	[3.572]	[3.934]	[3.554]		[1.287]	[1.320]	[1.728]	[0.724]		[1.011]	[1.014]	[1.292]	[0.672]
$Log(NEER)_{ct0}$			0.014	0.010				-0.041**	-0.023				0.032**	0.031**	
			[0.048]	[0.045]				[0.017]	[0.022]				[0.014]	[0.015]	
$Log(NEER)_{ct0}$ * $FinDep_s$			-0.093	-0.052	-0.086			-0.014	-0.021	0.024			-0.066*	-0.070*	0.041
			[0.132]	[0.099]	[0.143]			[0.040]	[0.055]	[0.042]			[0.037]	[0.036]	[0.029]
$Import_{cst0}/Output_{cst0}$				-0.002	-0.004				-0.000	-0.001***				0.000**	-0.000
				[0.005]	[0.003]				[0.000]	[0.000]				[0.000]	[0.000]
$Export_{cst0}/Output_{cst0}$				-0.051	0.005				-0.006	-0.001				0.000***	0.000**
				[0.048]	[0.018]				[0.013]	[0.005]				[0.000]	[0.000]
Fixed Effects															
Year	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country-Sector	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country-Year	NO	NO	NO	NO	YES	NO	NO	NO	NO	YES	NO	NO	NO	NO	YES
Sector-Year	NO	NO	NO	NO	YES	NO	NO	NO	NO	YES	NO	NO	NO	NO	YES
Observations	348	332	332	252	215	1,300	1,207	1,207	1,012	944	1,044	1,044	1,044	1,006	968
R-squared	0.393	0.404	0.406	0.475	0.851	0.344	0.355	0.366	0.373	0.788	0.223	0.250	0.256	0.247	0.779
Number of id	122	121	121	103		437	416	416	381		331	331	331	329	

Note: Robust standard errors are reported in parenthesis;
*** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

4.4.6. Interpreting the results

In this section we interpret the results obtained in our baseline as well as extended specification with trade effect, alternative finance sources and effective nominal exchange rate. Being aware of the presence of potential endogeneity in the model, we do not interpret our coefficients in terms of casual relationship. However, the positive correlation between the explanatory variable and our variable of interest is robust across different specifications and tests. Our results suggest that in the baseline specification with time and country-industry fixed effects (Table 12 column 2), remittance inflows explain around one third of the within variation of the growth in the manufacturing industries with the highest level of financial dependence (Appendix 6a).[63] In the augmented specification, the variation explained by the initial value of remittances in the average growth of highly financially dependent industries is higher.

We also provide the above interpretation with the other two alternative sources of external finance in our model, namely domestic credit and FDI inflows normalized by the GDP. Using the largest specification as above, we see that in our model domestic credit as a share of GDP has very small explanatory power as opposed to remittances (see figures in Appendix B.6c and B.6d.) ; less than one percent of the within variation of growth in highly financially dependent manufacturing industries is explained by domestic credit to private sector.

On the other hand, the situation is different with the level of inward manufacturing foreign direct investments. Results are consistent with the established positive role of FDIs in the literature as well as our initial findings in the previous chapter - FDI inflows matter for the private sector development, manufacturing in particular. In the same (extended) specification, the FDI inflows explain around one third of the within variation in the average value added growth across 5-year spans in the manufacturing industries. Finally, our results indicate that remittance inflows similar to inward FDIs may well serve as a complementary source of finance to the manufacturing – mainly capital intensive - industries, that rely heavily on external finance.

[63] The within variation is calculated using the same method as in the previous chapter in section 3.4 (see Appendix B.5, B6a and B6b)

4.5. Final remarks

The main message of this chapter is that beyond the role on poverty alleviation, remittances may have also industry growth enhancing effects via the external finance channel. Exploiting this new channel, our preliminary findings suggest that remittances may serve as a complementary source of external finance for the industry. Specifically, we show that the average growth rate of highly financially dependent manufacturing industries increases when moving from countries with low remittance inflows to GDP to countries with high remittance to GDP share. Our results were consistent in both OLS and fixed effects framework. Moreover, robustness of our results is confirmed when using different sets of fixed effects. Since remittances may take a while to exert their external finance role, lagged values of remittances to GDP share interacted by the RZ external finance dependency index has been used in our specifications. Furthermore, the positive relationship between our explanatory variable and manufacturing growth is re-confirmed also after controlling for the trade effect, namely industry import and export flows seperately. However, non-linearity of the relationship illustrate diminishing properties of remittances; the coefficient of squared explanatory variable is negative and significant. Consistency of the results is confirmed also when conducted an additional robustness check with other potential candidates of external finance such as FDI to GDP share and also domestic credit to private sector as a share of GDP. In addition, we controlled also for the effect of the exchange rate appreciation which, according to the Dutch disease theory, may be affected by the large flow of remittances. The coefficient of our main predictor remained positive and significant in all specifications and robustness tests also when controlling for all combinations of fixed effects. Splitting the sample according to country's income level have not changed the results; however, when high income economies were included in the sample, the main coefficient became insignificant. In our baseline specification, the lagged level of remittances to GDP explain around one third of the within variation in the growth of financially dependent industries. Our findings may have policy implications, in particular for least developed and developing economies where financial systems are less advanced. Conducive policies that would channel remittances more towards investments in manufacturing, mainly capital intensive, industries, may fill the external finance gap. Similar to the previous chapter, potential endogeneity in our model have not been addressed as this is an ongoing research and the next steps will be dedicated in finding suitable instruments that would allow us to properly account for endogeneity.

