Department of Economics
University of Ioannina

Essays in International Economics

By

TAMILYAM MEMANOVA

A dissertation submitted in partial fulfilment of the requirements for the degree
DOCTOR OF PHILOSOPHY

IOANNINA 2021

Consulting Committee:

1. Nikolaos Mylonidis, Professor at the Department of Economics, University of Ioannina (Supervisor)
2. Nikolaos Tsakiris, Associate Professor at the Department of Economics, University of Ioannina
3. Antonis Adam, Associate Professor at the Department of Economics, University of Ioannina

Examination Committee:

1. Nikolaos Mylonidis, Professor at the Department of Economics, University of Ioannina (Supervisor)
2. Nikolaos Tsakiris, Associate Professor at the Department of Economics, University of Ioannina
3. Antonis Adam, Associate Professor at the Department of Economics, University of Ioannina
4. Stephanos Papadamou, Professor at the Department of Economics, University of Thessaly
5. Krina Griva, Assistant Professor at the Department of Economics, University of Peloponnese
6. Paraskevi Salamaliki, Assistant Professor at the Department of Economics, University of Ioannina
7. Stella Tsani, Assistant Professor at the Department of Economics, University of Ioannina

Grant Acknowledgement

I would like to thank the General Secretariat for Research & Technology (GSRT) and Hellenic Foundation for Research & Innovation (HFRI) for awarding and co-funding this research with scholarship from the "1st Call for PhD Scholarships by HFRI" – "Grant Code 2466".

Acknowledgments

I would like to express my gratitude and appreciation to every person, who supported me in the course of my studies and made possible this dissertation.

Foremost, I am deeply indebted to my supervisor, Professor Nikolaos Mylonidis. I am sincerely thankful for giving me the opportunity to do PhD studies and research, for his guidance, patience and encouragement during all these years, for his immense knowledge and invaluable advices. I could not have imagined completing this dissertation without his continuous support, time and effort contribution, vigorous ideas and compassion. I cannot express enough thanks for teaching me a systematic and disciplined approach in accomplishment of academic research. It has been great privilege and honour to study under his supervision.

I am also extremely grateful to Associate Professor Nikolaos Tsakiris, who has been supporting me and sharing his ideas and views throughout my research. I am truly thankful for his kindness, insightful discussions, directions and suggestions. The second chapter of this dissertation would not have been completed without his assistance and input. Furthermore, I would like to express my deep gratitude to the third member of the advisory committee, Associate Professor Antonis Adam for his support, contribution and help. Besides, his expertise, valuable advices and opinions helped significantly to enrich and build a more solid econometric framework in my research.

I would like to sincerely thank all academic staff of the Department of Economics at the University of Ioannina, and all participants of seminars and conferences, where I was presenting my research, for their constructive comments and suggestions. I am also very grateful to Sofia Tsarsitalidou, Stamatia Ftergioti and Anastasia Leontiou. I appreciate a lot their help and support during conferences and their willingness to share their views on my research. I would also like to thank Alexandra Kyriakou and Maria Venizelou for their encouragement and help during my adaptation period.

Last, but not least, I want to thank my family. I am grateful to my parents, Gulzaryam and Gainidin, and to my siblings, Karim and Diloryam, for their unconditional

love, belief in me, for helping me to achieve my dreams and supporting me in any regards. I am very thankful to my best friend, Yuliya Gorshkova, who has always been supporting me and helping me in all aspects of my life through my long journey overseas and became a family member of mine. Finally, I am thankful from the bottom of my heart to my husband, Dimitris, and my daughter, Damiani, for their love, care and support, for tolerating me in ups and downs, for inspiring me and sharing their energy from day to day.

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Abstract

It is well-established that both international trade and financial development promote economic growth through better allocation of resources and capital, greater productivity, technological development and improved access to external financing.

As exporters are commonly challenged with significant credit constraints, the costs and availability of financing options determine their propensity to export and exports' dynamics. The first chapter of the thesis explores the link between bank market structure and export activity at the country- and firm-level. The theoretical literature proposes two opposing views on the effect of bank market structure on credit market conditions. The industrial organization theory predicts that greater rivalry in the banking sector yields more competitive pricing of financial products and ensures greatest supply of credit, whilst the information hypothesis posits that bank market power reduces informational barriers between lenders and borrowers through the formation of lending relationships which facilitate the provision of credit and services to borrowers. Our empirical findings show that greater bank market power encourages export activity in high income countries. This effect is particularly stronger in markets where information asymmetries are more severe. In contrast, bank market structure seems to play no significant role in developing countries' export performance.

In the course of trade liberalization process, developing countries have been struggling with successful implementation of trade reforms and accompanying fiscal policies. The second chapter aims to contribute to the limited strand of the relevant theoretical literature by analyzing the welfare and revenue implications of coordinated radial and selective consumer-price-neutral reforms and radial producer-price-neutral reforms in the presence of tax administration costs. We derive the necessary conditions for welfare-enhancing and revenue-increasing piecemeal reforms, and show that the standard revenue and welfare gains are inconsistent when the capacity of tax administration system is limited. Our results emphasize the importance of providing adequate resources in modernizing the tax administration system and complementing existing infrastructure in the presence of high tax administration costs.

The third chapter examines the determinants of international portfolio investment flows. It investigates whether informational distance and religious proximity influence bilateral portfolio choices using a world sample. Building on Kogut and Singh (1988) formula, we construct a novel informational distance indicator which measures the bilateral differences in credit market regulations. Our results show that bilateral portfolio flows are significantly reduced with greater informational distance between countries. Nevertheless, religious similarity enhances the willingness to invest in foreign markets. This effect is more pertinent for portfolio holdings in emerging countries, signifying the role of trust and cultural interconnectedness in mitigating informational frictions for this group of countries. Furthermore, we document that different types of portfolio investments vary in the degree of their information-sensitivity depending on the level of economic development of origin and destination countries. These findings remain valid through the series of robustness checks.

Introduction

The literature has long established that international trade can spur economic development by generating positive welfare implications. As countries are differently endowed with production resources, international trade stimulates efficient employment of resources by shifting production to relatively more cost-effective locations. Guided by the principles of the comparative advantage theory, countries achieve specialization gains, which, in turn, accelerate overall productivity and the volumes of output (Krugman, 1979; Grossman and Helpman, 1990). The resulting expansion of industries facilitates optimization in manufacturing processes, allows for economies of scale and scope and leads to increasing returns (Krugman, 1979; 1980). Furthermore, trade intensifies competition and promotes innovation and creation of knowledge that benefit countries through accumulation of human capital and learning effects (Grossman and Helpman, 1990; Young 1991).

International trade can have positive effects in developing countries and create new opportunities. First, it allows businesses in developing countries to increase their production due to better access to external capital and production inputs (Dornbusch, 1992; Sachs and Warner, 1995). Second, developing countries may benefit from the expansion of their industries as the production is transferred from industrialized to less industrialized countries during the product cycle due to technology diffusion (Krugman, 1979). As such, developing countries may exploit the positive externalities of opening to trade and achieve technological development via the adoption and learning of best practices from advanced economies (Balassa, 1979). It follows that the outward orientation allows developing countries to experience stronger economic growth (Dollar, 1992) and economic convergence with advanced countries (Sachs and Warner, 1995).

External finance is a key determinant of international trade. The notion of external financial dependence in international trade can be traced back to the Heckscher-Ohlin-Samuelson's model. Using two-country two-sector models, this model shows that differences in financial development lead to comparative advantages and mutual gains from specialization and trade, even when countries have identical endowments, consumer

preferences and technologies. It is well documented that financial development accelerates economic growth through its impact on total productivity, capital accumulation and income growth across countries (King and Levine, 1993) and regions (Rioja and Valev, 2004). Furthermore, well-functioning financial markets support trade activities by reallocating resources and satisfying production needs for capital. Exporters are often challenged with additional requirements for external financing that arise from the considerable up-front costs of entering foreign markets, working capital needs for maintaining international transactions and inherited risks associated with economic fluctuations abroad (Foley and Manova, 2015). Thereby, developed financial markets facilitate trade activity, especially in industries with greater financial vulnerability (Kletzer and Bardhan, 1987; Beck, 2003; Svaleryd and Vlachos, 2005; Hur et al., 2006). In contrast, a weak financial environment can disrupt patterns of trade by affecting intensive and extensive margins of trade (Melitz, 2003).

Banks represent the financial backbone of the international trade system. The recent global financial meltdown revealed that up to 80-90% of world trade is backed by trade finance, whereas nearly 30-40% of world trade is relying on bank trade financing products (Chauffour and Malouche, 2011). Banks specialize in developing instruments required for effective information collection, processing and dissemination. As such, they are able to alleviate problems associated with incomplete informational flows between lenders and borrowers which exacerbate credit market conditions and result in adverse selection and moral hazard problems. In essence, banks act as an information mediator through continuous monitoring and screening of prospective borrowers (Demetriades and Andrianova, 2004). The extent to which banks can successfully manage information asymmetries reflect the efficiency and stability of financial system in a country and affect the capital productivity, volumes of investment flows (Demetriades and Andrianova, 2004) and patterns of international trade activity (Foley and Manova, 2015).

The first two chapters of the present thesis deal with international trade and trade liberalization. Specifically, Chapter I empirically examines the relation between bank market structure and export activity across countries. The trade theory emphasizes that the propensity to export and export intensity depend on the availability of external

financing. Exporters face significant credit constraints due to the limited asset liquidity and risks associated with international markets (Beck, 2003; Svaleryd and Vlachos, 2005; Foley and Manova, 2015). As bank-led financing is the primary source of external credit for exporters, the structure of banking sector is likely to affect export activity. Thereby, Chapter I investigates the impact of bank market power on the volume of exports. The theoretical literature yields two contradictory predictions on the effect of bank market structure on credit availability. Specifically, the traditional industrial organization approach posits that greater competition in banking leads to more favourable credit conditions in the sense that the greatest quantity of credit is supplied at the lowest price (Freixas and Rochet, 2008). Nevertheless, this approach ignores the specific characteristics of banks related to their capacity in managing informational flows. These exact characteristics are taken into account by the information hypothesis which argues that bank concentration can be beneficial for economic activities as banks have greater capacity for screening and monitoring potential borrowers (Boot and Thakor, 2000; Marquez, 2002; Caminal and Matutes, 2002) and can devote more resources in the production, accumulation and processing of soft information through repetitive transactions (Petersen and Rajan, 1995). As such, banks with market power have more incentives to engage in relationship lending, and thus are more likely to provide liquidity and informational services to exporters (Bartoli et al, 2014).

Based on these theoretical considerations, we assess the impact of bank market structure on aggregate exports (as a percentage of GDP) using a world sample of 125 countries over the 1997 – 2010 period. To measure the bank market power at the country level we employ the Lerner Index estimates from Clerides et al. (2015) and the World Bank. The empirical analysis is carried out using standard panel data models with country and time fixed effects. In order to control for the potentially endogenous nature of bank market power we also resort to instrumental variables techniques.

The baseline findings concord with the information hypothesis and suggest that greater bank market power facilitates export activity. These results remain qualitatively similar when employing alternative indicators of bank market power, namely the adjusted Lerner index and the Boone indicator. Next, we disaggregate the countries in accordance

with their economic development (based on the IMF and World Bank classification). This exercise indicates that the positive effects of bank market power on exports materialize only when a country reaches a certain level of economic development (i.e. if it belongs in the high income group).

We examine the robustness of these findings by accounting for the extent of markets' information opacity. First, we introduce an interaction term between the Lerner Index and the share of private credit to GDP that inversely captures the degree of information asymmetries in a country. Second, we employ alternative measures of markets' informational opaqueness, namely the share of syndicated loans held by lead lenders and the credit information index. Third, we split the countries into transparent and opaque markets based on their credit information index value. The robustness checks show that the positive effect of bank market power on export activity is more pronounced in informationally opaque countries with persistent information asymmetries.

In the final section of Chapter I, we pay attention on the absence of a statistically significant relation between the Lerner Index and exports in low and middle income countries. By assuming that this finding may stem from the use of aggregate country-level data, we conduct a firm-level analysis for a set of 9,676 heterogeneous exporters residing in 58 developing countries. Our findings confirm the results of the country-level analysis and clearly indicate that bank market power does not affect the activity of individual exporters in developing countries.

Chapter II addresses the question of why some countries have been more successful in adopting trade liberalization reforms and restructuring their tax revenues, whereas other countries remain heavily reliant on trade tax revenues. Since the 1980s, international institutions, such as the World Bank and IMF, have been designing trade liberalizing policies as part of structural adjustment programs. Nevertheless, the implementation of these programs in developing economies has been challenging due to the limited propensity of their tax authorities in managing more sophisticated tax systems.

In Chapter II we develop a theoretical model of piecemeal trade reforms in the presence of tax administration costs. The theoretical model augments the standard model

of coordinated trade reforms (Hatzipanayotou et al., 1994; Keen and Ligthart, 2002) with the inclusion of tax administration costs. Tax administration costs reflect the efficiency of tax officials, the institutional structure and legal systems in improving tax collection and the compliance of taxpayers and enforcement of practices preventing bribery and corruption incidents. Historically, developing economies have developed sufficient infrastructure for taxing trade activities in sustaining their fiscal revenues. However, the broadening of tax base and the adjustment of fiscal systems towards more differentiated tax structures remains a complex task.

Tax administration costs are introduced in our model as a fraction of revenues collected from production and consumption taxes that is consumed for administrative purposes. It follows that tax administration costs reduce the amount of governmental revenues available for redistribution to consumers. The theoretical model yields implications of coordinated consumer-price-neutral radial and selective reforms and producer-price-neutral radial reforms on governmental revenues and welfare. The piecemeal radial (selective) type of tariff reforms keeps consumer prices constant and involves a marginal reduction in tariffs on all commodities (on selected commodity) produced in economy, followed by a point-by-point compensated increase in consumption taxes of these commodities (of the selected commodity). The existing literature suggests that, in the absence of tax administration costs, piecemeal trade reforms strictly enhance welfare and increase revenues. Nevertheless, our model shows that the reforms' implications are ambiguous, when tax administration costs are at concern. As follows, the welfare and revenue gains, stemming from radial tariff-tax reform, are attainable only if the costs of tax administration do not exceed a threshold level. In the case of selected tariff-tax reform, additional assumptions are required for ensuring the welfare-enhancing and revenue-increasing effects. Specifically, the selective tariff-tax reform yields positive revenue and welfare implications only if the commodity, subject to tariff reduction, bears the highest price distortion, it is a substitute in production to all commodities produced in the economy, and the tax administration costs comply with the threshold conditions.

The analysis in Chapter II also defines the sufficient conditions for tax administration costs for the radial producer-price-neutral reform, which entails a uniform

piecemeal reduction of all export taxes accompanied with the offsetting increase in the production taxes so that producer prices remain unchanged. The intuition behind this finding is straightforward. The presence of a poor functioning tax administration prevents countries from reaping the benefits of piecemeal trade and tax reforms. Due to incompetent administrative capacity, the restructuring of the tax system can exacerbate the existing inefficiencies and incur additional expenses that outweigh the possible benefits associated with the reduction of price distortions in economy. Sufficiently high tax administration costs can even result in negative implications on welfare and reduce governmental revenues. Therefore, the modernization of administrative and institutional infrastructure is a prerequisite for the effective adoption of trade and tax reforms.

Chapter III focuses on international financial flows. Specifically, it investigates the impact of informational distance on the patterns of bilateral portfolio investments and the role of religious proximity in mitigating the negative effects of informational frictions. Although the financial literature has long identified that international portfolio diversification leads to greater returns and reduced associated risks, investors still exhibit strong home (or proximity) bias when building their investment portfolios. This bias is often attributed to information asymmetries across countries. The international financial decisions require information about the institutional structure, cultural and historical background, bureaucratic procedures and political system in destination countries (Brennan and Cao, 1997; Portes and Rey, 2005; Guerin, 2006; Owen and Yawson, 2013). As investors are less competent about foreign markets, they prefer to allocate a larger share of their wealth in home markets (Graham et al., 2009; Portes and Rey, 2005; Amiram, 2012). The existence of legal barriers and transaction costs further exacerbates the home bias of investors (Levi, 2005).

In Chapter III, we introduce a new indicator, based on the credit information index, which measures the informational distance between 11,573 country pairs. Thereby, our indicator captures the presence of informational frictions in different financial markets and establishes the link between credit market conditions and international portfolio holdings. The banking literature posits that countries should establish effective instruments of credit information sharing to improve financial stability and mitigate the informational problems

in credit markets (Jappelli and Pagano, 2002; Büyükkarabacak and Valev, 2012; Kusi and Ansah-Adu, 2015). In other words, the presence of well-functioning credit information sharing institutions reduces investment risks, promotes informational transparency across financial markets and increases international financial flows. In contrast, greater informational distance indicates the persistence of financial imperfections and information asymmetries across markets with a negative effect on cross border investments.

We also investigate whether the negative effects of informational asymmetries are alleviated by religious proximity. The theory suggests that common religious affiliations foster reciprocal trust by reducing prejudice towards outgroup members (Jackson and Hunsberger, 1999; Daniels and von der Ruhl, 2010; Chuah et al., 2014; Chuah et al., 2016; Hellmanzik and Schmitz, 2017). In turn, high trusting societies create investment incentives due to lower transaction costs, greater transparency in economic transactions and better enforcement of regulations and laws (Gambetta, 1988; Knack and Keefer, 1997; Zak and Knack, 2001). Religious proximity also implies cultural interconnectedness which, in turn, translates into greater competence of foreign investors (Aggarwaal et. al., 2012; Helmanzik and Schmitz, 2017). Therefore, religious proximity should encourage international financial investment activity.

Building on the augmented gravity model, the analysis in Chapter III covers 70 origin and 162 destination countries for the 2010 – 2014 period. The baseline results show that informational distance significantly reduces the propensity to invest in foreign markets. This effect is stronger for equity than for debt investment, indicating the larger information sensitivity of equity investments. In contrast, religious proximity enhances international investment activity by alleviating informational frictions and promoting mutual trust. A more careful investigation indicates that the underlying factors of spatial allocation of portfolio investments depend on the level of economic development of origin and destination countries. Specifically, we document that informational distance exhibits a negative effect on bilateral investment flows mostly between advanced and emerging countries, whereas investment decisions between emerging countries are primarily dictated by their religious proximity.

Our results withstand the robustness checks. First, we address the problems associated with linear transformation models. Thereby, we employ the Pseudo-Poisson Maximum Likelihood (PPML) estimator with high dimensional fixed effects that solves for the zero-valued observations and produces heteroscedasticity-consistent estimates. The PPML estimates confirm that informational distance diverts investment choices in international portfolio investments, whereas religious proximity increases the willingness to invest in foreign markets. Moreover, the results verify that the strength of these relations vary with the level of economic development of countries and the degree of information sensitivity of equity and debt investments. Next, we further examine the validity of the religious proximity effect on the patterns of portfolio investments. To this end, we construct an alternative measure of religious commonality between countries based on information from the World Value Survey. We show that our baseline findings remain unchanged in the sense that religious commonality encourages bilateral investment activity.

In additional robustness tests, we also control for the impact of market integration on bilateral portfolio flows. Specifically, we distinguish between "deep" and "shallow" integration, with the latter being largely economic (e.g. signed regional trade agreements) while the former incorporates a significant degree of political integration (such as in the case of EU membership). We confirm the validity of our main findings even though market integration significantly reduces investors' home bias.

As a final exercise, we account for the risk diversification motive in international equity holdings. In general, the results reveal that there is weak evidence for the risk diversification motive, while the propensity to invest in foreign equity markets is primarily dictated by the greater cultural interconnectedness, and lower geographical and informational barriers.

Chapter I: Exploring the nexus between bank market power and exports[1]

1.1 Introduction

What is the impact of bank market power on aggregate exports? Although the beneficial role of well-functioning financial markets in international trade can be traced back to Kletzer and Bardhan (1987), very little is known about whether and how market power in banking affects export performance. Our question becomes even more pertinent when considering that exporting aggravates information asymmetry (Chaney, 2016; Ferry et al., 2019) and that exporters, and especially the smaller ones, are highly reliant on bank services to support their international activities (Melitz, 2003; Amiti and Weinstein, 2011; Manova, 2013; Yang and Mallick, 2014; Bartoli et al., 2014). In turn, the supply of these services is likely to be affected by the structure of the banking market.