Chapter V

5. Conclusions

The benefits of international financial flows in recipient economies were discussed by a large amount of literature to date. International capital mobility helps in financing the most productive investments and improve access to finance in scarce capital countries. Moreover, it also improves efficiency of domestic financial markets as a result of the exposure to the foreign competition. Our work in this dissertation contributes to the relevant literature with a new evidence on the international financial flows and its potential impact on development and growth. We have focused on the two largest external financial flows, namely foreign direct investments (FDI) and remittances, and the role that both sources have on the manufacturing industries' specialization and growth. To the best of our knowledge, the existing literature to date have not examined neither FDIs nor remittances as alternative sources of finance for financially dependent industries.

Our empirical analysis brings a new evidence on the role of FDIs and remittances in manufacturing industries. The main contribution of our work consist on the exploration of a novel transmission mechanism through which FDI and remittances exert their growth-enhancing effect at the micro level. Specifically, we have examined whether FDIs and remittances may serve as alternative sources of finance for financially dependent manufacturing industries. In our empirical analysis we use RZ financial dependence index as a proxy for the manufacturing industries' reliance on external finance in our panel. Using the RZ financial dependence index in our model internalizes few assumptions. Since RZ uses U.S. firm level data to constrict the index, we assume that the firms in the U.S. do not face financial constraints as U.S. financial markets are almost frictionless. So, the demand for external finance of the U.S. firms should reflect the actual firms' dependence external sources for capital expenditures. In addition we also assume that the (technological) needs of external finance are common across countries in the same industries.

In order to examine the "external source of finance" channel, we first empirically estimated the relationship between FDIs and country's comparative advantages and specialization - as evidenced by export flows - in OECD economies. As expected, results from our empirical analysis show that FDIs are positively correlated with comparative advantages in financially dependent manufacturing industries. Results are consistent with the existing literature on FDI, productivity

and specialization (Karpaty and Kneller, 2001; Greenaway et al, 2004; Javorcik, 2004; Harding et al, 2016).

Next, we investigated the impact of remittances on value added growth in manufacturing industries with different levels of dependence on external finance. Here our focus was in developing and underdeveloped economies since the largest share of global remittances is absorbed by these two income categories. We have shown that except the poverty alleviation effect, remittances matter for manufacturing growth, too. In contrast to the Dutch disease theory, our findings suggest a positive and statistically significant relationship between remittance inflows and manufacturing growth in the industries with higher dependence on external finance. Lagged remittance inflows explain around one third of the within variation of the growth in the manufacturing industries with the highest level of financial dependence when controlling for time and country-industry fixed effects. Results in both empirical analysis were robust when controlled for different country as well as industry level indicators. Positive association of remittances with the growth of financially constrained industries is also found in Bahadir et al. (2017). Our findings are also consistent with Fayad (2011).

Several policy interventions might be suggested based on the findings from our analysis; our results suggest that FDI promotion policy targeting more financially constrained industries as well as policies conducive to easing access to finance and lowering the cost of finance (i.e. those in more need for external finance) would improve country's comparative advantages. Another important implication stemming from our empirical results suggest that policies that would channel remittances towards investments rather than consumption in more capital intensive manufacturing industries, may reduce the external finance gap.

Our research make an original contribution to the literature on finance, growth and specialization which may open up new research avenues for better understanding the role of international financial flows, specifically FDIs and remittances, on industry comparative advantages and growth. However, endogeneity remain the main concern to be addressed in future developments of this work. The analysis could be improved by enriching our models with additional industry level data and strong instruments which would capture a valid casual effect.

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Appendix

A. Appendix to Chapter III

A.1. OECD sample included in the Chapter III

No.	Country
1	Australia
2	Austria
3	Belgium
4	Chile
5	Czech Republic
6	Germany
7	Denmark
8	Spain
9	Estonia
10	Finland
11	France
12	Great Britain
13	Greece
14	Hungary
15	Ireland
16	Island
17	Israel
18	Italy
19	Japan
20	South Korea
21	Latvia
22	Mexico
23	Netherland
24	Norway
25	New Zealand
26	Poland
27	Portugal
28	Slovakia
29	Slovenia
30	Sweden
31	Turkey

A.2. Definition of industry variables as per UNIDO – Industrial data user's guide

a.) ***Number of establishments***

An "establishment" is ideally a production unit that engages, under a single ownership or control, in one, or predominantly one, kind of activity at a single location; for example, workshop or factory. A "kind-of-activity unit" differs from the establishment in that there is no restriction with respect to the geographical area in which a given kind of activity is carried out by a single legal entity. A "local unit", on the other hand, comprises all activities carried out under a single ownership or control at a single location and differs from the establishment-type of unit in that there is no restriction on the range of these activities.

b.) ***Number of employees***

The number of persons engaged is defined as the total number of persons who worked in or for the establishment during the reference year. However, home workers are excluded. The concept covers working proprietors, active business partners and unpaid family workers as well as employees.

c.) ***Output***

The measure of output normally reported is based on census concept, which covers only activities of an industrial nature. The value of output in the case of estimates compiled on a production basis comprises: (a) the value of sale of all products of the establishment; (b) the net change between the beginning and the end of the reference period in the value of work in progress and stocks of goods to be shipped 34 in the same condition as received; (c) the value of industrial work done or industrial services rendered to others; (d) the value of goods shipped in the same condition as received less the amount paid for these goods; and (e) the value of fixed assets produced during the period by the unit for its own use. In the case of estimates compiled on a shipment basis, the net change in the value of stocks of finished goods between the beginning and the end of the reference period is also included.