The aim of this paper is to empirically investigate for the first time the correspondence between bank market power and exports at the country level. For theoretical guidance, we turn to the works of Petersen and Rajan (1995), Marquez (2002), Boot and Thakor (2000) and Caminal and Matutes (2002) which account for the presence of information asymmetries in the lending market. Specifically, Petersen and Rajan (1995) develop the information hypothesis according to which bank market power allows for greater investment in relationship lending and lower agency problems between lenders and borrowers. As such, market power increases banks' screening ability to identify profitable investment proposals (Marquez, 2002). Boot and Thakor (2000) and Caminal and Matutes (2002) add to this perspective by positing that market power promotes investment outcomes through banks' greater incentives to monitor their borrowers' performance during the loan relationship.

These studies are particularly pertinent to the understanding of the role of credit relationships in export performance. If exports are vulnerable to information asymmetries between borrowers and lenders, banks with market power have more incentives to invest in relationship lending, and in conjunction with their superior screening and monitoring

[1] A shorter version of this chapter, which was written in collaboration with Professor Nikolaos Mylonidis, was published in the Economic Modelling journal, Volume 84, pp 222-233 in January 2020.

capacity, they can better foster export activities than their competitive competitors. This positive effect of bank market power on exports is expected to be stronger in informationally opaque environments. Building on this reasoning, we formulate two testable hypotheses. First, we conjecture that market power in banking allows for the formation of tighter bank-firm relationships which can promote information intensive activities, such as exports. Second, we postulate that this export-enhancing effect of bank market power should be particularly relevant for markets characterised by higher information asymmetries between firms and financiers.

In view of these hypotheses, we adopt a two-stage empirical strategy. In the first stage, we formulate an empirical model to assess the impact of bank market power on aggregate exports using a world sample. Next, conditional on the findings of the first stage, we examine whether the beneficial effect of bank market power on exports is stronger in informationally opaque markets. A key point of our strategy is how to measure information asymmetry at the country level. Because greater financial development has a negative association with information asymmetries (Godlewski and Weill, 2011; Fungáčová et al., 2017), we use private credit by financial intermediaries divided by GDP as an inverse proxy of market opacity. Thus, we argue that information asymmetries are likely to be larger in countries with lower ratios of private credit to GDP.

We employ data for a maximum of 125 countries over the period 1997–2010 and gauge bank market power at the country level using the Lerner index estimates provided by Clerides et al. (2015). To account for biases introduced by omitted variables and unobserved country-specific effects, we estimate a series of panel regressions with country- and time-fixed effects and an array of control variables at the country-year level describing the macroeconomic, demographic, financial and institutional environment. Thus, we obtain identification from within-country changes in bank market power.

The challenge, however, resides in establishing causality from bank market power to exports, i.e. controlling for potential reverse causality bias. We first attempt to mitigate this bias by lagging bank market power. Second, and given the potential existence of further unobserved within-country time-varying characteristics that correlate with both bank market power and exports, we resort to instrumental variables (IV) estimators. Specifically,

we instrument the Lerner index with an indicator which quantifies entry restrictions in banking. This instrument is naturally strongly correlated with the banking market structure in a given country. At the same time, entry barriers to banking should in principle not exert any direct impact on exports. This empirical strategy allows us to accurately estimate the causal effect of the Lerner index on export performance.

The first set of estimates we obtain indicates that higher bank market power is associated with higher exports at the country level. The estimated effect is also economically relevant. For example, an increase in market power by one standard deviation results in an increase in exports over GDP by 1.62% *ceteris paribus*. For the average share of exports in GDP in our sample, this effect is equivalent to a 4% increase. A more careful investigation reveals that this result is primarily driven by high-income countries which exhibit an even stronger pattern than that described above (a one standard deviation increase in bank market power leads to a 2.11% increase in exports). Thus, economic development seems to be a prerequisite for the real effects of bank market power to be at work.

Next, we document the importance of information asymmetries in explaining the nexus between bank market power and export performance in high-income countries. Specifically, we show that information asymmetries strengthen the beneficial effect of bank market power on exports for approximately two thirds of the country-year observations in our sample. This finding is robust to the use of alternative measures of financial market informational asymmetries, namely the lead lender share in the syndicated loan market (Sufi, 2007) and the depth of credit information index. In sum, these findings conform with the theoretical propositions of Petersen and Rajan (1995), Marquez (2002), Boot and Thakor (2000) and Caminal and Matutes (2002) which suggest that market power in banking induces stronger bank-firm relationships which can generate benefits for both borrowers and lenders.

The country-level analysis indicates the absence of a statistically significant effect of the bank market power on exports in low and middle income countries. This is a somewhat counterintuitive finding since relationship lending is considered to reduce widespread information asymmetry, and thus it should alleviate credit constraints and market

imperfections in developing countries (Rajan and Zingales, 1998, Beck et.al, 2005, Chauvet and Jacolin, 2017). Assuming that this finding may be induced from the use of aggregate data, we extend the analysis by employing firm level data for 9,676 heterogeneous exporters located across 58 developing countries over the 2002-2010 period and investigate the impact of bank market power on individual firms' direct export activity. In this exercise, we do not find any statistically significant evidence in support of the information hypothesis. The results indicate that firms' export intensity in developing countries is not influenced by the bank market structure. Thereby, we confirm the results of the country-level analysis which suggest that higher bank market power leads to greater export propensity only in countries having achieved a certain level of economic development.

The rest of the paper is structured as follows. Section 1.2 provides an overview of the related literature and formulates the testable hypotheses. Section 1.3 describes the data used in our work and section 1.4 discusses the empirical design. Section 1.5 presents the empirical results for aggregate-level and firm-level analyses. Section 1.6 concludes the chapter.

1.2 Literature review and hypothesis development

The trade literature has long identified that firms' export performance depends on firm-level (Melitz, 2003; Yang and Mallick, 2010; Eaton et al., 2011) and industry-level characteristics (Rajan and Zingales, 1998; Berman and Héricourt, 2010). At the same time, exporting firms often face increased funding requirements to cover the sunk costs associated with their foreign operations (Amiti and Weinstein 2011; Manova, 2013; Yang and Mallick, 2014). As such, access to external finance plays a key role in international trade flows. According to the Bank for International Settlements (2014), nearly one third of global trade benefits from bank-related products with an estimated value of over US $6.5trillion. In this sense, credit constraints operate as a barrier to international trade (Goksel, 2012) and evidently worsen export performance both in a cross-country context (Iacovone and Zavacka, 2009; Manova, 2013) and in single countries including Peru (Paravisini et al., 2015), Italy (Minetti and Zhu, 2011) and Greece (Bardakas, 2014).

The theoretical rationale underlying the links between financial dependence and trade activity dates back to Kletzer and Bardhan (1987) and Baldwin (1989). Baldwin (1989) argues that financial development allows for better risk diversification, thereby affecting the output and trade decisions of firms. Kletzer and Bardhan (1987), in turn, adapt the classical Heckscher-Ohlin-Samuelson international trade model and argue that in the presence of credit market frictions, financially advanced countries enjoy a comparative advantage in sectors that require more external funding. Beck (2002) extends this work by considering two sectors which both rely on external finance and shows that the sector exhibiting increasing returns to scale profits more from outside finance than the sector with constant returns to scale. This theoretical prediction is verified using both country-level data (Beck, 2002) and disaggregated data at the country-industry level (Beck, 2003; Svarelyd and Vlachos, 2005).

A common critique of the aforementioned studies is that they rely on classical models of international trade which adopt a representative firm approach. As such, they do not allow for firm heterogeneity, and thus fail to account for the fact that within each sector, only the most productive firms participate in international trade (Yang and Mallick, 2010). Therefore, a number of recent contributions introduce the concept of external financial dependence into trade models with heterogeneous firms. Financial frictions are introduced by assuming that exporters face both fixed costs, which determine firms' export decisions, and variable costs which affect the level of firm exports. Within this context, Manova (2013) demonstrates that financially developed countries export significantly more in industries that are intensive in external capital and intangible assets. Manova et al. (2015) reach similar conclusions when using micro-level data for China.

The aforementioned literature suggests that firm exports are highly vulnerable to credit constraints.[2] However, the role of banks in fostering export activities goes beyond the mere provision of financial support and includes other special trade finance products,

[2] This link assumes that the causality runs from the financial sector to the private sector. However, the direction of causality may also be reversed. For instance, Kim et al. (2010) report strong positive long-run effects of trade openness on financial development using a sample of 88 countries, with the effects being more prominent and persistent for lower income countries. This link may even be the outcome of a third factor (such as government policies) which affects both financial development and export performance (Beck, 2002). In our empirical analysis we attempt to control for possible reverse causality and simultaneity bias.

such as letters of credit (Boot, 2000). In addition, Portes and Rey (2005) argue for the importance of information flows between local and foreign markets in goods trade. In this sense, banks can intermediate and act as information and advice providers for local producers who want to export, providing an additional mechanism through which bank support raises firms' ability to export (Bartoli et al., 2014).

The extent of bank support to firms' export activities is likely dependent on the market structure of the banking industry. On this front, the theoretical literature provides two conflicting views of the impact of bank market power on borrowers' welfare. First, the traditional industrial organization (IO) approach posits that greater competition in banking is beneficial for all borrowers as it ensures that the greatest quantity of credit is supplied at the lowest price (Freixas and Rochet, 2008).

The main drawback of the IO approach is that it treats banks like any other firm and ignores the unique characteristics of the banking sector (adverse selection, moral hazard and credit rationing problems). In their seminal paper, Petersen and Rajan (1995) explicitly take into consideration these characteristics and develop the information hypothesis which states that credit supply can actually increase with bank concentration as banks tend to invest more in relationship lending. Relationship lending facilitates the exchange of *soft* information between borrowers and lenders and it is primarily demanded by informationally opaque firms (e.g. small, young firms or firms with low tangibility of assets) that cannot obtain arm's length transactions due to limited transparency. Through repetitive interactions, banks obtain customer-specific, proprietary information which alleviates problems of asymmetric information and facilitates *implicit* long term contracting. This positive role of relationship lending in small firm financing becomes even more prominent during economic downturns and crises (Beck et al., 2018). In contrast, banks operating in competitive environments have fewer incentives to invest in information production about the borrower as the probability of switching lenders is increasing and the expected duration of the loan relationship shortens (Boot, 2000). As such, banks' screening ability to identify good projects is reduced (Marquez, 2002).[3]

[3] Cetorelli (1997) also shows that banks operating in competitive environments have fewer incentives to invest in relationship lending due to free-riding in the screening process.

The intuition of the information hypothesis is straightforward: banks with higher market power can reduce information asymmetries and achieve better rent extraction from profitable projects, thereby increasing their willingness to lend to opaque firms. Most of the relevant empirical literature verifies the validity of the information hypothesis. For example, Petersen and Rajan (1995), Cetorelli and Gambera (2001), Bonaccorsi di Patti and Dell' Ariccia (2004) and Crawford et al. (2018) show that credit availability (especially for smaller firms) is greater in more concentrated banking systems. Even those studies which find a negative effect of bank market power on firms' access to credit (Beck et al., 2004; Love and Pería, 2015) acknowledge that this damaging effect is dampened in countries with higher levels of economic and financial institutional development.

Better credit availability, however, may not be sufficient for securing improved firm performance and positive effects on the real economy. Mallick and Yang (2011), for instance, find that bank loans lead to lower firm profitability and productivity, especially in advanced markets, and attribute this finding to the riskiness of the borrowing firms. To this end, theory suggests that bank market power can mitigate the damaging effect of bank loans on firm performance through greater monitoring. Specifically, Boot and Thakor (2000) suggest that relationship lending allows banks to use their knowledge and expertise to improve project payoffs after loan origination and that the generated payoff surplus is split between banks and borrowers. This support extends beyond financial assistance and it includes valuable guidance on product pricing, inventory management and capital budgeting decisions. In a similar vein, Caminal and Matutes (2002) show that market power incentivises banks to deal with agency problems by exhibiting greater monitoring effort during the loan relationship, which induces borrowers to take more efficient decisions. The scarce empirical evidence on this matter verifies these theoretical predictions. Delis et al. (2017) find that banks with market power not only facilitate credit provision to relatively poorly performing firms in the USA, but they also improve their future profitability. In sum, these influential works provide a monitoring-based explanation for the positive effect of bank market power on firm performance and suggest that this beneficial effect should be stronger in markets where information asymmetries are more severe.

Information asymmetries may even be more important in the case of export financing as information about foreign markets is more difficult to acquire and less verifiable, thereby deterring banks from trusting firms that want to export (Chaney, 2016). Therefore, access to soft information about export activities is crucial and relationship lending may be especially valuable for informationally opaque exporters. Ferri et al. (2019) verify this hypothesis and show that during the 2009 great trade collapse, small and young European manufacturers experienced milder contractions in their exports when banks had access to soft information about their export prospects.

Drawing on the above mentioned literature, we conjecture that market power in lending allows for the development of closer bank-firm relationships which enable banks to support the internationalisation of smaller-sized firms, and thus to promote exports.[4] In other words, the access to soft information enables banks to better evaluate export prospects and safeguard borrowing firms against suboptimal export activities. Therefore, we formulate our first testable hypothesis as follows:

H1: Bank market power is positively associated with exports at the country level.

A further way to identify the underlying linkages between bank market power and exports is to consider market characteristics related to credit information availability. The export-enhancing effect of relationship lending is likely to be more relevant in markets where credit information is scarce (i.e. in opaque markets) than in markets where all pertinent information is readily available to the public (i.e. in transparent markets). In opaque markets, banks with market power are better able to build lending relationships with their borrowers, and thus to screen, fund and monitor projects with a positive expected payoff that competitive banks cannot. Therefore, the positive effect of bank market power on exports is expected to be stronger in informationally opaque environments. This leads to our second testable hypothesis:

[4] Chaney (2016) shows that larger and more productive firms can generate more profits from domestic sales, and they are thus able to cover their export costs with their own funds. Furthermore, alternative sources of funding (such as bond and capital markets) are often unavailable to small business borrowers. As such, banks represent the main financiers for smaller-sized exporters. The importance of these exporters should not be underestimated. According to OECD data for the period 2008-2010, smaller business exports accounted for approximately half of the total value of exports in 28 high income countries.

H2: Bank market power exerts a stronger positive impact on exports in countries where information asymmetries are higher.

We expect these two testable hypotheses to yield useful insights on the mechanism through which bank market power might affect real outcomes and provide normative implications for the design of competitive policies in the credit market.

1.3 Data

We use panel data for a maximum of 125 countries over 1997–2010. The selection of the sample period is dictated by the data availability on our preferred measure of bank market power. The large number of countries indicates that the panel includes countries from all regions and income groups. As in virtually all empirical studies employing macroeconomic data, our panel is unbalanced in the sense that there are missing observations for some years and specific countries. Table 1 includes definitions and data sources for the variables used in the empirical analysis. Table 2 provides basic descriptive statistics for the full set of countries (panel A) as well as for the high-income countries versus the rest of world (panel B). Table 3 reports the correlation coefficients between the explanatory variables of export shares. The results indicate the absence of any serious multicollinearity between the explanatory variables, except from those variables characterising the level of human capital, banking efficiency and trade openness.

The dependent variable of our study is the value of total exports to GDP at the country-year level. The average value in our dataset is 40.2%. The lowest value is recorded for Myanmar in 2003 (18.29%) and the highest for Singapore in 2008 (230.27%). Information for bank market power is from Clerides et al. (2015). Our baseline measure is the Lerner index which measures deviations from the competitive benchmark of marginal cost pricing. The index ranges from 0 to 100 with higher values corresponding to greater market power. Clerides et al. (2015) apply a two-stage procedure in the computation of the Lerner index. In the first stage, they collect information at the individual bank level and calculate the Lerner Index at the bank-year level as follows:

$$LI_{i,c,t} = \frac{P_{i,c,t} - MC_{i,c,t}}{P_{i,c,t}} \qquad (1.1)$$

where P and MC are the price and marginal cost of bank i in country c at time t, respectively. Their novelty rests in the estimation of the marginal cost using a semi-parametric method (the partial linear smooth coefficient model), which allows for improved flexibility in the functional form of the cost function.[5] In the second stage, the authors take averages of the Lerner indices at the country–year level.

[5] See Delis et al. (2012) for the advantages of using semi-parametric methods (relative to parametric techniques) to estimate the marginal cost function.

Table 1: Variable definitions and sources

Variable	Definition	Source
Exports	Value of all goods and other market services exported to the rest of the world as a percentage of GDP.	Teorell et al. (2017), WDI
GDP growth	Annual percentage GDP growth rate at market price based on constant local currency.	Ibid
FDI inflow	Net inflows of Foreign Direct Investments as a percentage of GDP.	Ibid
Population	Total population by country and year.	Ibid
Tertiary education	Total enrolment in tertiary education, regardless of age, expressed as a percentage of total population.	Ibid
Lerner index	Lerner index by country and year where marginal cost is estimated using a log-linear production function and total output is measured by total earning assets. It measures actual (exercised) market power and it ranges from 0 to 100, with higher values indicating greater market power.	Clerides et al. (2015)
Adjusted Lerner Index	Measures potential market power by country and year. It ranges from 0 to 100, with higher values indicating greater market power.	Ibid
Boone Indicator	Measures the elasticity of profits to marginal cost by country and year. It takes negative values with larger absolute values indicating more competitive market conditions.	Ibid
Private Credit	Domestic credit to private sector by financial institutions as a share of GDP.	World Bank
Capital Regulation	The index measures the degree of regulatory stringency regarding the nature and source of banking capital. It ranges from 0 to 10, with higher values corresponding to more stringent regulations.	Barth et al. (2013)
Supervisory Power	The index measures the power of supervisory authorities in obtaining information from banks and taking corrective action. It ranges from 0 to 16, with higher values indicating greater supervisory authority.	Ibid
Financial Freedom	It reflects the relative openness of each country's banking and financial system. It takes values from 0 to 100, where 100 indicate maximal degree of financial freedom.	Teorell et al. (2017), Heritage Foundation
Trade Freedom	A composite measure of the trade-weighted average tariff rate and non-tariff barriers. It ranges from 0 to 100, with 100 representing the highest degree of trade freedom.	Ibid
Lerner World Bank	The World Bank's Lerner index by country and year, where marginal cost is estimated with the usual parametric techniques and a translog cost function.	World Bank
Depth of credit information index	The index measures the scope and accessibility of credit information distributed by credit bureaus and credit registries. It ranges from 0 to 6 with higher values indicating the availability of more credit information to facilitate lending decisions.	Ibid
Lead lender share	The share of syndicated loans held by lead lenders aggregated at the country level.	Delis et al. (2017)
General entry restrictions	The index quantifies the requirements needed for entering into banking. It ranges from 0 to 8, with higher values indicating higher stringency.	Barth et al. (2013)

Table 2: Descriptive statistics

Panel A: Full sample					
Variable	Obs.	Mean	S.D.	Min.	Max.
Exports	2,413	40.210	25.571	0.183	230.269
Lerner index	1,729	27.169	11.923	0	82.4
Adjusted Lerner	1,773	21.82	12.285	0	82.2
Boone indicator	1,775	-45.519	7.948	-70.3	-33.1
FDI inflow	2,433	4.942	8.369	-58.978	173.45
GDP growth	2,533	4.236	6.144	-33.101	149.973
Private credit	2,348	44.053	42.097	0.001	312.12
Population	2,607	33.6 millions	128 millions	9,298	1.34 billions
Supervisory power	1,959	11.018	2.622	3	16
Capital regulation	1,804	6.169	1.881	1	10
Financial freedom	2,168	50.216	20.377	0	90
Trade freedom	2,168	65.777	16.439	0	90
Tertiary education	1,580	31.651	25.138	0.221	117.891

Panel B: Subsamples					
	High-income countries		Rest of the world		Mean equality
Variable	Mean	S.D.	Mean	S.D.	*p*-value
Exports	51.239	32.564	35.721	20.475	0.000
Lerner index	23.895	10.652	29.160	12.263	0.000
Adjusted Lerner	19.421	10.899	23.222	12.825	0.000
Boone indicator	-46.555	8.100	-44.915	7.798	0.000
FDI inflow	6.178	11.516	4.456	6.685	0.000
GDP growth	3.297	3.962	4.630	6.819	0.000
Private credit	82.571	48.631	28.705	26.644	0.000
Population	19.4 millions	44.5 millions	39.5 millions	149 millions	0.000
Supervisory power	10.705	2.571	11.171	2.634	0.000
Capital regulation	6.152	1.825	6.178	1.912	0.770
Financial freedom	66.130	16.354	43.462	18.026	0.000
Trade freedom	77.289	11.158	60.891	15.876	0.000
Tertiary education	52.831	21.534	20.436	18.918	0.000

Notes: Panel A reports the summary statistics (number of observations, mean, standard deviation, minimum, and maximum) for the full set of countries variables included in the empirical analysis. Panel B reports the mean and standard deviation for the same variables for high-income countries versus the rest of the world (upper-middle, lower-middle and low-income countries). The country classification is based on the World Bank's 2018 categorisation. The last column of panel B reports the *p*-values of mean equality tests between high-income countries and the rest of the world. Panels span the period 1997–2010.

Table 3: Correlation matrix

	Lerner	Adjusted Lerner	Boone	FDI inflow	GDP growth	Private credit	Population	Supervisory power	Capital regulation	Financial freedom	Trade freedom	Tertiary education
Lerner Index	1.000											
Adjusted Lerner Index	0.813	1.000										
Boone Indicator	0.410	0.351	1.000									
FDI inflow	-0.009	0.048	-0.016	1.000								
GDP growth	0.239	0.356	0.177	0.050	1.000							
Private credit	-0.174	-0.192	-0.111	0.106	-0.245	1.000						
Population	0.063	0.035	0.062	-0.080	0.142	0.070	1.000					
Supervisory power	0.167	0.141	0.111	0.015	0.021	0.006	0.012	1.000				
Capital regulation	0.039	0.029	0.041	0.047	-0.083	0.018	0.083	0.052	1.000			
Financial freedom	-0.200	-0.113	-0.082	0.181	-0.201	0.427	-0.249	-0.060	-0.096	1.000		
Trade freedom	-0.168	-0.134	-0.025	0.167	-0.172	0.419	-0.291	-0.077	0.037	0.427	1.000	
Tertiary education	-0.255	-0.250	-0.080	0.028	-0.182	0.504	-0.114	-0.156	-0.030	0.356	0.541	1.000

We also examine the sensitivity of our findings to several variants of our baseline Lerner index (again provided by Clerides et al., 2015). The first variant (named *adjusted Lerner Index*) accounts for the fact that banks may not choose prices and input levels that maximise profits. In other words, the adjusted Lerner index measures the *potential* market power. We also experiment with a different measure of bank market power, namely the Boone indicator, which is estimated using the elasticity of profits to marginal costs. The profit equation is estimated using the same semi-parametric approach with the Lerner indices, and estimates are obtained for each observation (i.e. at the bank–year level) and then averaged by country and year. As a final exercise, we consider the equivalent Lerner index from the World Bank where marginal cost is estimated using common parametric techniques and a translog cost function.

To assess the impact of market power on exports, we need to control for an array of macroeconomic, demographic, institutional and financial variables that may affect exports. First, we use domestic credit to private sector by commercial banks and other financial institutions divided by GDP. The banking literature often utilises this ratio to gauge the development of financial intermediaries (Beck, 2002) and shows that it is negatively associated with information asymmetries between borrowers and financiers (Godlewski and Weill, 2011; Fungáčová et al., 2017). Therefore, we consider this ratio as an inverse proxy of information asymmetries in bank lending markets. In line with the information hypothesis, we expect greater information asymmetries to incentivise banks to invest in relationship lending, which can, ultimately, result in improved export performance (i.e. we expect a negative relation between the ratio of private credit to GDP and exports).

We also control for the regulatory and supervisory environments of the banking system given their prominent role in determining bank competition, credit availability, and financial stability (Claessens and Laeven, 2004; Houston et al., 2012; Barth et al., 2004). Specifically, we use two indices, both from Barth et al. (2013), which measure the stringency of bank capital regulations and the degree of official supervisory power. As stricter capital requirements result in fewer funds being available to banks to grant loans (De Nicolò, 2015), we expect

a negative impact of capital stringency on exports. The effect of official supervision on credit availability, and thus on export performance, is a debated topic. On the one hand, the official supervision view posits that powerful supervisors foster financial stability, improve the governance of banks and boost the efficiency with which banks channel savings (Beck et al., 2006). On the other hand, the political/regulatory capture view suggests that powerful supervision may lead to corruption and could hurt efficient credit allocation by favouring a few well-connected firms (Barth et al., 2004; Beck et al., 2006). Ahamed and Mallick (2017a, 2017b) contribute to this discourse by arguing that there are instances where regulatory forbearance is beneficial especially when the banking sector is distressed. To this end, they examine the Corporate Debt Restructuring (CDR) programme introduced in India in 2002 and provide robust evidence that this mechanism increases the soundness of participating banks.

To capture all other elements of financial development and liberalisation that might affect exports (Manova, 2008), we also employ the financial freedom index. This index measures both banking efficiency and independence from government control and interference, with higher values reflecting higher financial liberalisation.

Following Manova et al. (2015), we also incorporate foreign direct investment (FDI) inflows (as a percentage of GDP) since FDI can lessen the effect of domestic financial market inadequacies on trade, especially in financially underdeveloped economies. We further control for the population size of a country, since changes in the dynamics of population can influence export performance (Morrison, 1977) and the GDP growth rate. The latter captures the effect of macroeconomic conditions on exports. Thus, controlling for this variable is essential to avoid attributing such macroeconomic effects on export performance to bank market power.

In addition, we account for a country's trade policy regime by using the trade freedom index. This is a composite measure, based on tariff rates and non-tariff barriers, and it ranges between 0 and 100, with higher scores indicating a more open trade policy. Trade literature outlines that barriers to trade tend to exacerbate trade activity (and thus exports), while their abolition allows for

greater efficiency gains (Krugman et al., 2002) and knowledge-spillover effects (Grossman and Helpman, 1991) both resulting in higher trade activity. Furthermore, this index allows us to ascertain that our bank market power measure (or any other of our financial indicators) is not a proxy for trade openness. For example, in their seminal paper, Rajan and Zingales (1998) show that when trade flows are liberalised, more private interests favour financial deregulation. In this view, trade openness exerts a positive effect on financial development and market structure.

Finally, we use data on total enrolment in tertiary education as a percentage of the population of official education age to account for the strong linkages between exports and human capital (Findlay and Kierzkowski, 1983; Contractor and Mudambi, 2008). The prediction is that, on average, countries with large endowments of human capital also experience greater exports.

1.4 Methodological considerations

The baseline model we use to study the relation between bank market power and exports is of the following form:

$$exp_{i,t} = a_0 + a_1 bmp_{i,t-1} + a_2 Z_{i,t} + v_i + \mu_t + u_{i,t} \quad (1.2)$$

Our dependent variable (*exp*) is the share of exports over the GDP of country *i* at year *t*. Exports are regressed on the measure of bank market power (*bmp*), a vector of variables Z observed at the country-year level and country- and time-fixed effects (denoted by v_i and μ_t, respectively). The last term, $u_{i,t}$, is the stochastic term.

Our aim is to identify a causal relation running from bank market power to export shares. In the setting of equation (1.2), endogeneity can arise both from reverse causality and omitted-variable bias. If causality is reversed, the degree of market power will depend on exports and the market power indicator will be correlated with the error term. For instance, the willingness of banks to cater for the needs of their exporting clients might lead to lower net interest margins. This, in turn, affects banks' pricing policies and their resultant Lerner index estimates. To overcome this potential reverse causality issue, we follow the

literature (Beck et al., 2013) and lag bank market power by one year. We also attempt to mitigate endogeneity issues due to omitted-variable bias by using country-fixed effects, to control for all missing time-invariant country-level characteristics, and time-fixed effects to account for time-varying global shocks.

This empirical strategy, however, is not adequate in establishing causality in the presence of country-year unobserved factors that influence the dynamics of both bank market structure and export shares. A solution to this problem is to identify at least one instrumental variable that satisfies the exclusion restriction and use appropriate estimation techniques. A viable instrument should be correlated with the Lerner index but it should not influence exports. Therefore, in robustness checks we employ two-stage least squares (2SLS) and use the index of *general entry restrictions* as an instrument. We construct this index using information from Barth et al. (2013). This index takes values from 0 to 8, with higher values indicating higher barriers to entry into banking. We expect this index to be a good instrument, as entry barriers make the banking market less competitive, i.e. they directly affect bank market structure. Intuitively, general entry restrictions should also satisfy the exclusion restriction, as there is no theoretical channel linking entry barriers to banking with exports; if anything, this would be through bank market power. For instance, higher entry barriers are likely to create a more monopolistic banking environment which, in turn, may lead to higher or lower exports depending on the prevalence of the alternative theories of bank market power on the supply and costs of loans (traditional IO approach versus information hypothesis).

We further examine the statistical properties of our instrument in the context of our model and our sample. *General entry restrictions* have a correlation coefficient with the Lerner index variable equal to 0.156 which is statistically significant at conventional levels. The respective correlation coefficient with exports is only 0.028. Moreover, regressing exports on our instrument shows that entry restrictions are statistically insignificant determinants of exports.[6]

[6] The estimated coefficient of general entry restrictions on exports equals 0.615 with a standard error of 0.518 and *t*-statistic equal to 1.19.

Another potential identification problem is that the true model may incorporate some dynamics and take the form:

$$exp_{i,t} = a_0 + \sum_{j=1}^{p} \beta_j \, exp_{i,t-j} + a_1 bmp_{i,t-1} + a_2 Z_{i,t} + v_i + \mu_t + u_{i,t} \qquad (1.3)$$

or the form:

$$exp_{i,t} = a_0 + \sum_{j=1}^{p} a_j bmp_{i,t-j} + a_2 Z_{i,t} + v_i + \mu_t + u_{i,t} \qquad (1.4)$$

where p denotes the number of lags. These are sensible models as they reflect the possibilities that export performance is affected by its past values, or that bank market power further back than one year exerts a substantial statistical influence on the dependent variable.

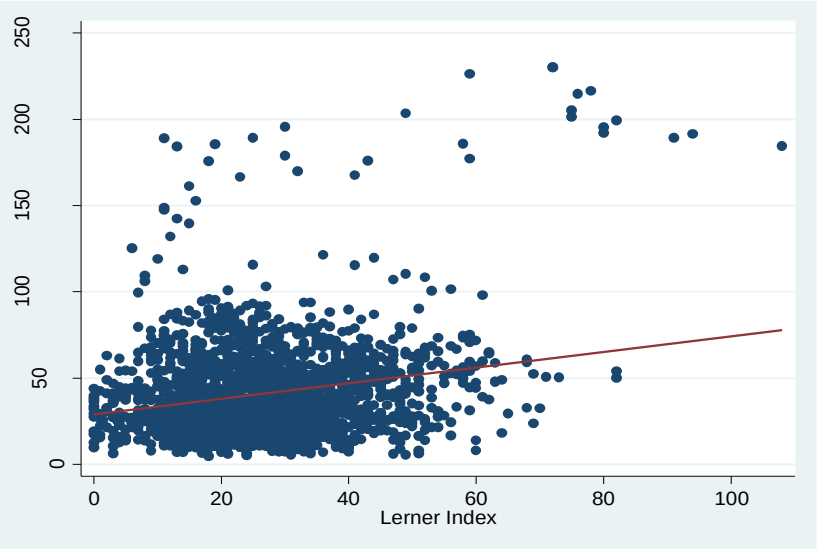
Equation (1.4) can be estimated using conventional econometric techniques. Estimation of equation (1.3), however, with fixed effects will produce biased results because of the inclusion of the lagged dependent variable (Nickell, 1981). Therefore, we estimate equation (1.3) by GMM for dynamic panels (Arellano and Bond, 1991). This method allows the use of IV-style instruments, but also allows us to instrument for the presence of the lagged dependent variable among the regressors to remove endogeneity bias stemming from the presence of $exp_{i,t-j}$. This procedure purges fixed effects by first-differencing, and is therefore robust to omitted-variable bias stemming from unobserved country effects. A common critique of GMM estimators is that their estimates can be biased and inaccurate in panel data with a relatively small number of cross-sections (Bruno, 2005). As a robustness test, we also estimate equation (1.3) using least squares dummy variables (LSDV) and then appropriately correcting the results for the dynamic panel bias (Kiviet, 1995; Bruno, 2005). Bearing these issues in mind, we proceed with the estimation and discussion of our results.

1.5 Estimation results

1.5.1. Country-level analysis

Figure 1 is a scatter plot of exports as a percentage of GDP against the Lerner index. The figure provides a first indication of a positive relationship between export performance and bank market power. In addition, the regression line reveals a linear relationship, with relatively few outliers. To further explore the issue at hand, we carry out the empirical analysis below.

Figure 1: Bank market power and exports



In Table 4 we report the baseline regression results from the estimation of equation (1.2). All regressions are estimated with country- and time-fixed effects and robust standard errors clustered at the country level. In our baseline regression (column 1) we use the Lerner index and the core set of control variables, and confirm the presence of a significant (at the 5% level) positive association between (lagged) bank market power and exports. This effect is also economically relevant. For example, an increase in market power by one standard deviation results in an increase in exports over GDP by 1.62% (11.923*0.136) in the following year. For the average export shares in GDP in our sample (40.21%), this effect is equivalent to a 4% increase. Interestingly, the effect of the Lerner index remains qualitatively unaltered when adding a number

of explanatory variables related to financial freedom (column 2), trade freedom (column 3) and human capital (column 4), albeit its magnitude becomes somewhat economically smaller. Specifically, it remains statistically significant (at the 5% significance level) and positive across all specifications with its magnitude ranging from 0.101 (in column 2) to 0.113 (in column 4).These findings seem to confirm H1 and provide a first indication that bank market power and relationship lending can exert a positive impact on the real economy.

Table 4: Exports and bank market power-baseline regressions

	1	2	3	4
Lerner index	0.136**	0.101**	0.102**	0.113**
	(0.053)	(0.046)	(0.045)	(0.047)
FDI inflow	0.035	0.030	0.028	0.056
	(0.022)	(0.019)	(0.019)	(0.035)
GDP growth	0.151	0.159	0.155	0.088
	(0.106)	(0.108)	(0.106)	(0.096)
Private credit	-0.023	-0.019	-0.018	-0.020
	(0.026)	(0.027)	(0.027)	(0.031)
Population	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Supervisory power	0.121	-0.040	-0.042	-0.096
	(0.245)	(0.197)	(0.198)	(0.226)
Capital regulation	-0.345	-0.311	-0.311	-0.454*
	(0.251)	(0.244)	(0.244)	(0.264)
Financial freedom		-0.007	-0.008	0.017
		(0.037)	(0.037)	(0.041)
Trade freedom			0.052	0.058
			(0.045)	(0.046)
Tertiary education				0.084
				(0.075)
Constant	37.313***	39.114***	36.014***	32.027***
	(3.713)	(3.754)	(4.655)	(5.424)
Country-fixed effects	Y	Y	Y	Y
Time-fixed effects	Y	Y	Y	Y
Observations	1,188	1,168	1,168	885
Countries	123	121	121	109
R-squared	0.196	0.197	0.199	0.210
F-statistic	8.713	7.873	7.495	6.422

Notes: The table reports estimated coefficients and standard errors clustered at the country level (in brackets). Dependent variable is the share of exports in GDP. Variables are defined in Table 1. The ***, **, and * marks denote statistical significance at the 1%, 5%, and 10 % level, respectively.

The results in Table 4 suggest that the inclusion of time-fixed effects, which absorb time-varying economic conditions, results in statistically insignificant control variables. The only variable that is (marginally) statistically

significant is capital regulation in column 4, which carries a negative sign in accordance with our prior expectations.

We test the robustness of our baseline results in a number of ways. First, we investigate whether the main results hold when using alternative measures of bank market power at the country level. Thus, we re-estimate our baseline regression using the lagged value of the adjusted Lerner index, which measures *potential* rather than *actual* market power.

Compared to Table 4, the results, reported in column 1 of Table 5, remain similar with the coefficient on market power being positive and significant at the 5% level. The economic significance of this effect is, nevertheless, smaller than that previously reported. A one standard deviation increase in the adjusted Lerner index (12.29) induces a mere 0.79% (0.064*12.27) rise in export shares over GDP in the following year, *ceteris paribus*. We obtain similar results when experimenting with the Boone indicator at the country level. Specifically, the relevant estimated coefficient is negative and significant in column 2 of Table 5, suggesting that the prevalence of less competitive conditions in banking markets leads to higher export shares in GDP. Next, we employ the equivalent country-year Lerner index from the World Bank (column 3). In this way, we test the robustness of our results for a relatively larger sample, since the World Bank dataset is available for the period 1995–2014. Again, the estimated effect of the (lagged) Lerner index on export performance is positive and highly significant at the 1% level. Lastly, it is worth noting that some of the controls show significant correlations with export shares. Specifically, GDP growth, and to a lesser extent FDI inflows, seem to exert a positive impact on export performance, while capital regulation retains its negative sign.

Table 5: Exports and bank market power-Alternative measures of bank market power

	1	2	3
Adjusted Lerner index	0.064**		
	(0.027)		
Boone indicator		-0.074**	
		(0.036)	
World Bank Lerner index			0.109***
			(0.022)
FDI Inflow	0.037	0.039*	0.027
	(0.024)	(0.024)	(0.022)
GDP growth	0.144**	0.149**	0.078
	(0.060)	(0.059)	(0.058)
Private credit	-0.019	-0.015	-0.026**
	(0.013)	(0.013)	(0.012)
Population	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Supervisory power	0.104	0.108	0.056
	(0.113)	(0.113)	(0.109)
Capital regulation	-0.248*	-0.246*	-0.481***
	(0.147)	(0.147)	(0.138)
Constant	38.340***	42.712***	39.669***
	(1.985)	(2.736)	(1.782)
Country-fixed effects	Y	Y	Y
Time-fixed effects	Y	Y	Y
Observations	1,203	1,205	1,629
Countries	125	125	124
R-squared	0.174	0.173	0.169
F-statistic	11.734	11.707	12.530

Notes: The table reports estimated coefficients and standard errors (in brackets). Dependent variable is the share of exports in GDP. The ***, **, and * marks denote statistical significance at the 1%, 5%, and 10 % level, respectively.

In Table 6, we explore the sensitivity of our main findings by re-estimating the baseline regression of column 1 in Table 4 for specific groups of countries with different levels of development. First, we split our sample into advanced economies and developing/emerging economies according to the International Monetary Fund (IMF) classification. The regression results (columns 1 and 2 of Table 6) suggest a positive impact of the lagged Lerner index on exports in both groups of countries, albeit the effect is statistically more robust for emerging/developing countries.

Next, we group countries according to the World Bank classification of high-income, upper-middle income, lower-middle income and low-income economies. Due to the small number of available observations for the latter two categories, we merge lower-middle income and low-income countries into a single group. The results (reported in columns 3–5 of Table 6) yield more fruitful insights for the distinct role of bank market power in exports. Specifically, we

find that the Lerner index is statistically significant only for the high-income countries with a sizeable effect on exports. A one standard deviation increase in the Lerner index is associated with a 2.11% (0.198*10.652) increase in exports or a 4.1% improvement in the export performance for the average country in the high-income sample. This finding, in essence, reflects the mean equality test results reported in panel B of Table 2 which show that there are significant differences in the average values of the variables employed in the empirical analysis between high-income countries and the rest of the world.[7]

It is important to comment on two issues at this stage. The first relates to the lack of a statistically significant relation between bank market power and export shares in upper-middle and lower-middle/low-income economies. While, to the best of our knowledge, we conduct the first cross-country study on this matter, it is worth mentioning that the literature on bank competition and access to credit indicates that lower economic development is associated with higher financial constraints (Beck et al., 2004; Godlewski and Weill, 2011) stemming primarily from poorly functioning institutions (Djankov et al., 2007). Furthermore, Delis (2012) shows that the effects of financial reforms on banking efficiency are weaker in lower income countries. Within this context, our findings indicate that a certain level of economic development is a prerequisite for the real effects of bank market power to be at work. In lower income countries, exporters are likely to face greater barriers in accessing banking products, thereby resorting to the use of alternative sources of funding such as liquid reserves and personal savings. This conjecture accords with Beck et al. (2008) who also find that price and non-price barriers impede significant parts of the developing world from accessing and using formal banking services.