d.) ***Gross fixed capital formation:***

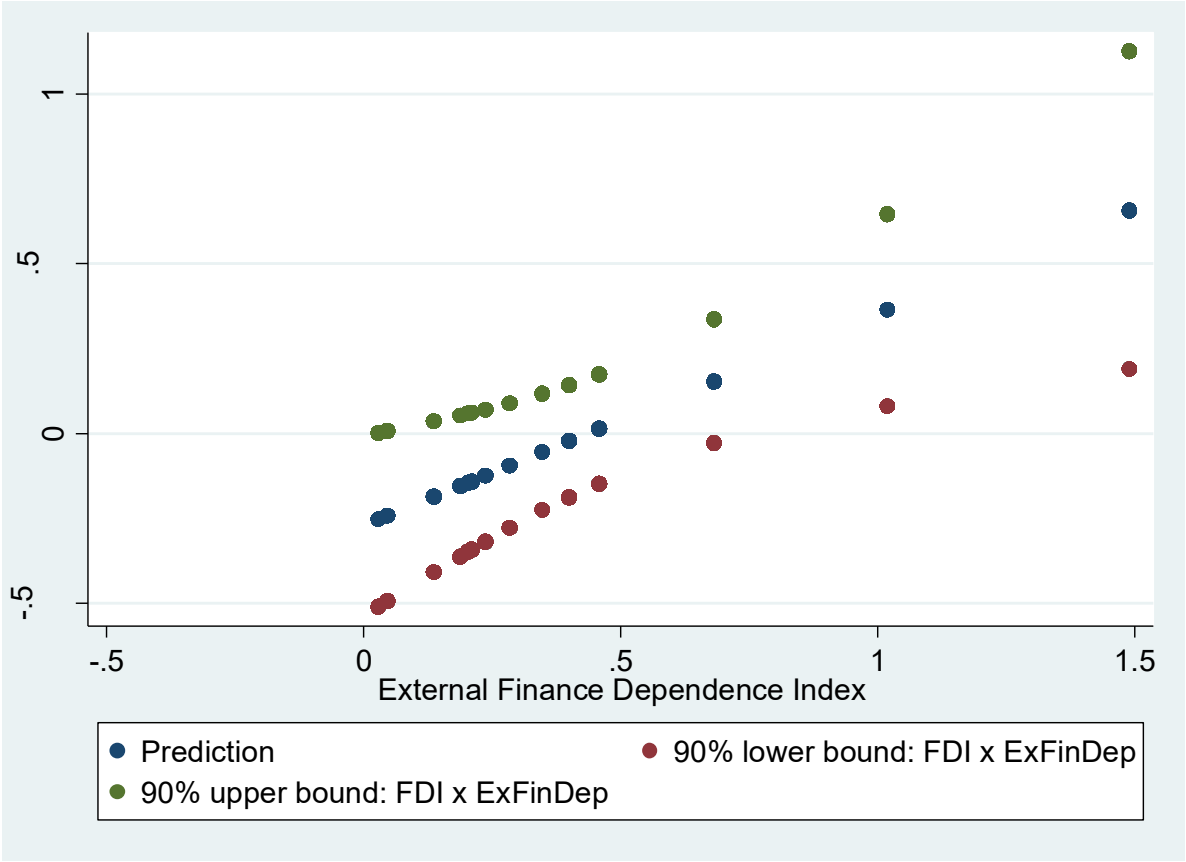
Gross fixed capital formation refers to the value of acquisition of fixed assets including the work done on own-account during the reference year, less the value of corresponding disposals. The fixed assets covered are those (whether new or used) with a productive life of one year or more. Major additions, alterations and improvements to existing assets, which extend their normal economic life or raise their productivity, are also included. New fixed assets include all those that have not been previously used in the country. Thus, newly imported fixed assets are considered new whether or not used before they were imported. Used fixed assets include all those that have been previously used within the country. Transactions in fixed assets include: (a) cost of land purchase and land improvement; (b) dwellings, other buildings and structures; (c) machinery and

equipment including transport and ICT equipment; and (d) 35 intellectual property products, such as products of research and development, computer software, databases, etc.

A.3. Summary statistics for the FDI-comparative advantage model

Variable	Observations	Mean	Std. Dev.	Min	Max
FDI_{cst} / $Output_{cst}$	2,807	0.03	0.50	-5.01	22.50
FDI_{cst} / $Output_{cst}$ * $ExFinDep_{s}$	2,807	0.01	0.14	-2.15	4.23
$ExFinDep_{s}$	8,740	0.33	0.38	-0.45	1.49
Log $(GDP/cap)_{ct}$	8,740	10.03	0.80	8.19	11.54
$Log(population)_{ct}$	8,740	16.16	1.36	12.65	18.67
$Export_{ct}/GDP_{ct}$	8,740	0.24	0.15	0.00	0.75
Value $added_{cst}$ / Value $added_{ct}$	6,647	0.04	0.05	0.00	0.31
Value $added_{cst}$ / $Employees_{cst}$	5,901	10.47	1.11	2.74	14.48
$Employees_{cst}$	6,993	63,586	130,154	0	1,334,019
DC_{ct}/GDP_{ct}	7,544	93.47	44.73	20.84	250.76
$Corp\_Bond_{ct}/GDP_{ct}$	5,934	1.82	1.27	0.03	5.36
$Debt\_Sec_{ct}/GDP_{ct}$	4,508	42.38	38.94	0.05	197.14
$Deposit_{ct}/GDP_{ct}$	7,475	103.02	44.09	29.03	262.31
$PC\_Deposit_{ct}/GDP_{ct}$	7,475	92.39	45.32	19.59	259.97
$Mutual\_Fund_{ct}/GDP_{ct}$	7,130	34.97	98.69	0.01	788.28
$Skill\_Intensity_{s}$	4,560	0.67	0.21	0.33	1.00
$Capital\_Intensity_{s}$	3,420	188.37	157.77	80.81	622.71
$Log(Complexity)_{s}$	8,740	5.01	0.09	4.75	5.24E+00

A.4a. FDI and the industry financial dependence plot from the baseline specification



A.4b. Descriptive statistics of estimated sample in the baseline specification

Variable		Mean	Std. Dev.	Min	Max	Observations
Gravity-based RCA	overall	-1.30959	1.39201	-10.6405	1.345541	N=1623
	between		1.398457	-8.63444	1.249431	n=355
	within		0.184456	-4.74618	0.686427	T=4.57183
FDI_{cst-1}/Out_{cst-1}	overall	0.009975	0.166612	-2.36664	2.822594	N=1623
	between		0.12883	-0.77884	1.28102	n=355
	within		0.128919	-1.57782	1.634924	T=4.57183

A.5. FDI, comparative advantages and industry characteristics

VARIABLES	Symmetric RCA		
	(1)	(2)	(3)
FDI_{cst-1}/Out_{cst-1}*$FinDep_s$	0.338*	0.281	0.338**
	[0.187]	[0.177]	[0.172]
FDI_{cst-1}/Out_{cst-1}	0.056	0.110	3.265
	[0.196]	[0.146]	[2.767]
$ValueAdd\_Share_{cst-1}$	5.895***	5.892***	5.886***
	[0.303]	[0.302]	[0.303]
$Labour\_prod_{cst-1}$	0.037	0.037	0.036
	[0.031]	[0.031]	[0.031]
$Skill\_Intensity_s$ * $FDI_{cst-1}/Output_{cst-1}$	-0.277	0.281	
	[0.364]		
$Capital\_Intensity_s$ * $FDI_{cst-1}/Output_{cst-1}$		-0.002	
		[0.001]	
$Log(Complexity)_s$ * $FDI_{cst-1}/Output_{cst-1}$			-0.670
			[0.548]
Fixed Effects			
Country	No	No	No
Sector	No	No	No
Year	No	No	No
Country-year	**Yes**	**Yes**	**Yes**
Sector-year	**Yes**	**Yes**	**Yes**
Observations	1,505	1,505	1,505
R-squared	0.470	0.470	0.470

Note: Robust standard errors are reported in parenthesis;
*** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

A.6. FDI, comparative advantages and financial depth

VARIABLES	Symmetric RCA					
	(1)	(2)	(3)	(4)	(5)	(6)
FDI_{cst-1}/Out_{cst-1}*$FinDep_s$	0.332*	0.344*	0.311*	0.338*	0.341*	0.319*
	[0.178]	[0.180]	[0.177]	[0.181]	[0.180]	[0.176]
FDI_{cst-1}/Out_{cst-1}	-0.109	-0.111	-0.105	-0.110	-0.111	-0.106
	[0.077]	[0.078]	[0.082]	[0.078]	[0.077]	[0.077]
$ValueAdd\_Share_{cst-1}$	5.872***	5.789***	5.603***	5.871***	5.864***	5.782***
	[0.302]	[0.308]	[0.309]	[0.299]	[0.300]	[0.298]
$Labour\_prod_{cst-1}$	0.037	0.042	0.054*	0.036	0.036	0.032
	[0.031]	[0.031]	[0.032]	[0.031]	[0.031]	[0.031]
DC_{ct-1}/GDP_{ct-1}*$FinDep_s$	0.001					
	[0.001]					
$Stock_{ct-1}/GDP_{ct-1}$*$FinDep_s$		0.002**				
		[0.001]				
$Debt\_Sec_{ct-1}/GDP_{ct-1}$*$FinDep_s$			0.001			
			[0.001]			
$Deposit_{ct-1}/GDP_{ct-1}$*$FinDep_s$				0.001**		
				[0.001]		
$PC\_Deposit_{ct-1}/GDP_{ct-1}$*$FinDep_s$					0.001**	
					[0.000]	
$Mutual\_Fund_{ct-1}/GDP_{ct-1}$*$FinDep_s$						0.001***
						[0.000]
Fixed Effects						
Country-year	Yes	Yes	Yes	Yes	Yes	Yes
Sector-year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,505	1,505	1,412	1,505	1,505	1,505
R-squared	0.471	0.473	0.463	0.472	0.472	0.473

Note: Robust standard errors are reported in parenthesis;
*** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

A.7. Results from OLS regression in baseline specification – longer lags

VARIABLES	Symmetric RCA					
	(1)	(2)	(3)	(4)	(5)	(6)
	2nd lag	2nd lag	3rd lag	3rd lag	4th lag	4th lag
$FDI_{cs\tau}$ /$Out_{cs\tau}$*$FinDep_s$	0.518**	0.543**	0.496**	0.491**	0.437*	0.436*
	[0.210]	[0.229]	[0.220]	[0.244]	[0.223]	[0.239]
$FDI_{cs\tau}$ /$Out_{cs\tau}$	-0.152	-0.149	-0.142	-0.135	-0.106	-0.104
	[0.099]	[0.109]	[0.110]	[0.121]	[0.109]	[0.117]
$Log(GDP/cap)_{c\tau}$	-0.063		-0.099		-0.156	
	[0.223]		[0.302]		[0.606]	
$Log(Population)_{c\tau}$	-0.807		-0.349		-2.601	
	[1.476]		[2.187]		[4.572]	
$ExportShare_{c\tau}$	0.288		0.118		-0.005	
	[0.620]		[0.989]		[2.018]	
$ValueAdd\_Share_{cs\tau}$	5.764***	5.829***	5.526***	5.634***	5.259***	5.357***
	[0.347]	[0.361]	[0.428]	[0.452]	[0.582]	[0.616]
$Labour\_prod_{cs\tau}$	0.024	0.052	0.063	0.075*	0.074	0.075
	[0.035]	[0.037]	[0.040]	[0.044]	[0.055]	[0.058]
Fixed Effects						
Country	**Yes**	No	**Yes**	No	**Yes**	No
Sector	**Yes**	No	**Yes**	No	**Yes**	No
Year	**Yes**	No	**Yes**	No	**Yes**	No
Country-year	No	**Yes**	No	**Yes**	No	**Yes**
Sector-year	No	**Yes**	No	**Yes**	No	**Yes**
Observations	1,208	1,208	894	894	571	571
R-squared	0.439	0.463	0.437	0.453	0.426	0.439