Second, we observe that private credit to GDP in column 3 of Table 6 carries a highly significant negative coefficient. This finding is in accord with our prior expectations and, along with the positive impact of bank market power, it

[7] It should be noted here that there are some notable disagreements between the IMF and World Bank's country classifications. For example, IMF identifies 39 countries as advanced economies, whereas the World Bank identifies 68 high-income countries. In addition, a number of countries identified as developing/emerging according to the IMF classification (e.g. Chile, Hungary, Saudi Arabia, United Arab Emirates, etc.) belong to the high-income countries according to the World Bank classification. These disagreements may well explain the mixed results obtained when adopting the IMF versus World Bank classification.

suggests that banks operating in more opaque environments are more willing to invest in relationship lending and improve their borrowers' performance by forming strong and efficient inter-temporal relationships.[8] We further explore this issue below.

[8] It might be argued that the negative coefficient of private credit to GDP implies lower credit availability which, in principle, should be damaging for firm performance and exports. Nevertheless, Beck et al. (2012) show that the use of total private credit to GDP masks the important differences between enterprise lending, which is positively related to real economic outcomes, and household credit which is not. These differential effects of financial intermediary development become even more prominent in high-income countries where the share of household credit in the total bank credit significantly outweighs the share of enterprise credit. So, what matters most is not total bank lending to the private sector, but how it is actually distributed among firms. Since no such data are available at the country-year level, we opt to interpret the ratio of private credit to GDP as an inverse measure of market opacity and infer accordingly.

Table 6: Exports and bank market power by country groups

	IMF classification		World Bank classification		
	Advanced economies	Emerging market & developing economies	High income	Upper-middle income	Lower-middle & Low income
	1	2	3	4	5
Lerner index	0.111*	0.151***	0.198**	0.118	0.088
	(0.062)	(0.033)	(0.096)	(0.074)	(0.053)
FDI inflow	-0.012	0.175***	0.005	0.069	0.025
	(0.026)	(0.060)	(0.024)	(0.047)	(0.186)
GDP growth	0.326**	0.183***	0.147	0.409**	0.073
	(0.149)	(0.063)	(0.145)	(0.197)	(0.126)
Private credit	-0.074***	0.044*	-0.084***	0.075	-0.046
	(0.016)	(0.027)	(0.026)	(0.097)	(0.091)
Population	0.000**	0.000	0.000*	0.000	0.000
	0.000	0.000	(0.000)	0.000	0.000
Supervisory power	0.153	0.050	0.212	-0.152	-0.163
	(0.204)	(0.133)	(0.405)	(0.283)	(0.371)
Capital regulation	-0.145	-0.241	-0.288	-0.043	-0.335
	(0.249)	(0.180)	(0.367)	(0.294)	(0.467)
Constant	58.805***	28.959***	53.020***	31.313***	29.293***
	(5.519)	(2.400)	(4.542)	(7.079)	(5.408)
Country-fixed effects	Y	Y	Y	Y	Y
Time-fixed effects	Y	Y	Y	Y	Y
Observations	372	816	498	322	368
Countries	34	89	47	35	41
R-squared	0.326	0.207	0.393	0.286	0.105
F-statistic	8.130	9.740	8.170	9.85	2.75

Notes: The table reports estimated coefficients and standard errors (in brackets). Dependent variable is the share of exports in the GDP. In the left panel countries are classified according to IMF World Economic Outlook. In the right panel countries are classified according to the World Bank categories. The ***, **, and * marks denote statistical significance at the 1%, 5%, and 10% level, respectively.

In Table 7 we turn to our second hypothesis and examine whether market power in banking is more likely to yield beneficial, real economic effects in more opaque environments. As such, in equation (1.2) we introduce an interaction term between the Lerner index and private credit to GDP which inversely proxies for the level of information asymmetries at the country level. To provide inference for the impact of bank market power at the mean of the private credit to GDP, we demean both variables before interacting them. The results, reported in column 1 of Table 7, show that the interaction term enters the estimated model with a statistically significant (at the 5% level) negative coefficient while the positive effect of the (lagged) Lerner index on exports further strengthens (the coefficient increases to 0.342). This implies that in countries with relatively higher information asymmetries (i.e. countries with lower values of private

credit to GDP), bank market power exerts a positive effect on the real economy through higher exports.

Figure 2 visualizes the marginal effects from a change in the Lerner index on the predicted value of the dependent variable, for different levels of private credit to GDP, with the associated 95% confidence intervals. The figure clearly shows that marginal effects are statistically significant (at the 5% level) for values of private credit to GDP up to roughly 90%. This, in turn, means that the marginal effect of bank market power on exports is positive for approximately 62% of the country-year observations in the high income group.

It remains to examine whether these results hold under alternative identification schemes. Although the use of the lagged Lerner index eases concerns of reverse causality, the causal effect of bank market power on exports is still hard to pin down due to other aspects of endogeneity (omitted variables bias and measurement error). To be on the safe side, we prefer to interpret the estimated coefficients of market power in Tables 4–6 and in column 1 of Table 7 as correlations rather than as causal relationships. Therefore, we re-estimate column 1 of Table 7 using two-stage least squares (2SLS) with fixed effects and robust standard errors and report the results in column 2. The instrumental variable is *general entry restrictions* on banks. Besides the discussion in section 4, the appropriateness of the instrument is confirmed with the under-identification LM test (UIT) and the weak-identification Wald F-test (WIT) along with the first-stage estimation results between restrictions and bank market power.[9] Both the Lerner index and the interaction term are highly significant (at the 1% level) and retain their positive and negative sign, respectively. Based on these estimates, the computed private credit threshold, *below* which information asymmetries are strong enough to lead to a positive link between bank market power and exports, is equal to 104 (=0.729/0.007), pointing to a positive impact of bank market power on exports for 72% of the country-year observations in the high income group. Thus, we validate our previous findings which suggest that bank market power is beneficial for economic outcomes when information asymmetries are relatively large.

[9] For expositional brevity, we include the first-stage results only for the instrumental variable. The results for the rest of the variables of the first-stage regression are available on request.

Next, we introduce some dynamics. The regression in column 3 is estimated with country- and time-fixed effects, whereas the regressions in columns 4 and 5 with the GMM estimator of Arellano and Bond (1991). Again, the interaction term enters the estimated equations with a negative and statistically significant coefficient in all instances. Furthermore, the results in column 3 indicate that the second lag of the Lerner index exerts a highly significant positive effect on exports, thereby suggesting the presence of lasting export-enhancing effects of bank market power. Similarly, the coefficient on the one-period lagged value of the dependent variable in columns 4 and 5 is significant at the 1% level, providing evidence of a considerable level of persistence in export performance. Finally, to account for the relatively small number of cross-sectional units, we re-estimate the regression in column 4 using the bias-corrected LSDV estimator (Kiviet, 1995; Bruno, 2005). The estimates (reported in column 6) further support our main results.

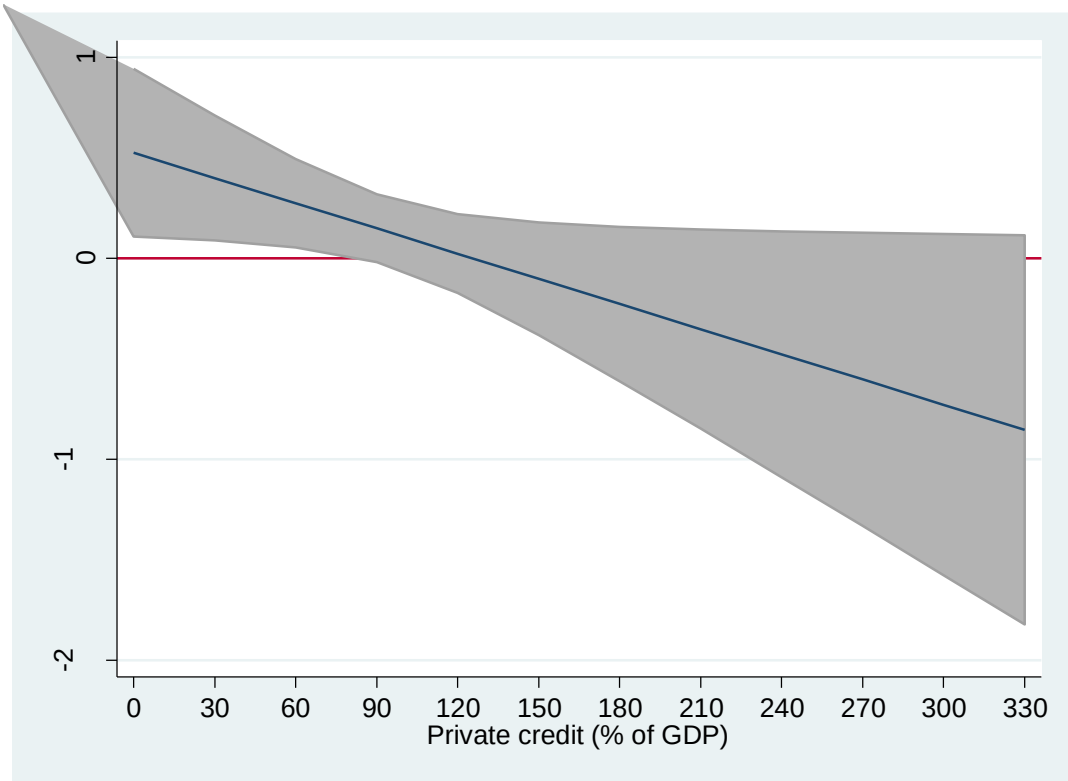
In sum, the findings of Table 7 confirm our second hypothesis: market power in banking exerts a stronger positive impact on exports in countries where information asymmetries are more severe. It is precisely in these markets where banks with market power can exploit their advantages over their competitive competitors. First, relationship lending and access to soft information enables these banks to better screen and extract future rents from opaque borrowers' profitable projects. Therefore, banks can finance risky investments with expected positive payoffs, such as export activities. Second, banks with market power possess greater monitoring incentives which improve borrowers' performance after loan origination, thereby increasing the success probability of export projects. These findings add a new element to the literature which investigates the impact of financial market imperfections on firms' decisions to export. Specifically, they show that in relatively opaque markets, some degree of market power in lending can be beneficial for the promotion of exports, reducing not only the level of financial constraints faced by firms, but also monitoring entrepreneurs' efforts during the life of the loan. In this sense, our results accord with the theoretical and empirical literature, which argues that banks with market power exert a positive impact on firm performance (Boot and Thakor, 2000; Caminal and Matutes, 2002; Delis et al., 2017).

Table 7: Exports and bank market power– Tracing the effect of information asymmetries

	1	2	3	4	5	6
Lerner index	0.342**	0.729***	0.114	0.302***	0.306***	0.149**
(1 lag)	(0.135)	(0.274)	(0.092)	(0.087)	(0.092)	(0.054)
Lerner index			0.184***			
(2 lags)			(0.049)			
Exports (1 lag)				0.582***	0.555***	0.816***
				(0.073)	(0.079)	(0.050)
Exports (2 lag)					0.043	
					(0.034)	
Lerner x Private credit	-0.004**	-0.007***	-0.002*	-0.003***	-0.003***	-0.002*
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
FDI inflow	0.011	0.061	0.004	0.035**	0.031*	0.017
	(0.022)	(0.040)	(0.018)	(0.015)	(0.016)	(0.020)
GDP growth	0.100	0.060	0.054	0.548***	0.563***	0.390***
	(0.141)	(0.170)	(0.136)	(0.141)	(0.146)	(0.099)
Private credit	-0.086***	-0.029	-0.071***	0.024	0.019	0.002
	(0.027)	(0.023)	(0.023)	(0.024)	(0.022)	(0.013)
Population	-0.000	0.000**	-0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Supervisory power	0.288	0.472*	-0.059	0.022	-0.091	-0.014
	(0.425)	(0.287)	(0.331)	(0.245)	(0.262)	(0.184)
Capital regulation	-0.155	-0.044	-0.197	0.448	0.338	0.284
	(0.345)	(0.240)	(0.318)	(0.283)	(0.293)	(0.200)
Constant	45.764***		50.564***	5.134	7.882	
	(6.299)		(4.731)	(4.470)	(5.505)	
First stage						
General entry restrictions		1.264***				
		(0.285)				
Observations	498	489	450	430	396	497
Countries	47	46	47	47	47	47
R-squared	0.420	0.246	0.400			
F-statistic	9.119	5.999	11.476			
UIT		16.915				
p-value		0.000				
WIT		19.610				
AR(2)				0.668	0.896	
p-value				0.504	0.370	

Notes: The table reports estimated coefficients and standard errors (in parentheses). Dependent variable is the share of exports in GDP. Regressions 1 and 3 are estimated with country- and time-fixed effects and standard errors clustered at the country level. Regression 2 is estimated using 2SLS with fixed effects and robust standard errors. Regressions 4 and 5 are estimated with the GMM estimator of Arellano and Bond (1991) and robust standard errors. Regression 6 is estimated with bias-corrected LSDV and bootstrapped standard errors (1,000 repetitions). UIT is the under-identification LM test by Kleibergen and Paap. WIT is the Wald F-statistic of the weak identification test by Kleibergen and Paap. Staiger and Stock's rule of thumb suggests rejecting the null hypothesis of a weak instrument when F≥10. AR2 is the *p*-value of the test for second-order serial correlation in the first differenced GMM errors. The ***, **, and * marks denote statistical significance at the 1%, 5%, and 10 % level, respectively.

Figure 2: Average marginal effects of the Lerner Index with 95% confidence intervals



As a final exercise, we check the robustness of the main finding of Table 7 by using two alternative measures of market opacity. First, we use the portion of the syndicated loans held by lead lenders as a proxy for information asymmetries. In his seminal work, Sufi (2007) empirically shows that in the syndicated loan market, lead arrangers (lenders) retain a larger share of the loan when borrowing firms require more intense investigation and monitoring, i.e. when they are opaque.[10] As such, we rerun the regression reported in column 1 of Table 7 using the lead lender share as a proxy for market opacity (with higher shares indicating higher levels of market opacity). The results, reported in column 1 of Table 8, are qualitatively very similar to those in Table 7. The lagged Lerner index retains its positive sign and statistical significance (0.313) and its interaction with lead lender share is positive and significant at the 5% level. The latter suggests that as the level of information asymmetry between borrowers and lenders increases, the positive effect of bank market power on exports

[10] We are grateful to Manthos Delis for the provision of country level data on lead lender shares.

reinforces. Figure 3 visualizes this finding by plotting the marginal effects of the Lerner index on exports at different levels of lead lender shares. Evidently, we observe significant marginal effects only when the percentage of syndicated loans held by lead lenders is above 0.34; a threshold which corresponds to approximately 64% of the country-year observations in the high income group.

Second, we use data on the depth of credit information index (cii) which measures the scope, access and quality of the credit information sharing schemes (public or private). Higher values of cii indicate lower opacity of financial information about firms. This index is probably the most direct measure of information asymmetries between borrowers and lenders.[11] Nevertheless, information on cii is only available after 2005, thus rendering the replication of the regression analysis of Table 7 difficult. Furthermore, the cii variable is either time invariant or it is slowly changing for most high-income countries during the 2005 – 2010 period. In other words, cii exhibits very little within variance which makes its estimation with fixed effects inefficient as most of its effect will be absorbed by the within transformation (Plümper and Troeger, 2007).

The small sample size and the presence of a rarely changing variable do not allow for a deep empirical analysis. Nevertheless, and since we are mostly interested in the coefficient of the credit information index, we estimate a parsimonious model with pooled OLS which includes only the main covariates of interest (lagged Lerner index and cii) along with a set of year dummies to control for time-specific shocks shared by all countries. Although the results from this exercise (reported in column 2 of Table 8) need to be interpreted with caution, they seem to verify our previous findings. Specifically, we obtain a significant (at the 10% level) positive coefficient for lagged bank market power and a highly significant (at the 1% level) negative coefficient for cii. The latter indicates that market opacity is positively related to export performance.

To investigate the heterogeneous effect of bank market power on aggregate exports across different levels of market opacity, we split the sample according to the country specific mean of the cii variable. Country-year

[11] The correlation coefficient between cii and private credit for the period 2005 – 2010 in our pooled sample is 0.3735 (ρ-value = 0.000), while the corresponding correlation at the country level is as high as 0.9208 (ρ-value = 0.079). Thus, private credit should be a good indicator of (inverse) market opacity at the country-year level.

observations with a cii value below or equal to the country specific mean cii are assigned to the opaque group whereas those with a cii value greater than the corresponding mean are assigned to the transparent group. The results, reported in columns 3 and 4 of Table 8, are consistent with our second hypothesis and verify the export-enhancing effect of bank market power predominantly in informationally opaque environments.[12] This finding remains robust even when we address the potential endogeneity of the Lerner index due to correlated unobservables in column 5.

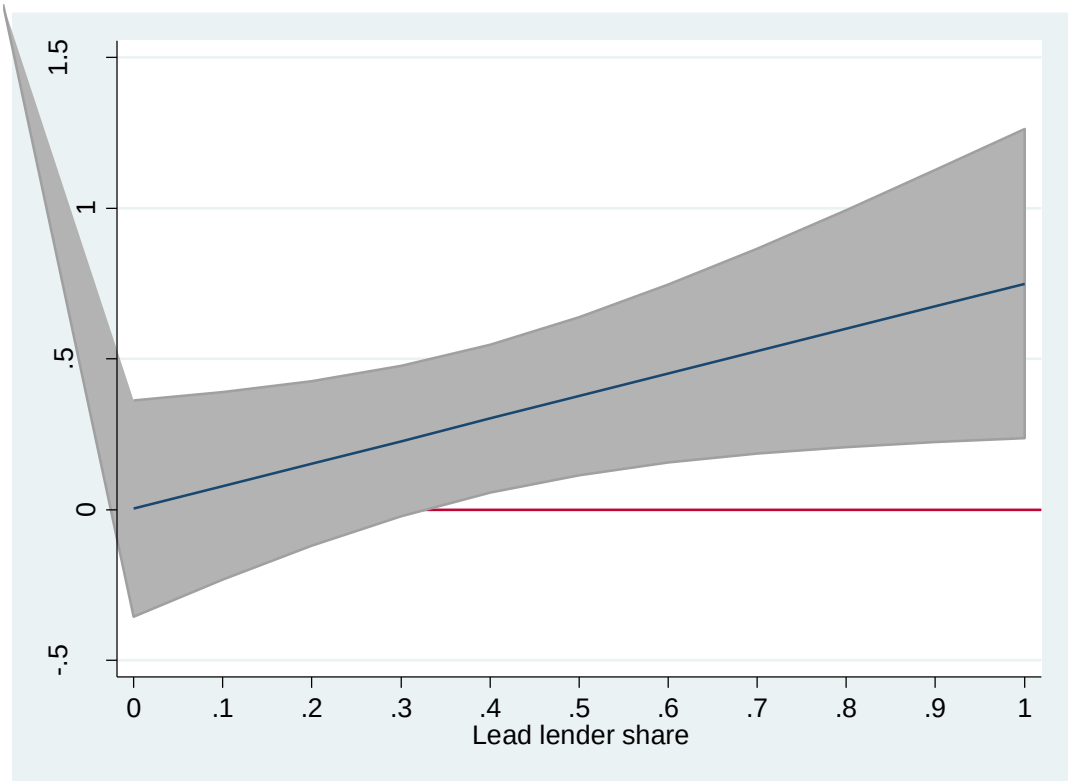
[12] Based on the number of observations in the regressions reported in columns 3 and 4 of Table 8, we observe that approximately 75% of the country-year observations [208/(208+67)] fall in the opaque group. This percentage is very close to the previously computed private credit threshold which points to a positive impact of bank market power on exports for 72% of the country-year observations in the high income group.