Note: Robust standard errors are reported in parenthesis; *** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

A.8. Reverse causality test

VARIABLES	Symmetric RCA	
	(1)	(2)
FDI_{cst0}/Out_{cst0}*$FinDep_s$	0.923***	0.970***
	[0.238]	[0.258]
FDI_{cst0}/Out_{cst0}	-0.287**	-0.288**
	[0.122]	[0.135]
FDI_{cst+5}/Out_{cst+5}*$FinDep_s$	-0.069	-0.037
	[0.090]	[0.098]
FDI_{cst+5}/Out_{cst+5}	-0.015	-0.036
	[0.066]	[0.066]
$Log(GDP/cap)_{ct0}$	-0.054	
	[0.217]	
$Log(Population)_{ct0}$	-0.821	
	[1.482]	
$ExportShare_{ct-1}$	0.049	
	[0.597]	
$ValueAdd\_Share_{cst0}$	5.517***	5.584***
	[0.337]	[0.351]
$Labour\_prod_{cst0}$	0.019	0.043
	[0.036]	[0.037]
Fixed Effects		
Country	**Yes**	No
Sector	**Yes**	No
Year	**Yes**	No
Country-year	No	**Yes**
Sector-year	No	**Yes**
Observations	1,087	1,087
R-squared	0.464	0.490

Note: Robust standard errors are reported in parenthesis; *** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

B. Appendix to Chapter IV

B.1. Countries in all samples ranked by the level of income

High income[64]	Upper-middle income	Lower-middle income	Low income
Australia	Brazil	Albania	Eritrea
Austria	Botswana	Bolivia	Ethiopia
Belgium	Chile	China	India
Canada	Costa Rica	Colombia	Kenya
Switzerland	Czech Republic	Ecuador	Myanmar
Cyprus	Estonia	Egypt	Mongolia
Denmark	Croatia	Fiji	Malawi
Spain	Hungary	Indonesia	Senegal
Finland	Latvia	Iran	
France	Mexico	Jordan	
United Kingdom	Mauritius	Sri Lanka	
Greece	Malaysia	Morocco	
Ireland	Oman	Macedonia	
Iceland	Poland	Peru	
Israel	Slovakia	Philippines	
Italy	Trinidad and Tobago	Romania	
Japan	Turkey	Russia	
Republic of Korea	Uruguay	Syrian Arab Republic	
Kuwait	South Africa	Tunisia	
Luxembourg			
Malta			
Netherlands			
Norway			
New Zealand			
Puerto Rico			
Portugal			
Qatar			
Singapore			
Slovenia			
Sweden			
Taiwan			

[64] The sub-sample on high income countries was included in the model only in the baseline specification as an initial robustness test for our hypothesis.

B.2. Summary statistics of the variables in the remittance-manufacturing growth model

Variable		Mean	Std. Dev.	Min	Max	Observations
Remittances / GDP	overall	0.02	0.03	0.00	0.22	N = 6036
	between		0.03	0.00	0.17	n = 1354
	within		0.01	-0.11	0.07	T-bar = 4.45790
FDI / GDP	overall	0.05	0.20	-0.16	3.41	N = 6304
	between		0.12	0.00	0.94	n = 1392
	within		0.17	-0.87	2.55	T-bar = 4.52874
External finance dependence index	overall	0.38	0.32	-0.11	1.04	N = 6743
	between		0.32	-0.11	1.04	n = 1430
	within		0.00	0.38	0.38	T-bar = 4.71538
Domestic credit / GDP	overall	62.63	45.33	3.76	241.04	N = 6327
	between		39.16	6.65	192.78	n = 1372
	within		22.08	-19.93	198.12	T-bar = 4.61152
Total trade/Output	overall	9.33	109.40	0.02	5,117.25	N = 4886
	between		100.24	0.02	1,981.99	n = 1311
	within		74.63	-1,706.64	3,378.39	T-bar = 3.72693
Imports/Output	overall	8.27	98.36	0.00	3,495.07	N = 4896
	between		85.74	0.00	1,676.21	n = 1311
	within		64.03	-1,598.03	2,309.26	T-bar = 3.73455
Exports/Output	overall	1.62	29.50	0.00	1,622.18	N = 4886
	between		21.86	0.00	554.12	n = 1311
	within		22.76	-542.90	1,069.68	T-bar = 3.72693
Nominal effective exchange rate	overall	11,935.64	20,8277.2	31.05	3,804,595	N = 6655
	between		90,042.5	80.39	761,013.3	n = 1408
	within		186,588.1	-74,8994.7	3,055,518	T-bar = 4.72656
Number of employees	overall	93,428.91	400,573.00	0.00	9.89E+06	N = 6558
	between		410,053.60	0.00	6.86E+06	n = 1430
	within		106,292.40	-1.84E+06	3.13E+06	T-bar = 4.58601
Number of establishments	overall	2,685.13	7,270.78	0.00	143,729.00	N = 5957
	between		6,025.41	0.00	71,090.40	n = 1390
	within		3,753.90	-65,529.27	109,785.60	T-bar = 4.28561
Output	overall	8.36E+09	2.71E+10	0.00	4.90E+11	N = 6709
	between		2.42E+10	0.00	4.10E+11	n = 1430
	within		1.13E+10	-1.61E+11	2.42E+11	T-bar = 4.69161
Value added	overall	2.72E+09	9.25E+09	0.00	1.39E+11	N = 6743
	between		8.34E+09	0.00	1.22E+11	n = 1430
	within		3.59E+09	-5.55E+10	8.65E+10	T-bar = 4.71538
Wages	overall	9.61E+08	2.83E+09	0.00	4.64E+10	N = 6456
	between		2.60E+09	0.00	3.76E+10	n = 1430
	within		1.03E+09	-1.77E+10	2.65E+10	T-bar = 4.51469
Gross fixed capital formation	overall	4.42E+08	1.58E+09	-2.55E+08	3.82E+10	N = 4967
	between		1.32E+09	-1.72E+07	2.12E+10	n = 1254
	within		8.81E+08	-1.09E+10	2.75E+10	T-bar = 3.96093
Stock Market Cap	overall	52.00	50.41	0.01	265.56	N = 4516
	between		45.39	0.69	178.91	n = 1272
	within		20.88	-27.79	150.39	T-bar = 3.55031
	overall	27.39	29.15	0.01	197.14	N = 2798

Outstanding domestic private debt securities to GDP (%)	between		25.45	0.28	135.25	n = 841
	within		13.64	-15.22	89.28	T-bar = 3.32699
Private credit by deposit money banks to GDP (%)	overall	58.40	42.62	3.05	218.61	N = 5051
	between		36.91	5.36	162.73	n = 1372
	within		20.92	-16.52	164.79	T-bar = 3.68149
Deposit money banks' assets to GDP (%)	overall	71.32	45.21	5.24	238.24	N = 5051
	between		39.60	7.46	195.47	n = 1372
	within		20.90	-5.55	178.81	T-bar = 3.68149
Stock market total value traded to GDP (%)	overall	26.51	35.10	0.00	201.22	N = 4617
	between		29.10	0.01	135.68	n = 1272
	within		18.76	-41.53	111.93	T-bar = 3.62972
Private credit by deposit money banks and other financial institutions to GDP (%)	overall	62.03	45.00	3.05	218.61	N = 5051
	between		39.90	5.36	181.38	n = 1372
	within		20.15	-12.89	168.42	T-bar = 3.68149

B.3. Estimates using uncensored ("unwinsorized") dependent variable

VARIABLES	Average growth of Value added					
	FE	FE	FE	FE	FE	FE
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Value added) $_{cs}\tau$	-0.147***	-0.148***	-0.145***	-0.139***	-0.143***	-0.139***
	[0.013]	[0.014]	[0.013]	[0.014]	[0.014]	[0.014]
Rem_{ct0}/GDP_{ct0}	-1.675***	-1.389***	-1.226**	-0.853*	-0.862*	-0.854*
	[0.531]	[0.530]	[0.528]	[0.485]	[0.484]	[0.484]
Rem_{ct0}/GDP_{ct0} * $FinDep_s$	2.604*	2.773*	2.736**	4.024***	4.043***	4.020***
	[1.380]	[1.419]	[1.392]	[1.213]	[1.216]	[1.213]
$Log(NEER)_{ct0}$			-0.010	-0.004	-0.004	-0.004
			[0.011]	[0.012]	[0.012]	[0.012]
$Log(NEER)_{ct0}$ * $FinDep_s$			-0.031	-0.032	-0.033	-0.032
			[0.027]	[0.030]	[0.030]	[0.030]
$DomCredit_{ct0}/GDP_{ct0}$		-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
		[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
$DomCredit_{ct0}/GDP_{ct0}$ * $FinDep_s$		-0.000	-0.001	-0.000	-0.000	-0.000
		[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
FDI_{ct0}/GDP_{ct0}		-0.045	-0.004	-0.143	-0.128	-0.143
		[0.213]	[0.215]	[0.229]	[0.230]	[0.229]
FDI_{ct0}/GDP_{ct0} * $FinDep_s$		1.125*	1.073*	0.783	0.778	0.782
		[0.612]	[0.614]	[0.643]	[0.647]	[0.643]
$Trade_{cst0}/Output_{cst0}$				-0.000		
				[0.000]		
$Import_{cst0}/Output_{cst0}$					-0.000	-0.000
					[0.000]	[0.000]
$Export_{cst0}/Output_{cst0}$						0.000
						[0.000]
Fixed Effects						
Year	YES	YES	YES	YES	YES	YES
Country-Sector	YES	YES	YES	YES	YES	YES
Country-Year	NO	NO	NO	NO	NO	NO
Sector-Year	NO	NO	NO	NO	NO	NO
Observations	2,337	2,245	2,245	2,013	2,017	2,013
R-squared	0.343	0.363	0.367	0.374	0.384	0.374
Number of id	767	746	746	710	710	710

Note: Robust standard errors are reported in parenthesis;

*** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

B.4. Baseline specification of remittances with longer lags

VARIABLES	2nd lag	3rd lag	4th lag	5th lag
	(1)	(3)	(4)	(3)
$Log(Value\ added)_{cs}\tau$	-0.132***	-0.135***	-0.134***	-0.137***
	[0.011]	[0.011]	[0.011]	[0.011]
Rem/GDP	-1.894***	-2.182***	-1.331***	-0.986**
	[0.451]	[0.465]	[0.367]	[0.394]
$Rem/GDP^{*}\ FinDep_{s}$	4.937***	5.729***	4.452***	4.155***
	[1.835]	[1.655]	[1.218]	[1.219]
Fixed Effects				
Year	YES	YES	YES	YES
Country-Sector	YES	YES	YES	YES
Observations	2,290	2,251	2,251	2,264
R-squared	0.269	0.294	0.293	0.278
Number of id	768	755	755	769

Note: Robust standard errors are reported in parenthesis;