Table 8: Exports and bank market power – Alternative measures of information asymmetries

	1	2	3	4	5
	Lead lender share	Credit information index	Credit information index	Credit information index	Credit information index
	Full sample	Full sample	Opaque group	Transparent group	Opaque group
Lerner index	0.313**	0.473*	0.905***	0.395	2.597***
	(0.126)	(0.267)	(0.250)	(0.317)	(0.552)
Lead lender share	-8.254				
	(6.897)				
Lerner x Lead lender share	0.746**				
	(0.364)				
Credit information index		-5.473***			
		(1.536)			
Constant	53.608***	58.591***	26.976***	59.788**	-18.784
	(4.903)	(11.168)	(7.136)	(22.503)	(13.924)
First stage					
General entry restrictions					3.956***
					(0.772)
Observations	522	240	208	67	192
R-squared	0.373	0.143	0.062	0.103	-0.095
F-statistic	7.627	5.660	2.633	2.785	3.950
UIT					17.369
p-value					0.000
WIT					26.235
Control variables	Yes	No	No	No	No
Fixed effects	Yes	No	No	No	No
Year effects	Yes	Yes	Yes	Yes	Yes

Notes: The table reports estimated coefficients and standard errors (in parentheses). Dependent variable is the share of exports in GDP. Regression 1 is estimated with the same set of control variables as in column 1 of Table 7 (besides private credit) and standard errors clustered at the country level. Regressions 2-5 are estimated with robust standard errors. The opaque group includes country-year observations when cii≤country-specific mean cii. The transparent group includes country-year observations when cii >country-specific mean cii. Regressions 2, 3 and 4 are estimated with pooled OLS. Regression 5 is estimated using pooled 2SLS. UIT is the under-identification LM test by Kleibergen and Paap. WIT is the Wald F-statistic of the weak identification test by Kleibergen and Paap. Staiger and Stock's rule of thumb suggests rejecting the null hypothesis of a weak instrument when F≥10. The ***, **, and * marks denote statistical significance at the 1%, 5%, and 10 % level, respectively.

Figure 3: Average marginal effects of the Lerner Index with 95% confidence intervals



1.5.2. Firm-level analysis

In this section we raise particular awareness on the lack of a statistically significant relation between bank market power and export shares in middle and low income countries as detected in the country-level analysis in Section 1.5.1. Arguably, relationship lending should be more effective in developing economies for a number of reasons. First, lenders reduce the risks associated with greater informational opacity of borrowers, weak protection of creditor rights and inefficient contract enforcement (Rajan and Zingales, 1998). Second, financial markets in developing countries are typically characterized by traditional bank-led financing models (Beck et.al, 2009). Thereby, firms are more reliant on banking products, while also being relatively more financially constrained due to corruption and financial underdevelopment (Beck et.al, 2005). As such, they obtain relatively less external financing than firms located in more advanced economies (Demirgüç-Kunt and Maksimovic, 1998). Under these conditions, bank market power should lessen the credit constraints by creating ties with potential borrowers and accumulating private soft information though repetitive interactions, leading ultimately to greater loan availability. For instance, Chauvet and Jacolin (2017) reveal that lower competition on banking market improves firm growth in developing and emerging economies for the relatively less financially-inclusive markets. However, once the share of firms with access to credit exceeds 85%, banks are discouraged from investing in information production and creation of long-term relations. In line with these arguments, we anticipate that greater bank market power should facilitate exports in developing economies.

Nevertheless, the country-level analysis reported in Section 1.5.1 does not support our conjectures. We contemplate that the absence of a significant relation between bank market power and exports in middle and low income countries may stem from the use of aggregate data, which inevitably masks variations within countries and does not allow for a full assessment of firm heterogeneity. To shed further light on this issue, we extend our analysis by using firm-level data. Specifically, we examine the correlation between bank market power and exports by combining country-level with firm-level characteristics for a maximum of 58 developing countries.

To this end, we adapt the empirical strategy of Chauvet and Jacolin (2017), who examine the effect of bank concentration on firms' sales growth in developing countries, and estimate the following modified equation:

$$direct\_exp_{i,j,t} = a_0 + a_1 bmp_{j,t-1} + a_2 Z_{j,t} + a_3 X_{i,j,t} + v_i + u_{i,j,t} \quad (1.5)$$

where $direct\_exp_{i,j,t}$ is the percentage of firm's *i* (in country *j*) total sales that are exported directly at time *t*. The term $bmp_{j,t-1}$ is country's *j* bank market power index, which is lagged by one time-period in order to alleviate reverse causality issues. Vector $Z_{j,t}$ includes the set of (time-varying) selected country variables that are also employed in Section 5.1, while vector $X_{i,j,t}$ encompasses (time-varying) firm characteristics. To account for endogeneity concerns associated with omitted variable bias, we incorporate firm fixed effects v_i which capture all time-invariant firm characteristics. Finally, $u_{i,j,t}$ stands for the stochastic term. We check the robustness of our findings by re-estimating equation (1.5) using alternative indicators of bank market power and controlling for firm heterogeneity based on their size and ownership status.

We extract firm-level data from the stacked World Bank Enterprise Surveys (WBES) over the 2002–2010 period (repeated cross-sections) and compile the sample using information on 9,676 heterogeneous firms that have records for at least two points in time. Table 9 includes definitions for firm-level variables (country-level variables are defined in Table 1). The corresponding descriptive statistics are reported in Table 10.

Table 9: Firm-level data: variable definitions and sources

Variable	Definition	Source
Direct exports	Percentage of firm's total sales that are exported directly.	WBES
Size	Categorical value reflecting the size of the firm: Small (< 20 employees)=1; Medium (20≤employees≤100)=2; Large (>100 employees)=3	Ibid
Foreign	Dummy variable that equals 1 when firm is foreign owned and 0, otherwise.	Ibid
State	Dummy variable that equals 1 when part (or all) of the firm is state owned and 0, otherwise.	Ibid
Loan	Dummy variable that equals 1 when firm has already had loan/line of credit and 0, otherwise.	Ibid
Overdraft	Dummy variable that equals 1 when firm has already had an overdraft facility and 0, otherwise.	Ibid

Table 10: Descriptive Statistics

Variable	Countries	Observations	Mean	Std. Dev	Min	Max
Firm-level data						
Direct exports	58	19,122	8.699299	23.08711	0	100
Size	58	18,996	1.697305	0.756946	0	3
Foreign	58	19,324	0.1187125	0.323458	0	1
State	58	19,337	0.0560583	0.23004	0	1
Loan	58	15,103	0.4605707	0.498459	0	1
Overdraft	58	12,804	0.5136676	0.499833	0	1
Bank market power estimators (lagged)						
Lerner Index	56	18,169	28.14676	8.809163	0.4	46
Adjusted Lerner Index	56	18,169	22.31622	8.392863	-5.4	44.2
Boone Indicator	56	18,169	-43.75338	6.227805	-65.3	-34.9
Country-level data						
GDP growth	58	19,171	4.701537	4.856342	-14.81	26.4
Tertiary Education	50	14,016	39.78005	23.10554	0.49	86.12
FDI inflow	58	19,537	4.236736	4.626435	-3.871	37.411
Population (in millions)	58	19,537	37	50.7	0.62	178
Financial Freedom	58	19,537	51.17828	16.85754	10	90
Trade Freedom	58	19,537	71.29134	8.814274	50	88
Private Credit	50	19,172	33.08942	23.64967	0	103.32

Notes: The table reports summary statistics (number of countries, observations, mean, standard deviation, minimum, and maximum) for the variables included in the empirical analysis. Variables are defined in Table 9. The maximum number of countries is 58 for the firm level analysis.

During the sample period, the majority of firms are represented by domestically-owned small and medium size enterprises (SMEs), whereas foreign- and state-owned firms account on average for 11.8% and 5.6% of the sample, respectively.[13] Nearly half of the firms have already had access to banking products such as loan and overdraft facilities. The average firm in the sample exports nearly 8.69% of its total sales, whereas 343 firms are 100% outward-oriented at some point in time with all of their production being exported. The bank market power indicators are obtained from Clerides et al. (2015). In addition to Lerner Index, we also employ alternative indicators such as the Boone indicator and Adjusted Lerner Index. The level of bank market power is moderate across countries reaching its maximum value (46) in Kyrgyz Republic. We also control for macroeconomic factors that affect export decisions. In general, the countries in our sample are relatively less financially developed and more informationally opaque in comparison with high-income countries. The average share of private credit in GDP is 33.08%, while 75% of the firms in our sample operate in countries with private credit to GDP ratios below 43%.

We provide a detailed discussion on the variables that reflect macroeconomic, financial, demographic and institutional factors influencing exports in section 3. Based on the extant literature that investigates the heterogeneity among exporters and their financing decisions, we incorporate a series of firm-level variables such as firm size, ownership status and access to credit.

Overall, we expect large and foreign firms to participate more intensively in exporting. Large firms are technology-oriented, more productive and cost-efficient due to economies of scale (Bernard and Jensen, 2001). They typically face lower entry barriers in foreign markets (Das et.al, 2007) and are less financially constrained (Beck et.al, 2005). Foreign ownership, in turn, can facilitate export activity through knowledge and experience dissemination and more developed distribution network (Bernard and Jensen, 2004), while at the same time better access to international financial markets allows mitigating the credit constraints (Manova et al, 2014).

[13] It should be noted that single firms may expand or shrink or even change their ownership structure over time.

Furthermore, we anticipate that the export activity of domestic SMEs is relatively more sensitive to changes in external financing conditions (i.e. measured by loan and overdraft variables). In general, exporters are more vulnerable to credit constraints as activities in foreign markets involve additional entry and operating costs with access to finance defining export selection, exporters' behaviour and trade flows (Berman and Héricourt, 2010, Amiti and Weinstein, 2011, Manova, 2013). However, smaller-sized businesses are more reliant on bank-led financing as they do not generate sufficient liquidity from domestic sales, while alternative sources of funding are usually unavailable (Chaney, 2016). SMEs are commonly challenged by the range of obstacles in accessing bank products with the negative effects exacerbating in the underdeveloped countries (Beck et.al, 2005). Besides, the domestic ownership further worsens the financial constraints as "crowding out" effects may persist when foreign-owned firms attract more local bank funds due to their higher relative profitability and liquidity. Yet, these effects may only apply to private domestic firms as state-owned ones remain irresponsive to the credit constraints and presence of foreign firms (Harrison and McMillan, 2003).

Last, and in line with the information hypothesis, we argue that the impact of bank market power on export shares intensifies with increasing information asymmetry of the firm. The literature regards smaller-sized firms as more informationally opaque due to the lack of sufficient collateral, limited amount of hard information and deficiency of historical records on creditworthiness and firms' performance. Thereby, the creation of a long-term bank relation, and the concomitant soft information accumulation, is crucial in alleviating SMEs' credit constraints (Peterson and Rajan, 1995, Berger and Udell, 2002).

The estimated coefficients of equation (1.5) are reported in Table 11. All specifications are estimated with firm-fixed effects and robust standard errors clustered at the country level. In column (1), we introduce only firm-level variables. Contrary to our prior expectations, the baseline results signify that bank market power does not exert any statistically impact on firms' export

activity in developing countries. This effect remains unchanged after the inclusion of the country-level variables in column (2).

In line with the existing literature, we observe that larger firms have greater propensity to enter foreign markets and directly export a greater share of their production.[14] Furthermore, our findings emphasize the importance of financial inclusion in firms' export intensity. Specifically, the coefficients of loan (column 1 – 2) and overdraft variables (3 – 4) are positive and statistically significant. Notably, the access to overdraft facility exerts a highly significant (at the 1% level) impact on export shares indicating its efficiency as a means of firms' export financing. In contrast, we find no evidence that firms' ownership status (foreign vs. domestic or state vs. private) affects export intensity.

[14] We examine the heterogeneous effect of the firm size in greater detail in Table 14.

Table 11: Direct exports and bank market power (Lerner Index)

	1	2	3	4
Lerner Index	0.037	-0.205	0.028	-0.117
	(0.063)	(0.298)	(0.056)	(0.237)
Size	1.433*	1.545**	1.458*	1.546***
	(0.796)	(0.577)	(0.804)	(0.551)
Foreign	0.546	-0.209	0.104	-0.987
	(1.842)	(2.336)	(1.894)	(2.342)
State	-2.045	-6.704	-4.783	-6.624
	(4.141)	(6.682)	(4.056)	(6.599)
Loan	1.339	1.934**		
	(0.961)	(0.867)		
Overdraft			1.684***	1.117***
			(0.630)	(0.379)
GDP growth		2.047		1.298
		(1.822)		(1.538)
Population		0.000		0.000
		(0.000)		(0.000)
FDI inflow		0.038		0.233
		(0.563)		(0.511)
Private Credit		0.212		0.150
		(0.243)		(0.205)
Tertiary Education		-0.589		-0.399
		(0.533)		(0.457)
Financial Freedom		1.072		0.662
		(1.063)		(0.895)
Trade Freedom		0.422		0.252
		(0.467)		(0.393)
Constant	3.914**	-241.121	4.481**	-145.310
	(1.768)	(247.985)	(1.715)	(210.851)
Observations	12,474	8,608	11,441	8,350
Countries	56	43	56	46
F-statistic	1.789089	165.268	2.185776	20.69509
p-value	0.144	0.000	0.083	0.000

Notes: The table reports estimated coefficients and standard errors (in brackets). Dependent variable is the share of direct exports of firm's sales. All regressions are estimated with firm-fixed effects and robust standard errors clustered at the country level. The ***, **, and * marks denote statistical significance at the 1%, 5%, and 10 % level, respectively.

Country-level variables are also statistically insignificant (columns 2 and 4). The absence of a significant relation between private credit and firms' exports merits attention. The empirical literature often uses this variable to gauge the level of a country's financial development (Beck, 2002; Manova, 2013). Following Chauvet and Jacolin (2017), we argue that the previously identified positive impact of firms' accessibility to credit on their export activity, along with the statistically insignificant coefficient of private credit, suggests that what matters for firms' exports is the distribution of credit across firms rather than the financial development at the country level *per se*.[15] In developing economies, these two are not necessarily linked in practice.

In the next stage of our analysis, we use alternative indicators of bank market power to examine the validity of our results. Specifically, we re-estimate equation (1.5) with the lagged adjusted Lerner Index and the lagged Boone indicator. The results reported in Table 12 remain qualitatively the same throughout all specifications and suggest that export decisions of firms are not influenced by the bank market structure in the country.

[15] For instance, Rioja and Valev (2004) show that the positive effect of the financial development on economic outcomes can be reached in financially advanced countries, while for financially undersized economies such impact is ambiguous. Henderson et al. (2013) also suggest that financial development favors developed countries, while no significant effect is detected for low-income economies. In turn, Demetriades and Law (2006) argue that these outcomes are primarily associated with poor functioning institutions in developing economies.

Table 12: Direct exports and bank market power (Adjusted Lerner Index and Boone Indicator)

	1	2	3	4	5	6	7	8
Adjusted Lerner Index	0.070	-0.070	0.060	-0.007				
	(0.109)	(0.308)	(0.101)	(0.219)				
Boone Indicator					-0.115	0.111	-0.109	0.286
					(0.108)	(0.645)	(0.119)	(0.584)
Size	1.370	1.525***	1.401	1.526***	1.489*	1.494***	1.500*	1.475***
	(0.837)	(0.560)	(0.843)	(0.536)	(0.756)	(0.537)	(0.769)	(0.507)
Foreign	0.566	-0.047	0.124	-0.893	0.603	0.018	0.175	-0.845
	(1.841)	(2.375)	(1.893)	(2.367)	(1.861)	(2.365)	(1.920)	(2.307)
State	-1.986	-6.486	-4.714	-6.453	-1.861	-6.372	-4.595	-6.402
	(4.126)	(6.579)	(4.039)	(6.511)	(4.186)	(6.463)	(4.106)	(6.393)
Loan	1.333	1.964**			1.401	1.931**		
	(0.956)	(0.866)			(0.955)	(0.717)		
Overdraft			1.646***	1.161***			1.729***	1.158***
			(0.609)	(0.384)			(0.635)	(0.397)
GDP growth		1.666		1.038		1.650		1.173
		(1.596)		(1.301)		(1.524)		(1.209)
Population		0.000		0.000		0.000		0.000
		(0.000)		(0.000)		(0.000)		(0.000)
FDI inflow		0.058		0.233		0.007		0.172
		(0.605)		(0.527)		(0.566)		(0.459)
Private credit		0.077		0.084		-0.018		-0.220
		(0.161)		(0.130)		(0.786)		(0.711)
Tertiary education		-0.524		-0.368		-0.424		-0.064
		(0.518)		(0.424)		(0.984)		(0.868)
Financial Freedom		0.804		0.476		0.728		0.431
		(0.883)		(0.719)		(0.795)		(0.642)
Trade Freedom		0.316		0.169		0.270		0.157
		(0.439)		(0.354)		(0.344)		(0.285)
Constant	3.495*	-183.866	4.035*	-106.031	9.914**	-184.309	9.945*	-134.217
	(2.067)	(207.917)	(2.078)	(170.931)	(4.885)	(201.672)	(5.281)	(162.314)
Observations	12,474	8,608	11,441	8,350	12,474	8,608	11,441	8,350
Countries	56	43	56	46	56	43	56	46
F-statistic	2.127491	108.1436	2.200986	16.03699	1.40068	22.98557	2.16908	5.74734
p-value	0.089	0.000	0.081	0.000	0.245	0.000	0.084	0.000

Notes: The table reports estimated coefficients and standard errors (in brackets). Dependent variable is the share of direct exports of firm's sales. All regressions are estimated with firm-fixed effects and robust standard errors clustered at the country level. The ***, **, and * marks denote statistical significance at the 1%, 5%, and 10 % level, respectively.

In our final exercise, we provide a more detailed analysis by accounting for firm-heterogeneity in terms of size and ownership, while also controlling for country-level variables. In columns 1 – 3 of Table 13, we split our sample into small, medium and large firms and re-run equation (1.5). The results indicate that bank market power does not affect the export intensity of firms, regardless of their size. At the same time, however, we observe that external financing (loans) encourages export activity especially for small-sized enterprises as evidenced by the highly significant (at the 5% level) positive coefficient. The results also indicate that foreign firms (medium- and especially large-sized ones) exhibit a more intense export activity. Last, in columns (4) and (5) of Table 13, we separate the sample in accordance with the firms' ownership status (foreign vs. domestic). Again, we observe that larger enterprises export a greater share of their production, irrespective of their ownership structure. However, the magnitude of this effect is more prominent for foreign-owned enterprises.

Table 13: Direct exports and bank market power and direct exports according to firm characteristics

	1	2	3		4	5
	small	medium	large		foreign	domestic
Lerner Index	-0.042	-0.026	-0.700	Lerner Index	-0.549	-0.194
	(0.070)	(0.364)	(0.918)		(1.131)	(0.235)
Foreign	-5.400	1.862*	6.501**	Size	5.858**	1.031**
	(4.395)	(0.954)	(2.851)		(2.233)	(0.418)
State	-16.789	-2.628	4.594	State	0.538	0.035
	(13.970)	(6.697)	(8.041)		(6.159)	(5.167)
Loan	2.056**	2.023*	5.189*	Loan	6.347*	1.230*
	(0.768)	(1.167)	(2.789)		(3.529)	(0.722)
Constant	-22.305	-309.298	-1203.428	Constant	-613.983	-234.454
	(51.485)	(271.971)	(782.077)		(742.174)	(192.156)
Country-level controls	yes	yes	yes		yes	yes
Observations	3,710	3,105	1,791		1,043	7,565
F-statistic	11.00009	7.139851	19.83022		2.366003	17.0459
p-value	0.000	0.000	0.000		0.025	0.000

Notes: The table reports estimated coefficients and standard errors (in brackets) only for the bank market power variable and firm-level controls. Coefficients and standard errors of country-level controls are omitted for brevity. Dependent variable is the share of direct exports of firm's sales. All regressions are estimated with firm-fixed effects and robust standard errors clustered at the country level. Firms are classified according to their size (in terms of number of employees) and ownership (foreign vs. domestic-owned firms). The ***, **, and * marks denote statistical significance at the 1%, 5%, and 10 % level, respectively.

To sum up, the results obtained in this subsection suggest that bank market power does not affect the activity of exporters in developing countries. Thereby, we support our country-level findings which suggest that economic development is a prerequisite for the real effects of bank market power to be sizable and persistent.

1.6 Concluding remarks

Inspired by the literature which acknowledges that exporting entails special financial needs and higher information asymmetries between exporters and their lenders, we first examine the impact of bank market power on aggregate exports. To this end, we employ the Lerner index as an indicator of bank market power and conduct a series of panel regressions with country- and time-fixed effects for a world sample over the period 1997–2010. Our baseline estimations show a positive relation between market power in banking and exports. Yet, this effect is primarily driven by high-income countries. Therefore, economic development seems to be a necessary condition for the real effects of bank market power to become visible. Next, we document that this export-enhancing effect is more potent in the presence of comparatively higher information asymmetries. Therefore, we provide support for the theoretical propositions of Petersen and Rajan (1995), Marquez (2002), Boot and Thakor (2000) and Caminal and Matutes (2002) which state that banks with market power can mitigate the negative effects of information asymmetries and positively affect their borrowers' performance.

Considering that our country-level results do not detect a significant relationship between bank market power and exports for middle- and low-income countries, we further explore this issue from a micro-level perspective. By employing firm-level data for a sample of 9,676 exporters in 58 developing countries, we find that in line with the country-level analysis, bank market structure does not influence firms' export activity. This finding may be relevant for policymakers in developing countries where institutional deficiencies impede the adoption of reforms and practices, which increase bank efficiency and promote relationship lending schemes.

Our findings qualify the view that the banking sector is special and the adoption of pro-competitive policies may have detrimental effects on the real economy. Instead, some degree of bank market power is likely to promote real outcomes especially in informationally opaque environments. Policy interventions should, therefore, not only reduce the bottlenecks that prevent smaller exporters from using banking services but also promote the supply of relationship lending as a means to mitigate information asymmetries in the export market.

In light of our findings, it would be interesting to examine the concomitant effects of the consolidation of the banking industry on credit supply and exports. The theory predicts that as banks grow larger and become more organisationally complex through consolidation, they tend to be less keen to make relationship loans (Berger and Udell, 2002). Clearly, additional research is needed on this front, particularly for advanced economies, where substantial bank consolidation is most likely to occur. We leave this issue for future research.

Chapter II: Piecemeal trade reforms and tax administration costs.

2.1 Introduction

Although, the benefits of free trade, such as efficient resource allocation, improved competitiveness, product diversification, and knowledge spillover effect are well-defined in trade literature (Krugman et al., 2002), developing economies have a history of protecting domestic industries by imposing high trade barriers (Ebrill et al., 1999). As the formalization of the second best theory in 1956 inspired an expanding stand of theoretical literature, welfare-enhancing mechanisms were identified in the presence of multiple price distortions (Foster and Sonnenschein, 1970; Bruno, 1972), and elimination of extreme tariff distortions (Hatta 1977 a, b; Bertrand and Vanek, 1971; Dixit, 1975; Fukushima, 1979). Guided by these principles, World Bank and IMF have been actively promoting the movement towards trade liberalization as a part of their structural adjustment loans and stabilization policies aiming on fostering economic growth in developing countries (Zee, 1996; Datta-Mitra, 1997). Starting in 1980s, the common practice included the replacement of quota restrictions with tariffs[16] and, at the next phases, implementation of tariff-reducing reforms[17] (Rajaram, 1992). During the period from 1979-1994, 171 sectoral or structural adjustment loans in 75 countries incorporated trade tax conditionality out of 250 operations in 86 countries of the World Bank[18] (Datta-Mitra, 1997).

[16] Anderson (2002), for instance, shows that the tariffication can be a welfare-enhancing reform if the increase in rent-retaining tariffs (i.e. tariffs levied to convert quotas) induced by the reform, is countervailed with the reduction of other tariffs such that revenue remains constant. In general, he concludes that the reform should be implemented if condition stating that MCF (marginal cost of funds) of tariff or quota amendments exceeds the MCF of the replacement taxes holds.

[17] Methods employed for tariff reduction included: radial tariff reduction, equiproportional cut of tariffs that exceed specified level, concertina method of reducing the highest tariff to the level of the second highest (Rajaram, 1992)

[18] Since 1992 most reforms tended to be piecemeal that involved reduction in trade taxes by a small margin.

The implementation of trade reforms has been a challenging process in developing economies, due to fiscal inefficiencies[19] including high reliance on trade tax revenues. Indeed, the share of trade tax revenues in total tax revenues was astonishing 29.6% and 26.5% in non-OECD countries during the period from 1975-1979 and 1985-1989, whereas OECD countries succeeded in collecting tax revenues primarily from consumption and income taxes with corresponding trade taxes revenues accounting only for 4.2% and 2.2% (Zee, 1996). As Keen and Ligthart (2002) demonstrated, the cut in tariffs undoubtedly generate revenue losses requiring complementary measures to sustain the fiscal balance. Nevertheless, the early trade reforms were lacking comprehensiveness and tended to neglect the compensatory tax reforms[20]. The study of Rajaram (1992) emphasized that even though reform design in few countries included the offsetting specification of the indirect taxes, the enforcement and management of it was inadequate. In the theoretical literature, Michael et al. (1993) pioneered this array of studies by incorporating the government budget constraint in the standard model of trade reform. They derived the sufficient conditions for welfare-enhancing tariff reforms[21] and pointed that compensating increase in consumption taxes following reduction in tariffs is efficient instrument in keeping tax revenues unchanged. Furthermore, these arguments allowed for identification of both welfare- and revenue - increasing implications of consumer price neutral reforms of tariffs (Hatzipanayotou et al., 1994; Keen and Ligthart, 2002), while standard recommendations for developing countries incorporated rise in consumption taxes and adoption of value added tax (VAT) as means for diversifying tax structure and compensating fiscal imbalances[22] (Datta-Mitra, 1997).

[19] The share of tax revenues in GDP was 32.9% and 36.6% in OECD countries in the period 1975-1979 and 1985-1989, while corresponding numbers for non-OECD countries amounted to 16.2% and 16.1% (Zee, 1996).

[20] The study of the World Bank find that in only 8 countries out of 18 offsetting tax reforms were implemented concurrently with trade reform, while in the 10 countries such requirement was ignored (Datta-Mitra, 1997).

[21] The reform types under consideration included: radial reform, moving of tariffs or consumptions taxes towards uniformity

[22] Nevertheless, Emran and Stiglitz (2005) reveal that such indirect tax reforms may even lead to negative implications for economy in case of large informal sector that escapes the VAT base and, consequently, remains untaxed, despite the broadening of the tax base in the post-reform period.

In practice, however, the empirical evidence suggests that the success in adoption of such reforms is not ubiquitous. For instance, Baunsgaard and Keen (2010) verify that only six low-income countries out of thirty seven analyzed cases over the short-run were successful in partially recovering revenue losses associated with the reduction in tariffs, while in case of the long-run, only in ten countries signs of recovery were detected[23]. The extensive study of Keen and Lockwood (2010) covering 143 developing and advanced nations also emphasize that revenue improvement resulting from VAT adoption is conditional on country individual characteristics such as level of trade openness and development. Recent figures of the trade taxes as a percentage of total revenues that are captured for a sample of selected developing countries in the Table 14, also suggest that only some countries could significantly reduce the reliance on trade taxes as a primary source of revenues, while in other countries the corresponding share remains prevalent[24].

Their results are particularly relevant to developing economies, where extent of informal sector may reach up to 40% (Scheider et al, 2010).

[23] However, the presence of VAT appeared not to have any significant impact on it.

[24] In the sample of 21 countries, only 9 countries could significantly reduce the share of trade tax revenues in total revenues throughout the period, while in the rest 12 countries the improvement is either too small or nonexistent.

Table 14: Trade taxes as a percentage of revenues in selected developing countries

	Trade taxes as a percentage of revenues							
	1995	2000	2005	2010	2011	2012	2013	2014
Bangladesh	n.a.	n.a.	32.39	24.30	24.56	23.42	20.57	20.45
Botswana	12.94	15.36	n.a	n.a	19.50	21.95	34.19	26.95
Benin	n.a.	n.a.	21.59	22.01	19.66	23.37	24.20	n.a.
Cote d'Ivoire	58.33	n.a.	43.96	42.37	40.96	39.18	39.83	41.16
Dominica	n.a.	37.00	42.74	18.65	18.01	16.83	14.78	14.92
Dominican Republic	36.38	42.43	22.95	8.18	7.23	6.63	5.97	5.99
Ethiopia	27.23	n.a.	33.86	29.09	29.66	38.31	33.19	n.a.
Grenada	n.a.	45.56	40.53	26.02	25.62	27.26	26.70	23.81
Jamaica	27.15	24.68	24.63	30.43	30.68	31.17	29.21	31.48
Lebanon	n.a.	25.56	7.02	6.94	5.90	6.02	6.24	5.29
Liberia	n.a.	n.a.	36.64	32.11	29.64	33.10	30.01	n.a.
Mauritius	33.97	27.47	19.60	2.18	2.09	1.85	1.64	1.36
Namibia	28.37	35.04	29.77	25.57	23.86	36.31	34.77	36.27
Nepal	25.95	23.50	19.04	16.29	14.46	15.22	17.20	16.80
Philippines	28.95	18.33	17.52	21.46	19.50	18.98	17.80	19.37
Sierra Leone	38.65	29.39	23.50	15.86	13.01	9.45	9.50	8.95
Sri Lanka	16.79	11.08	13.67	15.67	16.64	20.31	16.63	16.72
St. Kitts and Nevis	n.a.	35.74	41.00	16.43	16.28	16.25	16.78	15.50
St. Lucia	n.a.	47.38	52.95	44.92	45.75	39.23	24.93	25.54
St. Vincent and the Grenadines	41.86	37.89	40.83	16.43	16.28	16.25	16.78	15.50
Togo	n.a.	n.a.	21.69	18.84	18.32	19.08	18.34	n.a.

Data source: World Bank, World Development Indicators

Notably, Lebanon and Mauritius reached the fruitful outcomes as a result of coherent and well-structured tax and tariff reforms. The share of trade tax revenues in total revenues considerably dropped from 19.6% to 2.18% in Mauritius in the post-2005 period owing to the reform package[25] introduced in 2006 that not only improved the tax system and compliance, but also boosted the economic development in the country by attracting new businesses and FDI leading to growth in amount of registered companies and expansion of the

[25] Fiscal reforms introduced by Mauritius in 2006 included adjustment of VAT threshold to broaden the tax base; abolition of numerous official agencies through introduction of a single tax revenue body; reduction of import tariffs; reduction of income taxes and adoption of single flat rat personal and corporate income taxes; the simplification of tax system through removal of taxes on capital gains, elimination of some tax reliefs and exemptions, unification of various tax allowances, deductions etc. into income exemption threshold. The harmonized enforcement of these reform instruments allowed for simplification of tax system that considerably eased tax administration and made it more transparent (IMF, 2008).

service sector (IMF, 2008). The five-year fiscal adjustment plan[26], which was designed in year 1999 and strongly backed by Lebanese government, helped to develop more sound fiscal policy and achieve restructuring in tax revenues with the reduction in the share of the trade tax revenues from 25.56% in the year 2000 to 7.02% in 2005. Several countries of the Caribbean region also managed to lessen[27] their dependence on the trade-based taxes in the post-2005 period as a result of comprehensive reforms of the tax system and its administration. The Dominican Republic was amongst earliest in the region to efficiently adjust the tax structure. The main aspects of the tax and trade reforms in the country included the cut in the highest tariff rate with reduction in the number of tariffs, increase in the VAT rate, implementation of flat tax on fuel, fiscal amnesty for individuals and enterprises, modification of progressive income tax system and initiation of the simplified tax estimation tool (OECD, 2004). The reforms introduced in Dominica, Grenada, St. Kitts and Nevis, St. Lucia, and St. Vincent and Grenadines aimed on adoption of VAT with concurrent modernization of tax system, simplification of personal income tax compliance procedure, strengthening of tax legislation, adjustment of tax incentives to reasonable level, reduction of the high price distortions and significant restructuring of tax administration (Schlotterbeck, 2017). Yet, the enforcement of these reforms did not guarantee that the revenue mobilization will be achieved. For instance, in Jamaica that also took part in the implementation of reforms as a member of the Caribbean Community, the reliance on trade taxes is still concerning as the percentage of trade tax revenues ranges from 24.63% to 31.48% throughout the observation period. Regarding other regions, Ethiopia also fell short of meeting the initial targets settled by the 2002's comprehensive tax reform. Despite the lack of adequate administrative resources, Ethiopia hurried to adopt VAT that consequently provoked additional inefficiencies in tax system such as poor compliance, increased costs of tax collection and mismanagement during registration, inspection and record-keeping processes (Gashaw, 2015).

[26] Some of the main point of the fiscal adjustment plan included the adoption of VAT and global income tax, adjustment of income and property taxes and improvement in tax administration (Lucke et.al., 2007).

[27] Even though the share of trade tax revenues in total revenues are still relatively large during the period from 2010-2014 (i.e. for instance the corresponding figure for OECD countries is less than 1% on average), it was more than double the size in the years 1995, 2000, 2005.

Why developing economies remain reliant on trade taxes, while the implementation of fiscal reforms is successful only in some countries? Policymakers and academics has long identified that the administrative feasibility in managing more complex tax systems determines the success of liberalization process. The transition towards more differentiated tax structure demands compatible administrative infrastructure, while the trade-off between administrative costs and distortionary costs defines whether such changes are desirable. Differentiated tax structure requires more administrative resources, but the distortionary costs are minimized, while more primitive tax structures (such as uniform tariff rate) are associated with greater distortions, but incur less administrative costs as they are collected on the borders (Munk, 2008). The developing economies are more susceptible to tax administration issues due to a range of specific characteristics that they commonly share. For instance, relatively inadequate supply of skilled labour affects the cost-efficiency of tax administration as additional training has to be provided at the expense of tax authority, while relative wages of educated labour to unskilled tends to be higher than in developed countries. Competent human input is required during gathering, processing, monitoring, assessing and auditing the information about taxpayers (Newbery, 1988). The computerization facilitates these work processes as it allows for integration of management information systems, building databases and improving accessibility to third-party information (Datta-Mitra, 1997). However, the developing economies still struggle with update, maintenance and effective functioning of such products (Umar and Tusubira, 2017). The improvement of tax administration is essentially complex task in developing countries as it also requires development of financial and legal environment and political commitment. The growth of financial sector boosts cost-efficiency of tax administration through provision of services for tax collection or refund, while also enabling monitoring and documenting transactions (Gordon and Li, 2009). The effective legal system should eradicate complex and confusing tax laws and maintain well-defined and comprehensively written prosecution procedures that reinforces compliance and simplifies the tax administration (Datta-Mitra, 1997). At last, the stability and commitment of

political system helps to build trust into tax authorities, but also tackle widespread corruption and bribery (Umar and Tusubira, 2017).

Even though more than three decades passed since the World Bank recognized that strengthening of tax administration is a prerequisite for development of a tax system[28] (Datta-Mitra, 1997), the theoretical literature exploring the aftermaths of piecemeal reforms in the presence of cost of administration still remains almost unexplored. The only known contribution in this field is done by Emran (2005), who integrates the costs of administration in the model of export tax reform by assuming that the collection of all taxes (export taxes and producer taxes) generates costs of administration. Thereby, we are motivated to address the gap in the theoretical literature and develop theoretical foundation for devising the coordinated tariff-tax reform with the costs of tax administration. We extend the work of Emran (2005) to the cases of radial and selective consumer-price-neutral reforms and radial producer-price-neutral reform. But we also argue that the cost of administration should be considered only in the collection of consumption or production taxes, since developing economies are relatively efficient in collection of border taxes that is also verified by their continuant reliance on trade taxes and failure to adjust towards more diversified tax system. Thus, this analysis is particularly relevant for developing economies. Building on a standard model of small open economy, we introduce the tax administration costs that reduce the revenues from consumption or production taxes and derive sufficient conditions for welfare-enhancing and revenue-increasing piecemeal reforms. Our findings emphasize that the well-established welfare and revenue gains resulting from consumer-neutral and producer-neutral trade and tax reforms are inconsistent in the presence of administration costs. Specifically, cost-efficiency of tax administration defines the effectiveness of such reforms, as sufficiently high administrative costs (such that threshold conditions are not satisfied) result in negative implications for economy. Therefore, our study suggests that the tax administration issues should be addressed prior to design and implementation of any fiscal reform in the developing economies. In the case of infeasibility to

[28] Since 1987, some of early structural and sectoral adjustment loans included the conditionality of tax administration reform. Yet, the recommendations were rather general and imprecise.

comply with the demands of proposed tax structure, the tax administration may need to educate the personnel, hire foreign experts, develop new technology, improve enforcement and etc., and, thereby, induce additional costs that may reach some critical and unsustainable level and adversely affect welfare and revenues. As follows, policymakers should continuously attempt to analyze and improve the cost-efficiency of tax authorities and its propensity to administer complex tax systems. Moreover, they should always account for the additional burden on tax administration resulting from the planned implementation of any trade and tax reforms.

The rest of the paper is structured as follows. Section 2.2 provides a review of theoretical literature on evolvement of trade and fiscal reforms. In the next section 2.3, we set up the model for the standard economy. Section 2.4 involves the analysis of the consumer-price- neutral reforms. Then, we extend the model to the case of radial producer-price-neutral reform in the Section 2.5. Lastly, section 2.6 concludes the chapter.

2.2 Literature review

2.2.1. The theory of the second best and early theoretical foundations

The theory of the second best that was firstly formalized by Lipsey and Lancaster (1956) has a prominent impact in the understanding of the trade policies. It maintains that in the presence of multiple distortions in an economy, reforms aimed on abatement in a distortion and failing to achieve the full optimum may result in a welfare reduction. Thereby, the solution for the general problem requires identifying of optimum conditions for certain set of distortions, while keeping others unchanged. They illustrate the exemplary problem for the second best theory in the case of tariff distortions[29] and derive various implications on the economy's welfare resulting from the marginal tariff imposition on the previously untaxed imported good. At this point, it is worth to mention the antecedent work of Corlett and Hague (1954). In their theoretical proposition, the welfare improvement can be achieved by applying the system of

[29] The model is designed for a three goods economy, where two goods are imported, while the domestically produced one is exempted from any taxation. The fixed amount of revenues collected from taxation is distributed to consumers in a form of gift. Fixed tariff is levied on one of the imported goods, while the other is initially duty-free good.

indirect taxes[30]. Government reduces the income tax and countervail the tax revenue losses, by levying the ad valorem tax on one of the goods[31]. The move to a system with indirect taxation is justified by the capability to indirectly extract taxes even from leisure by taxing the complementary goods. Thereby, there is no discrimination in taxation. Nevertheless, consumers also work harder and share of income tax in total income is decreasing due to the introduced constraint capturing the constant tax payment[32].

The theory of the second best emphasize that the formulation of the piecemeal policies is complicated. Nonetheless, scholars have attempted to derive sufficient conditions for welfare improvement. Foster and Sonnenschein (1970) and Bruno (1972) examine the impact of the uniform changes across all distortions on welfare. Foster and Sonnenschein (1970) introduce a set of distortions to an n-commodity model, where equilibria are associated with a difference between marginal rates of transformation and individual consumer's marginal rates of substitution. By assuming the constant costs of production and absence of inferior goods, they derive that welfare increases resulting from a radial reductions in distortions, since a unique equilibrium is characterized by a vector of distortions. However, multiple equilibria arise, when the assumption on constant production costs is relaxed and economy's production possibilities frontier is strictly concave. They define three adjustment mechanisms to equilibria[33] that determine the welfare implications and confirm the previously

[30] The representative consumer spends all his after-tax income on three goods in an economy, X, Y and leisure.