*** p<0.01, ** p<0.05, * p<0.1 denotes significance at 1%, 5% and 10% level.

B.5. Additional summary statistics

a.) Industry growth and remittances – estimated sample in the baseline specification

Variable		Mean	Std. Dev.	Min	Max	Observations
$VA\_average\_growth_{cst}$	overall	0.0706	0.1758	-0.5212	1.3086	N = 2344
	between		0.1402	-0.3712	1.3086	n = 768
	within		0.1365	-0.6087	1.0539	T-bar = 3.05208
Rem_{ct-1}/GDP_{ct-1}	overall	0.0258	0.0401	0.0000	0.2042	N = 2344
	between		0.0365	0.0000	0.1933	n = 768
	within		0.0117	-0.0160	0.0687	T-bar = 3.05208

b.) Industry growth and remittances – estimated sample in the extended specification

Variable		Mean	Std. Dev.	Min	Max	Observations
$VA\_average\_growth_{cst}$	overall	0.0701	0.1695	-0.5212	1.3086	N = 2018
	between		0.1373	-0.5212	1.0501	n = 710
	within		0.1299	-0.6092	1.0535	T-bar = 2.84225
Rem_{ct-1}/GDP_{ct-1}	overall	0.0279	0.0422	0.0000	0.2042	N = 2018
	between		0.0396	0.0000	0.1933	n = 710
	within		0.0103	-0.0093	0.0611	T-bar = 2.84225

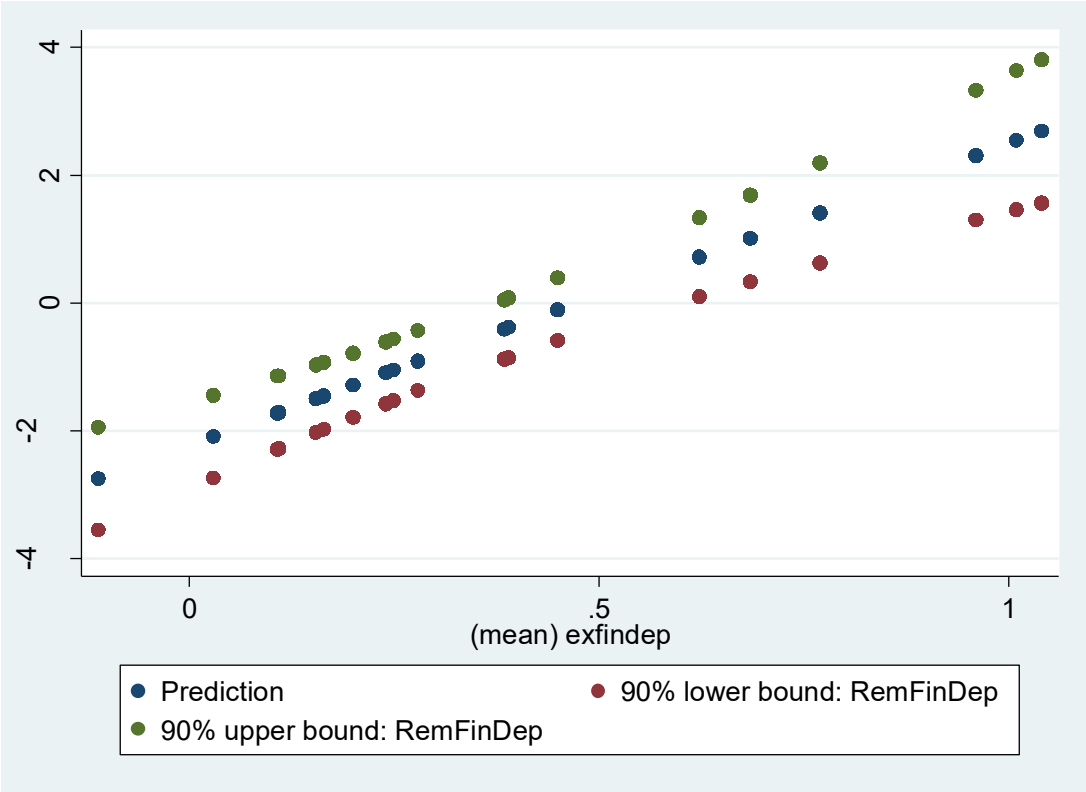
c.) Industry growth and domestic credit to GDP – estimated sample in the extended specification

Variable		Mean	Std. Dev.	Min	Max	Observations
$VA\_average\_growth_{cst}$	overall	0.0701	0.1695	-0.5212	1.3086	N = 2018
	between		0.1373	-0.5212	1.0501	n = 710
	within		0.1299	-0.6092	1.0535	T-bar = 2.84225
DC_{ct-1}/GDP_{ct-1}	overall	42.2013	29.8021	3.9600	149.150	N = 2018
	between		26.8056	4.5600	134.640	n = 710
	within		12.0482	1.2546	90.644	T-bar = 2.84225