[31] The recent work of Haibara (2012) complements that any combination of consumption-neutral reforms involving decrease in income taxes accompanied with rise in consumption taxes yields not only welfare improvement, but also potentially assures pubic revenue growth once the income effect exceeds the substitution effect on the taxed commodities.

[32] Lipsey and Lancaster (1956) further develop the discussion and argue that as variation is allowed the sufficient condition for the welfare maximum, and hence for welfare improvement, is no longer valid. They introduce the scenario, where two individuals in an economy have different preferences. The first individual perceives the good X as being more complementary to leisure and good Y as a substitute, while the other one considers the good Y as a complement and good X as a substitute. Thereby, in order to increase the tax revenues, it is necessary for a second best optimum to charge different relative prices from individuals. The good X should be taxed at a higher rate and good Y at lower tax rate for the first individual, while opposite should face the second individual while purchasing these goods. However, in a case of the non-discriminatory tax system and constant revenues, welfare is reduced, while both individuals are worse off, since they move towards lower indifference curve.

[33] Three adjustment mechanisms includes: 1) Government interference, where excise tax levy leads to adjustment of the lump-sum transfers to consumer, such that equilibrium consumption is achieved, while consumer reaches greater utility; 2) Flexible adjustment in wage. The labour as

reached outcome. Inspired by Foster and Sonnenschein (1970), Bruno (1972) outlines that the welfare improvement can be achieved through the adjustment processes involving the reduction in price distortions, and further strengthen the proposition by including in the model the consumer behaviour analysis and assuming the government transfer of surplus in a lump-sum manner, and reveals that the aggregate consumption increases as a result of the adjustment rule.

Hatta (1977a) and Bertrand and Vanek (1971) pursue a different approach and analyse separately the impacts of changes in each distortion. Bertrand and Vanek (1971) seek the solution for the second best problem in a case of economy with many goods, where distortions such as tariffs or subsidies cannot be eliminated or changed in non-discriminatory manner. They assume that tariff revenues are returned and distributed among consumers, and that there is one good with an extreme distortion (i.e. highest or lowest rate of tariff), which is altered by government, while all other tariffs are hold unchanged. As follows, they define that the elimination of such extreme distortions, by either reducing the tariff in case it is the highest one, or increasing the tariff rate if it is the lowest, is sufficient for welfare improvement and attainment of the second best solution in a multi-commodity setting with an absence of complementarity. Hatta (1977a) reaches a somewhat similar conclusion and derives that the utility level increases as long as the reduction (increase) in the highest (lowest) tariff reaches the next highest (lowest) tariff rate. However, there are notable differences in model derivation. Hatta (1977a) employs a dual formulation with regard to compensated demand functions and posits a strong assumption of constant cost of technology in production[34]. In his forthcoming work, Hatta (1977b) relaxes this assumption and generalizes the theoretical proposition. He alters the assumption on production side that is described by well-behaved

a factor of production and budget constraint of consumers are introduced to the model. The full employment is achieved through a process of wage and price adjustments: as unemployment occur, the wages start to decline inducing fall in prices that further facilitates demand and consumer's budget plane shifts towards equilibrium. Thereby, they show that the radial increase in distortion results in reduction in utility; 3) Flexible prices adjustment mechanism, illustrating that in a two-commodity economy the instability of equilibrium arise in a case, where the distortion kept at the same level, while producer prices change leads to either move away from the equilibrium point or excess demand for a commodity. However, if the amount of commodities exceeds two, the stable equilibrium associated with welfare increase can be reached.

[34] Hatta (1977a) specifies that compensated demand function is a commodity bundle that minimizes the expenditure under specified price and reaches a given utility level.

production possibility frontier. The economy is small and open, there are no transaction costs in trade, but ad valorem tariff is levied on imported commodities. There are no domestic distortions in price, so consumers and producers meet the same price. In addition, the tariff revenues are redistributed to consumers in a lump-sum fashion, all non-traded goods are in balance, while the balance of trade for traded goods is zero. Hatta (1977b) shows that the reduction of the highest tariff to the level of the next highest one increases the utility level of economy[35]. Both studies of Hatta (1977 a, b) were very influential for future work on policy formulation. He emphasizes the difficulties of the application of the second best theory for policy derivation, and argues that a more appropriate approach should involve direct examination of sufficient conditions for welfare improvement. Inspired by Hatta (1977 a, b), Dixit (1975) employs a dual approach in his study on the welfare implications of the changes in prices and taxes, while Fukushima (1979) extends the findings to a study with multiple commodities sharing the highest tariff rates. Dixit (1975)[36] derives a general proposition that welfare increases persist as long as this difference between the consumer price and the marginal costs of production is slightly diminished relative to the total distortion, while the tax revenues are compensated by the lump-sum taxes. By defining the different types of taxes and necessary assumptions, he reaches similar conclusion for the specific taxes and ad valorem taxes reduction. To extend the result for a case of trade taxes, he includes in a model an exogenously given international price, such that both consumers and producers face the price that is a sum of international price and tariff levied on imports. As goods become tradable, the composition of the cost of production also changes. The change in tariff is countervailed by the adjustment in lump sum taxes. As follows, he shows that the reduction in tariff increases welfare for an economy, where assumption on specialization is relaxed.

[35] Hatta (1977b) denotes matrix Z as a difference between the substitution matrices of compensated demand and supply functions and. Then, the components of Z are further employed for derivation of condition for welfare implication resulting from the tariff changes.

[36] Dixit (1975) models the (n+1) commodity economy, where the price of the numeraire is 1, and it is labelled as 0. The production side inhibits no distortions and the technology is convex with an exception that it can be fixed if it maintains the existence of equilibrium. The demand side is represented by a single consumer to secure absence of any distributional problems. The government collects taxes on commodities and lump-sum taxes with tax revenue being redistributed to consumers in a lump-sum manner.

Fukushima (1979) more closely follows Hatta (1977 a, b) in the model derivation, but extends it by allowing more than commodity to have the highest tariff. He formulates that the welfare improvement can be attained as a result of two different types of piecemeal policies, the policy involving the reduction of all extreme distortions in terms of the tariff levied, and the tariff unification with all tariffs being proportionally moved towards some specified rate. By integrating the assumptions of net substitutability and normality of goods as in Hatta (1977 a, b), it is derived that both types of piecemeal policies lead to a welfare increase and higher utility level. Michael and Hatzipanayotou (1995) extends the findings of Hatta (1977 a) and Fukushima (1979) by recognizing the influence of international mobility of factors on the welfare via its effects on domestic output and compensation to foreign labour. They determine that the welfare ultimately improves under policy instrument of changing tariffs proportionally towards specified number, while in case of reducing (increasing) the highest (lowest) tariff rate to the second-highest (second-lowest) the welfare gains achieved, if the good subject to the highest (lowest) tariff rate is the net substitute to the rest produced and traded goods, and if the all goods are substitutable by nontraded goods.

2.2.2. Tax revenues, policy formation and recent literature

The early literature provides prominent theoretical standpoint on the piecemeal reforms' effects on welfare improvement, however subject to some limitations. Most of aforementioned studies ignore the numeraire good in their analysis. Such exclusion can potentially lead to ambiguous outcomes in case of selective reforms amending the lowest tariffs (Neary, 1998). Another common critique that raised awareness is the failure to consider the impact of tariff reduction or elimination on government revenues. Conventionally assuming the lump-sum transfers of revenues to consumers and presence of only tariff distortions, the contribution of trade taxes in the government revenue structure is ignored, whereas in developing countries, such reliance inhibits the full trade liberalization process (Michael et al., 1993; Hatzipanayotou et al., 1994; Neary, 1998; Keen and Ligthart, 2002; Emran, 2005).

Michael et al. (1993) were amongst earliest, who recognized the concomitant effect of changes in tariff or commodity tax on government revenue. Drawing on a small open economy with multiple traded commodities that are subject to tariffs and consumption taxes, they introduce revenue constraint in the general equilibrium model. The government revenue is comprised of tariff and consumption taxes, and is distributed to consumers in a lump-sum manner. Thereby, any reforms involving adjustment in tariffs or taxes should be offset in order to keep the total tax revenues unchanged. As follows, sufficient conditions and assumptions of substitutability for welfare improvement are derived for different types of piecemeal reforms[37]. Hatzipanayotou et al. (1994) extend the model by incorporating into it the factors of production that are differentiated according to international mobility. They show that the government revenue can also be increased as a result of indirect tax reforms. Allowing for the presence of import tariffs and export subsidies for the majority of goods, such that the producers are subject to the net subsidy from the initial position, and keeping consumer prices unaffected, they derive that uniform decrease in tariffs combined with simultaneous rise in consumption taxes lead to a positive welfare effects as well as increase in government revenues. Keen and Ligthart (2002) generalized the theoretical standpoint of Hatzipanayotou et al. (1994), and derive that the reduction in any tariff, that induces the efficiency gains and growth in domestic output, lead to a welfare and revenue improvements as long as consumer prices held constant[38] through corresponding increase in consumption taxes[39]. For more intuitive interpretation, Keen and Ligthart (1999,

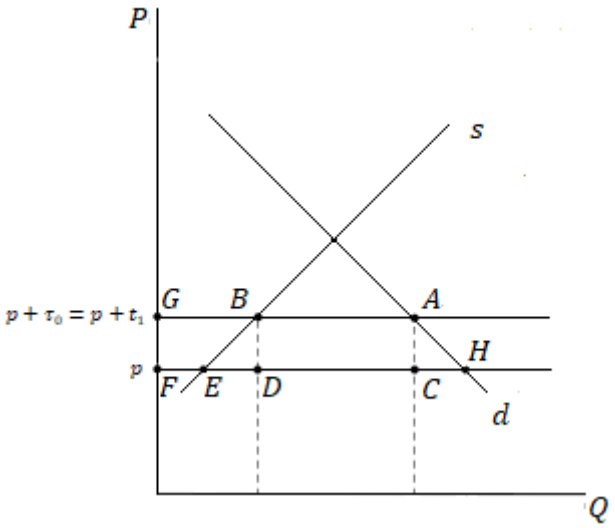
[37] Those include: i) reduction of tariffs with offsetting increase in consumption taxes, ii) decrease in the consumption tax of the highest taxed good to the second-highest with the respective rise in the consumption tax on the lowest taxed good with an aim to bring tax burdens towards uniformity, while iii) and the last scenario proposed is moving toward uniformity the tariff rates, involving the reduction in highest tariff of one good with compensating increase in the lowest tariff of the other good under absence of consumption taxes.

[38] It can be argued that only one neutrality condition (either on constant consumer prices, tax revenues or producer prices) incorporated into the model does not allow for variability in country characteristics. Hatzipanayotou et al. (2011) provide more comprehensive framework by distinguishing countries reliance on import or export taxes with the "neutrality" condition. Assuming that the tax revenues are used to finance the provision of public goods that are initially socially under-provided, they define sufficient conditions for welfare improvement and greater supply of public goods for each type of tax reforms.

[39] They also extend the model and propose a combined reform that accounts for the presence of export taxes or import subsidies, and show that welfare and revenue gains can be accomplished under sufficient conditions and composite policy instruments such as withdrawing export taxes/

2002) provide a simple analytical framework illustrating gains in revenues and welfare resulting from piecemeal reforms. The diagrammatical analyses are depicted for a partial equilibrium[40] on Figure 4 and for general equilibrium on Figure 5. For the both interpretations consider two-good economy, where only tariff τ_0 is levied on imported good, while consumption taxes are exempted. In a partial equilibrium model, the consumption initially takes place on point A, and production on point B, the difference is imported from overseas. Thereby, the government collects revenues corresponding to the rectangle area ABCD, the area EFGB is a producer surplus, but the deadweight loss to economy constitutes two triangles EBD and ACH. Assuming that government eliminates the tariff, but compensates it with the equivalent consumption tax, t_1, the consumption remains unchanged, and the production moves to the point E. The revenues are increased to the area ACFG, where the producer surplus EFGB is transferred to government, while the area EBD is gained due to better production efficiency.

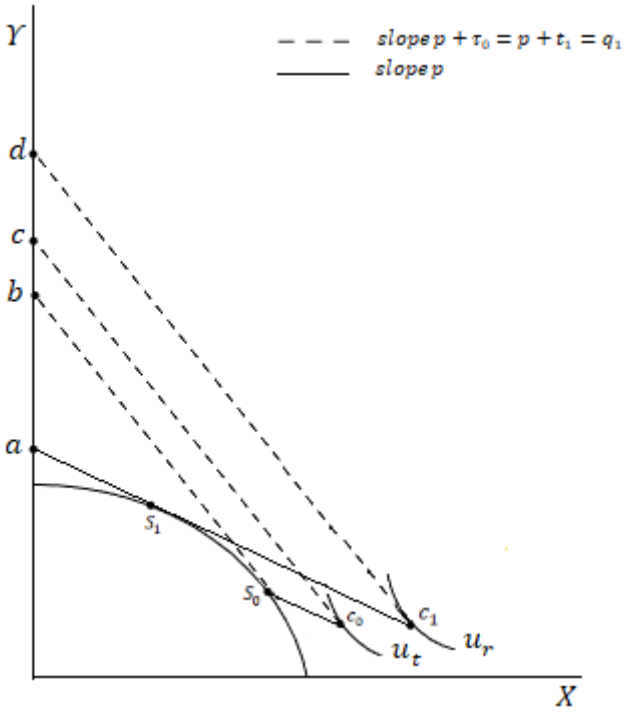
Figure 4: Coordinated Tax-Tariff Reform in Partial Equilibrium



import subsidies with offsetting increase in production tax, followed by reduction of the import tariff/ export subsidy with compensating rise in consumption tax.

[40] The diagram is available in Working Paper version of Keen and Ligthart (1999)

Figure 5: Coordinated Tax-tariff Reform in General Equilibrium



In interpretation of general equilibrium case, X is an imported good. The consumer and producer prices are equal to $p + \tau_0$, with the slope indicated by a dashed line. Initially, the consumption is at point C_0 and production at point S_0 on the production possibility frontier. As tariff is replaced by consumption tax t_1, while holding the consumer price q_1 constant, the new consumption reaches C_1, and production shifts to S_1, since the producer price become equivalent to world prices p. Consumers reach greater indifference curve, the welfare is improved with budget constraint moving outwards. The revenues that are measured in terms of the numeraire good Y are also increased[41] from the *cb* at initial position to *da* in the post-reform period.

Sustaining the tax revenues balance and achieving the positive welfare implications are critical in structuring piecemeal reforms. The theoretical literature furthermore extends the directions of trade policy formation by taking into account its effects on market access (Ju and Krishna, 2000; Anderson and

[41] From the $G = E(q, u) - R(p + \tau)$, where τ is an import tariff, the public revenues G are measured by subtracting the value of production at producer prices from value of consumption at consumer prices. Once reform is introduced τ is omitted, the output is produced at world price p, while consumer price q remains unchanged.

Neary, 2007; Kreickemeier and Raimondos- Møller, 2008; Anderson and Neary, 2015) and labour market (Kreickemeier, 2005; Falvey and Kreickemeier, 2007).

Ju and Krishna (2000) pioneered area of research on trade reform impact on market access[42] and show that welfare-enhancing tariff reforms, including proportional reduction of all tariffs and cut of the highest tariff to the next-highest one, do not guarantee greater imports, but also may lead to its reduction. Nonetheless, they derive a special type of tariff reform that ensures increase in market access. Anderson and Neary (2007) supplement the findings of Ju and Krishna (2000) by defining this reform type as a "Ju-Krishna rule" and showing that it does not require the assumption of substitutability among commodities. Moreover, they introduce the notion of the generalized moments of the tariff structure[43] and obtain conflicting results: the increase in the variance[44] leads to greater market access, yet, negatively affects the welfare in general. Krieckemeier and Raimondos-Moller (2008) adopts both approaches of Ju and Krishna (2000) and Anderson and Neary (2007) to define the implications of the coordinated tariff-tax reform on the market access, government revenues and welfare, and compare them with the aftermaths of tariff only reform. To begin with, they derive that the proportional decrease in tariff with offsetting increase in consumption tax may lead to lower imports, whereas the resulting gains in welfare do not exceed the corresponding improvements if tariff only reforms with unchanged consumer prices are applied. This outcome suggests that, in terms of welfare, decrease in lump-sum transfers to consumers originated from the tariff reductions is better than compensating the revenue losses by distortionary tax. Next, Krieckemeier and Raimondos-Moller (2008) modify the "Ju-Krishna rule" by extending it for tariff-tax reforms and show that the resulting increase in the market access is less under such amendments, compared to reforms of the tariff cuts only. Intuitively, the reduction in tariffs leads to greater consumption and decrease in production subsidy inducing greater imports, while offsetting the tariff with an increase in consumption tax

[42] Commonly measured by the value of imports
[43] More recently, Anderson and Neary (2015) employ the approach of generalized mean and variance, while devising conditions for the welfare-enhancing trade reform that incorporates the wage tax as offsetting instrument for reductions in tariffs to keep the revenues constant.
[44] That is higher dispersion of tariffs for a determined mean

eliminates the consumption effect, and import growth is induced only by the amendments in production subsidy. Both conclusions underline that sustaining government revenues through the coordinated tariff-tax reforms bears costs. The proportional reduction of tariff accompanied by point-by-point increase in consumption tax diminishes the positive effect on welfare, while in case of "Ju-Krishna rule" the benefits in market access are lower. Nevertheless, Krieckemeier and Raimondos-Moller (2008) succeeded in formation of "win-win-win" reform[45], but incorporate strong assumptions on substitutability of all commodities with the numeraire one in production. Drawing on Anderson and Neary (2007), they re-define the market access and welfare, first, in terms of ad valorem tariff, and then by incorporating the generalized mean and generalized variance of tariffs. As follows, they show that the increases in market access, welfare and government revenues are achieved, if the mean ad valorem tax is reduced and variance remains unchanged. Thereby, they ascertain that the reform involving the cut in tariff with corresponding rise in consumption tax that keeps the domestic prices of importables constant satisfies the specified condition and ensures plausible outcomes.

Supplementing the aforementioned discussion on trade policy implications, it is worth mentioning the employment effect of piecemeal reforms that draws prominent attention, especially in political domain. Kreickemeier (2005) examines the topic and allows for the presence of involuntary unemployment by incorporating the binding minimum wage into a standard model of small open economy. The introduction of such distortion to labour market suggests that the impact of piecemeal policy reform on welfare and employment will be directed by the labour-intensity of import-competing sectors. As follows, Kreickemeier (2005) shows that the reduction in the highest tariff of commodity may result in the welfare decrease, if the given commodity is labour intensive and is a net substitute to other goods. Intuitively, the tariff cut leads to greater volumes of trade as the price of importable decreases. However,

[45] Anderson and Neary (2015) also show that the greater welfare and market access can be achieved as a result of uniform absolute tariff reductions in proportion to domestic prices, but to assure the revenue gains the following condition must hold: the direct price effect captured by the inverse of MCF (marginal cost of funds) of tariff levied goods is less than the income sensitivity of revenue.

it induces fall in employment in import-competing sectors that are labour-intensive. Therefore, the resultant rise in aggregate unemployment exacerbates the welfare. On the other hand, tariff reduction for the non-labour-intensive commodity ensures not only conventional welfare improvement, but also additive gains from the rise in employment. Falvey and Kreickemeier (2009) provide a more comprehensive analysis of the piecemeal reforms impact in the presence of labour market distortions. They supplement the work of Kreickemeier (2005) by introducing the rigid real wage case, and extend the findings of Ju and Krishna (2000) and Anderson and Neary (2007) by investigating the implications for the market access. Building on Anderson and Neary (2007), they adopt the method of generalized moments of distortions and define generalized radial reforms that improve market access and welfare. However, the welfare-enhancing reform reduces both real and numeraire wage, whereas implications of market access increasing reforms on labour market are not clear-cut, and the real wages may either increase, decrease or kept unchanged. The latter type of special reform holding real wages constant can also be interpreted as a threshold distinguishing reforms that increase the real wage from those that decrease it.