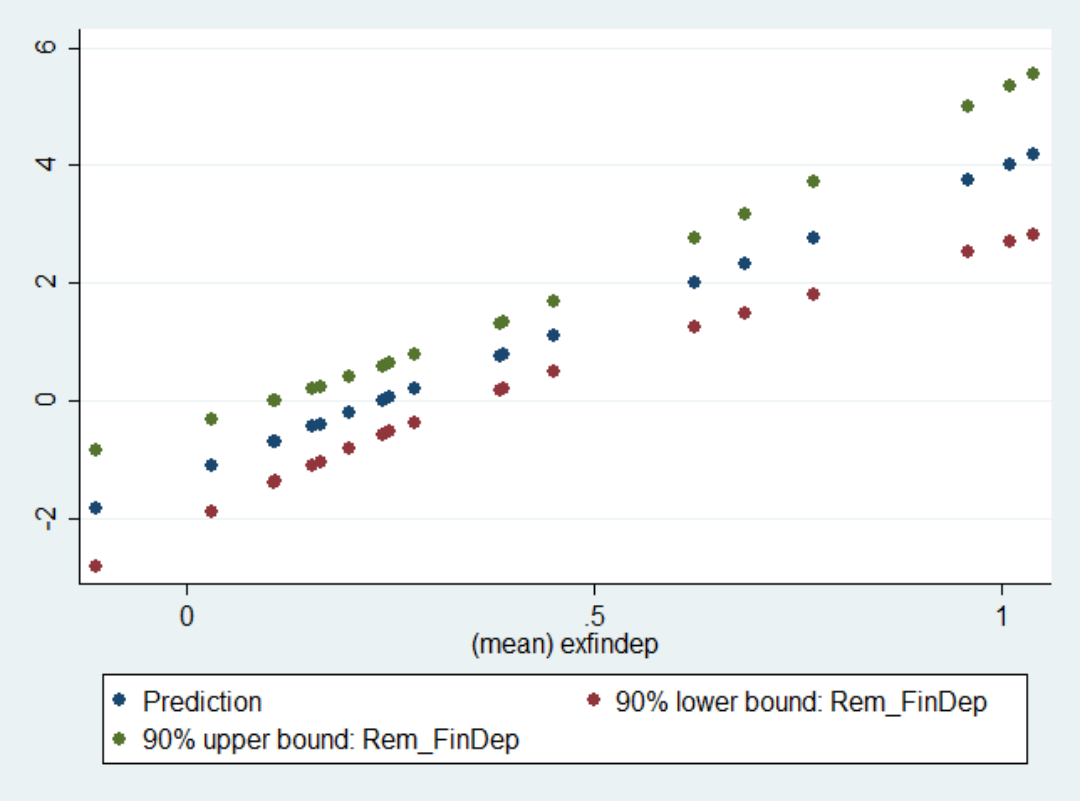
d.) Industry growth and FDI – estimated sample in the extended specification

Variable		Mean	Std. Dev.	Min	Max	Observations
$VA\_average\_growth_{cst}$	overall	0.0701	0.1695	-0.5212	1.3086	N = 2018
	between		0.1373	-0.5212	1.0501	n = 710
	within		0.1299	-0.6092	1.0535	T-bar = 2.84225
FDI_{ct-1}/GDP_{ct-1}	overall	0.0296	0.0278	-0.0227	0.1220	N = 2018
	between		0.0233	-0.0030	0.1165	n = 710
	within		0.0190	-0.0276	0.1012	T-bar = 2.84225

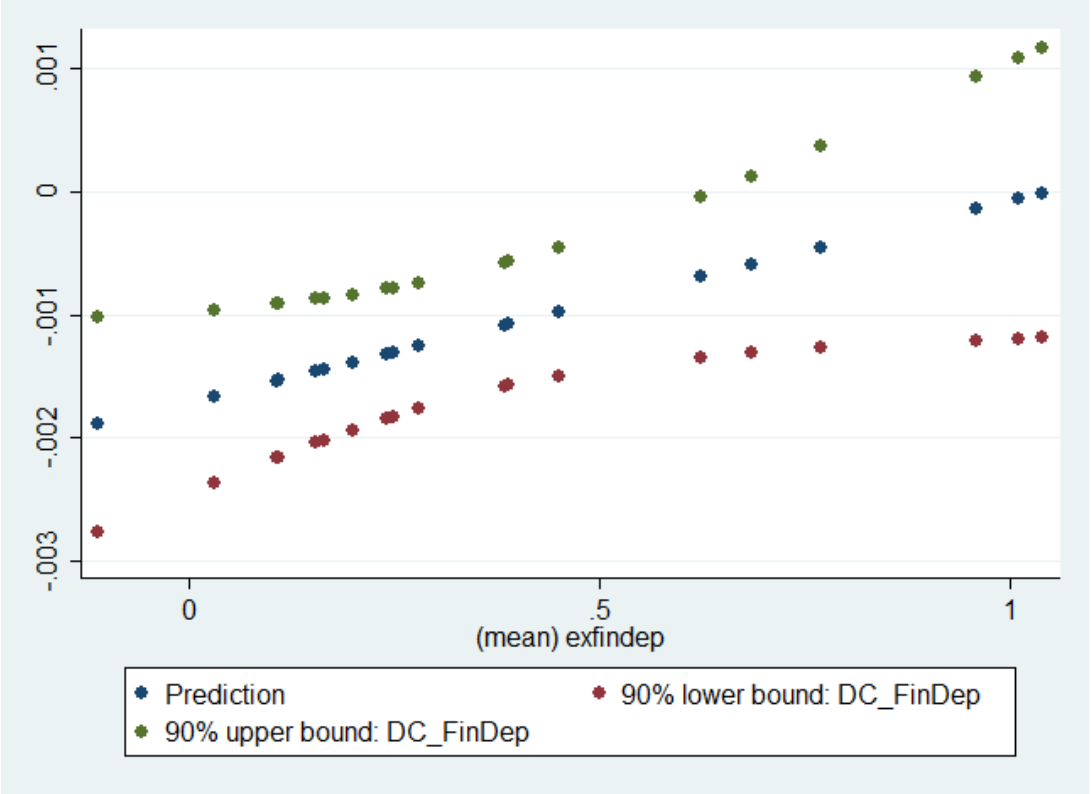
B.6a. Remittances and financial dependence plot from the baseline specification



B.6b. Remittances and financial dependence plot from the extended specification



B.6c. Domestic credit and financial dependence plot from the extended specification



B.6d. FDI and financial dependence plot from the extended specification