2.2.3. Pitfalls in successful policy implementation

Despite the four decades of prominent research, the implementation of trade reforms and accompanying fiscal policies has not been as successful as predicted by academics. Although some countries managed to adjust their tax structure towards non-trade taxation, the problems of raising revenues are still persistent (Baunsgaard and Keen, 2010). The World Bank report on structural and sectoral adjustment lending specified that insufficient administrative resources, presence of large informal sectors, informational constraints, limited institutional quality and incompetence of tax officials result in ineffective enforcement of tariff reforms (Thirsk, 1991; Datta-Mitra, 1997).

Emran and Stiglitz (2005) argue that the effectiveness of piecemeal reforms is questionable without consideration of informal sector as a restrictive factor. Since informal sector escapes the tax base, any revenue-neutral reform using indirect taxes for compensating the reduction in trade taxes will

apparently fail to succeed. Building on this argument, which is particularly relevant for developing countries, Emran and Stiglitz (2005) examines the welfare implications of the selective revenue-neutral tariff-tax reform and the broadening of consumption tax[46] base with offsetting decrease in trade taxes in the presence of informal sector. By extending the standard model of tariff reform with incorporation of the formal and informal sectors in the economy, they derive sufficient conditions for welfare worsening resulting from the aforementioned indirect tax reforms. They show that attaining welfare improvement is hardly feasible, if the selection of commodities subject to VAT reform is limited by large informal sector. Keen (2008) points out that these results are restrictive, since Emran and Stiglitz (2005) assume that the VAT is collected on the final commodity only, whereas VAT allows for tax collection even from informal sectors, due to the purchases of inputs or importables from formal sector. Moreover, imposing the withholding tax on intermediate goods can further contribute to tax extraction from informal sector. Since both VAT and withholding tax are subject to refund or credit for compliant firms, only informal firms will be charged. Thereby, assuming that both formal and informal sectors produce identical nontraded output and employ imported input and fixed labour, Keen (2008) designs a simple analytical framework showing that if VAT and withholding taxes are optimally implemented, then the tariffs should be avoided as a distortion[47]. Although the results of Emran and Stiglitz (2005) and Keen (2008) are convincing and informative, both analyses do not consider the possibility of adjustments in the size of formal and informal sectors resulting from the amendments in tax regime and tax enforcement. Referring to these limitations, Boadway and Sato (2009) devise more general approach examining the optimal tax design conditional on the presence of informal sector and its size[48]. At first, the study derives the implications of tax regimes given that

[46] Emran and Stiglitz (2005) draw results employing VAT as type of consumption tax required for coordinated tariff-tax reform.

[47] However, the results of Keen (2008) are achieved provided that all intermediate goods are levied with VAT. Moreover, the model does not account for any administration and compliance costs associated with tax collection. Boadway and Sato (2009) also add that the assumption of non-tradable goods produced by informal sector does not allow deriving any implications resulting from tariff changes.

[48] In their model, government can pursue only one tax regime by imposing either VAT or trade tax that vary with the type of commodity. Both formal and informal sector produce tradable

producers cannot switch the sector. VAT regime enhances production efficiency in the formal sector and indirectly taxes the informal sector, while trade tax regime allows for taxation of sales and profits of both sectors. Thereby, the selection of the suitable tax regime is determined by the extent of the informal sector and individual targets of economy. Once the assumption on constant size of sectors is omitted, the producers will opt for a formal sector only if they can gain productivity advantage in the trade tax regime. In the VAT regime producers of exportables will tend to enter formal sector in order to exploit benefits from the input tax credit, while producers of importables will prefer to operate in informal sector for a profitability reasons. However, the relative size of sectors cannot be defined as the magnitude of these implications is ambiguous. At last, arguing that government can intervene and reduce the size of informal sector by intensifying tax enforcement, Boadway and Sato (2009) introduce costs associated with tax administration. Production in informal sector entails some costs that arise from the possibility of facing prosecution for tax evasion, while corruption of tax authorities may induce producers in the formal sector to pay some amount of money in order to ensure reporting of smaller amount of tax liabilities. More effective tax enforcement increases costs incurred from tax evasions and, simultaneously, combats illegal actions of tax authorities. Assuming for simplicity that the administrative effort does not impact the consumer's budget, even if it incurs additional expenses to government, Boadway and Sato (2009) diagrammatically illustrate that the size of formal sector is extending in tax enforcement under VAT regime with moderate administration costs. However, if these costs are too high, the trade tax regime is more appropriate.

The results of Boadway and Sato (2009) are particularly relevant for further discussion as they emphasize the importance of administration costs in formulation of tariff and tax reforms. In general, the administration costs are incurred by tax authorities from managing the tax collection system, and are associated with the maintenance and functioning of tax administration including

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commodities and can employ tradable intermediate inputs. Formal firms are granted with credit on input tax under a VAT regime that ensures indirect tax extraction from informal firms through the purchase of intermediate goods from VAT-compliant firms.

compensation of employees, acquisition and upkeep of assets, cost of utilities (Sandford et al., 1989). However, administration costs are not uniformly defined. For instance, it is not obvious whether costs of investigation of tax frauds or any other tax disputes should be added (Allers, 1994), thereby, individual researches may vary components of tax administration costs in accordance with data availability. The cost-efficiency of tax administration in raising revenues tends to be increasing with the improvement of human capital, computerization (OECD, 2017), and development of legal and financial environment (Gordon and Li, 2009). The incorporation of novel IT products and online services in a tax collection system help to build an integral platform that facilitates communication, simplifies registration and reporting for applicants and ensures better control and audit for tax officials. The technological advance yet demands skilled labour, so officials may introduce training and educational programs as a part of human resource management, but aggregate literacy level should be correspondent (OECD, 2017). Nevertheless, tax administration cannot be well-functioning unless the legal system assures coherent formulation of tax laws and harmonized enforcement. Tax officials should also be empowered to access required information about the taxpayers and investigate tax evasion cases. The financial development may also reduce the cost of tax administration by promoting banking services for tax collection and making transactions on bank accounts more transparent and observable (Gordon and Li, 2009). Obviously, all these factors characterize advanced economies that are relatively more efficient in tax administration. On the other hand, developing economies suffer from the lack of sufficient and quality resources, mismanagement of available resources, low level of governance and corruption that altogether leads to poor execution and functioning of tax administration (IMF, 2011). Such weak administrative capacity limits the extent of adoption of trade liberalization policies. Trade taxes require relatively less resources and are easier to manage, so developing economies tend to heavily rely on tariff revenues (Musgrave, 1969). VAT has been widely promoted for compensating losses associated with tariff reduction, improving production efficiency and modernization of tax administration. Although, nearly 165 countries[49] implemented some form of VAT, raising

[49] More detailed information is available in OECD issue of International VAT/GST Guidelines

revenues from it is still challenging task for authorities[50] (Keen and Lockwood, 2010). This problem is mainly attributable to developing economies where tax base is relatively narrow due to unsophisticated economic structure. Therefore, taxpayers can exploit their advantage and implement "aggressive tax planning" schemes to reduce payments of taxes (IMF, 2011). Moreover, VAT administration is more complex, because broader range of taxpayers are liable to VAT, additional resources are required for controlling credit given to eligible producers of intermediate goods, while differing tax rates further complicates the collection and compliance (Carnahan, 2015). Realizing the administrative limitations in developing economies, Emran (2005) designs a selective trade reform in the presence of administration costs. He considers the case of producer-price neutral reform that involves reduction of export taxes with concomitant increase in production taxes allowing for keeping producer prices and revenues unchanged. Drawing on a multi-commodity economy, he incorporates the costs of tax administration that diminishes the net transfers to consumers and is expressed as a part of the revenues, which are spend on collection of taxes and management of expenditures. Assuming absence of cross price substitution effects in consumption, Emran (2005) shows that both welfare and revenues increase if the administration costs satisfy threshold condition. The analysis becomes more complex as the substitutability among commodities is allowed. Plausible outcomes can be achieved conditional on assumptions of substitutability, indirect tax burden and administration costs[51].

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[50] The empirical estimates of Keen and Lockwood (2010) for 143 advanced and developing economies outline that VAT adoption increases revenues over long-run, but the effect varies with country characteristics. More open and higher income economies are more effective in achieving revenue gains from VAT, while the effect is negative for closed and poor economies.

[51] Emran (2005) derive sufficient conditions for the welfare improvement and increase in revenues for a scenario, where substitutability is allowed, but following must hold: the sum of indirect taxes (consumption and producer prices) on commodity subject to reform should be the lowest, the commodity is a weak substitute in consumption to compound commodity and administration costs is less than a specified threshold. Noting that the continuous reduction of the export tax may result in elimination of consumption subsidy, such that reform does not guarantee positive outcomes, he analyzes the case, where positive tax burden is applicable to all non-numeraire commodities. Thereby, in addition to conditions stated above, the commodity should also complement the numeraire good (untaxed exportable good). As the condition on complementarity is hardly feasible, Emran (2005) rules it out by incorporating more stringent assumptions on pair-wise substitutability and show that the welfare-enhancing and revenue-increasing reform is achievable.

2.3 Model

We built our analysis on the standard model of coordinated trade and tax reforms that have been extensively employed in theoretical literature. Consider a small, open and perfectly competitive economy that produces and consumes (N+1) internationally traded goods. The numeraire good 1 captures all untaxed and duty-free goods and is labelled as "0". By assuming that the country is small, we imply that any adjustment in the trade taxes and consumption or production taxes, resulting from the implementation of fiscal reforms, do not influence the world prices. The vector of commodity world prices of goods is $p^w \equiv [p_1^w, p_2^w, \dots, p_N^w]$, while the consumer and producer prices are affected by the specific trade taxes, $\tau \equiv [\tau_1, \tau_2, \dots, \tau_N]$ with $(\tau > 0)$ standing for import tariff and $(\tau < 0)$ capturing the export tax, consumption tax $\nu \equiv [\nu_1, \nu_2, \dots, \nu_N]$ and production tax $\pi \equiv [\pi_1, \pi_2, \dots, \pi_N]$[52]. Thereby, the vector of producer prices is given by: $p = p^w + \tau - \pi \equiv [p_1^w + \tau_1 - \pi_1, p_2^w + \tau_2 - \pi_2, \dots, p_N^w + \tau_N - \pi_N]$, and vector of consumer prices is $q = p^w + \tau + \nu \equiv [p_1^w + \tau_1 + \nu_1, p_2^w + \tau_2 + \nu_2, \dots, p_N^w + \tau_N + \nu_N]$.

The demand side of economy is described by the expenditure function $E(q_0, q, u)$ that represents preferences of a representative consumer and yields the minimum expenditure on commodities needed to achieve the utility level u at consumer prices q. The function $E(q_0, q, u)$ is increasing in u, and non-decreasing and concave in q, and the matrix E_{qq} is (NxN) negative semi-definite matrix.

$$E(q_0, q, u) = \min_x \{q'x : U(x) \geq u\}$$

The economy's production side is defined by the revenue function $G(p_0, p)$ that captures the maximum output level y reached at producer prices p and fixed factors supplies Λ with production possibility set $F(Y, \Lambda)$.

$$G(p_0, p) = \max_y \{p'y : F(Y, \Lambda) \leq 0\}$$

[52] Note that all vectors are column vectors. Prime stands for the transposition of a vector or matrix, while the subscripts of functions denote the partial derivatives.

We assume that there is some substitutability between factors of production and the endowment of factors is fixed. Since the supply of factors of production is constant, we omit them from any further consideration in analysis as they do not impact the results. The function $G(p_0, p)$ is homogeneous of degree 1 in prices and is strictly convex in p, and the matrix G_{pp} is (NxN) positive semi-definite matrix. By the properties of expenditure and revenue functions partial derivatives with respect to q and p, correspondingly, denote country's compensated demand and supply vectors,$\left(\text{i. e } E_q = \frac{\partial \text{E}}{\partial \text{q}}, G_p = \frac{\partial \text{G}}{\partial \text{p}}\right)$[53], while $\left(E_q(q_{0\,,}q,\, u) - G_p(p_0,\, p)\right)$ indicate vector of excess demand for commodities[54]. We assume that both $E(q_{0,}q,\, u)$ and $G(p_0,\, p)$ are twice continuously differentiable.

The country's budget constraint characterize the equilibrium condition in economy and is expressed by the income-expenditure identity requiring the aggregate expenditure to be equalized with revenues from domestic production plus net government revenues collected on taxes:

$$E(q_{0,}q,\, u) = G(p_0,\, p) + R, \tag{2.1}$$

The government collects revenues by taxing trade, consumption and production and redistributes them to consumers in a lump-sum fashion. Thereby, the revenue function is given by:

$$R(t, v) = \tau' \left(E_q(q_{0\,,}q,\, u) - G_p(p_0,\, p)\right) + (1 - \delta)\left[v' E_q(q_{0\,,}q,\, u) + \pi' G_p(p)\right]. \tag{2.2}$$

The term $(1 - \delta)$ with $\delta \in (0,1)$ captures the tax administration costs incurred in the collection of the consumption and production taxes. The tax administration costs are incorporated in the model in the sense than instead of 1$ of collected tax revenue from consumption and production, only the amount $(1 - \delta)$ is added to government revenues and is available for redistribution to consumers. At this point, we should note that we incorporate the tax administration costs in a spirit of Emran (2005). However, Emran (2005) applies

[53] The partial derivatives E_{q_i}=$\frac{\partial E}{\partial q_i}$, and G_{p_i} =$\frac{\partial G}{\partial p_i}$ with $i = 1..N$ denote the compensated demand and supply functions for a good *i*, respectively.

[54] The term $\left(E_{q_i} - G_{p_i}\right) > 0$ indicates the imports of i^{th} commodity, while the term $\left(E_{q_i} - G_{p_i}\right) < 0$ denotes exports of it.

the administration costs to the total revenues collected[55], while we distinguish from it by assuming that the burden on tax administration is primarily incurred from taxing production and consumption, rather than international trade activities. We consider this assumption plausible as tax authorities in developing countries, which we mainly address, are relatively more efficient in collection of border taxes than domestic indirect taxes. The administration of trade taxes require less effort, resources and infrastructure as commodities are readily monitored once they cross the border. Thereby, developing economies historically rely in sustaining their fiscal balance by taxing the trade activities (Musgrave, 1969). On the other hand, attempts to restructure the tax revenues by introducing the consumption and production taxes or broadening the tax base through adjustment of threshold levels require competent technological, financial, legal and political support, and considerable investments in education and training of personnel, enforcement of new taxes and modification of tax administration (see for instance Newbery, 1988; Carnahan, 2015; Umar and Tusubira, 2017).

Equations (2.1) and (2.2) define the framework of our analysis of piecemeal trade reforms with the cost of tax administration.

[55] i.e. the administration costs applied to the total government revenues such that it is reflected in the income-expenditure identity:

$$E(q_0, q, u) = D + G(p_0, p),$$

where $D = (1 - \delta)R$, is the net transfer to consumers of the government revenues after accounting for the administration costs, $\delta \in (0,1)$

2.4 Consumer-price-neutral reforms

In this section, we study the welfare and revenue implications resulting from radial and selective consumer-price-neutral reforms that, generally speaking, involve the reduction in tariffs and corresponding increase in consumption taxes (i.e. VAT). For simplicity, we assume zero production taxes such that the producer prices are affected by tariff only $p = p^w + \tau \equiv [p_1^w + \tau_1,\ p_2^w + \tau_2,\ \dots\ , p_N^w + \tau_N]$, while government revenues are collected from tariff revenues (i.e. τ >0) and consumption taxes:

$$R(t, v) = \tau' \left(E_q(q_0, q,\ u) - G_p(p_0,\ p)\right) + (1 - \delta)\left[v' E_q(q_0, q,\ u)\right], \qquad (2.2')$$

2.4.1 Radial coordinated tariff-tax reform

The radial consumer-price-neutral under our consideration is exactly the same as formulated in Hatzipanayotou et al. (1994) and Keen and Ligthart (2002). As follows, we examine the impact of marginal reduction in all tariffs ($d\tau = -\theta\tau$) by a small increment[56] ($\theta > 0$) accompanied by the offsetting increase in the consumption taxes ($dv = -d\tau$), such that the consumer prices remain unchanged ($dq = d\tau + dv = 0$). The standard finding in theoretical literature conveniently suggests that, in the absence of administration costs, the specified type of reform is unambiguously welfare- and revenue- increasing.

1) Totally differentiating (2.2') and keeping in mind that $dq = 0$, gives following:

$$dR = \tau' E_{qu} du + E'_q d\tau + \tau' E_{qq} d\tau + \tau' E_{qq} dv + (1 - \delta)[v' E_{qu} du + E'_q dv + v' E_{qq} d\tau + v' E_{qq} dv] - \tau' G_{pp} d\tau - G'_p d\tau$$

$$dR = (\tau' + (1 - \delta)v') E_{qu} du - \delta E'_q dv - \tau' G_{pp} d\tau - G'_p d\tau \qquad (2.3)$$

2) The effect on welfare is derived by totally differentiating the (2.1) and using (2.3) to substitute for *dR*:

$$E_u du - (\tau' + (1 - \delta)v') E_{qu} du = -\delta E'_q dv - \tau' G_{pp} d\tau \qquad (2.4)$$

[56] θ is a small positive scalar

As follows, the post-reform welfare effect of the radial uniform reduction of all tariffs with simultaneous increase in consumption tax ($d\tau = -\theta\tau,\ \theta > 0, dv = -d\tau, dq = 0$) is determined by following equations:

$[E_u - (\tau' + (1-\delta)v')E_{qu}]du = [\tau' G_{pp} - \delta E'_q]\theta\tau$, or

$$\Omega du = [\tau' G_{pp} - \delta E'_q]\theta\tau\ . \qquad (2.5)$$

The left-hand-side of equation (2.5) is not negative, $\Omega du > 0$, i.e. $[E_u - (\tau' + (1-\delta)v')E_{qu}]du > 0$. Since the E_u is homodenous of degree one 1 in $[q_{0,}q]$, then by Euler's theorem applies that $E_u = E_{q_0 u} + q' E_{qu}$. By this means, we can re-write the left-hand-side as $[E_{q_0 u} + q' E_{qu} - (q - p^w - v)' E_{qu} - v' E_{qu} + \delta v' E_{qu}]du$, and consequently prove that $[E_{q_0 u} + \delta v' E_{qu} + p^{w\prime} E_{qu}]du > 0$, assuming the normality condition[57] and noting that $\delta \in (0,1)$. Therefore, the effect on welfare is solely defined by the sign of the $[\tau' G_{pp} - \delta E'_q]$ on the right-hand-side of (2.5). Since both terms $(\tau' G_{pp})$[58] and $(\delta E'_q)$ are greater than zero[59], given that, initially, $\tau > 0$ and $\delta \in (0,1)$, the sign of the right hand side can be expressed through the size of administrative costs such that welfare effect is positive as long as administrative costs do not outweigh the relative of two terms, i.e.

$$\delta < \tau' G_{pp}[E'_q]^{-1} = \tilde{\delta}. \qquad (2.6)$$

The given condition determines the threshold level for welfare implications of the reform.

3) Next, the revenue effect of the reform can be derived through equations (2.4) and (2.3):

$(\tau' + (1-\delta)v')E_{qu}du = E_u du + \delta E'_q dv + \tau' G_{pp} d\tau,$

$dR = E_u du + \delta E'_q dv + \tau' G_{pp} d\tau - \delta E'_q dv - \tau' G_{pp} d\tau - G'_p d\tau,$

$dR = E_u du - G'_p d\tau.$

[57] i.e. there are no inferior goods in economy

[58] $\tau' G_{pp}$ captures the production distortion resulting from tariffs

[59] $G_{pp} > 0$ is positive semi-definite matrix as $G(p_{0,}p)$ is convex in prices, and it reflects the own-price effect, which is non-negative given that production of a commodity increases with its price. $E'_q > 0$ is defined by the properties of expenditure function i.e. $E(q_0, q, u)$ is non-decreasing in prices.

By applying the radial consumer-price-neutral reform we get the following expression explaining the post-reform effect on revenues:

$$dR = E_u du + G'_p \theta \tau \tag{2.7}$$

The equation (2.7) can be signed positively ($dR = E_u du + G'_p \theta \tau > 0$) only by assuming positive welfare effect ($du > 0$) implying that the administration costs are less than the critical value ($\delta < \tilde{\delta}$). If this assumption is relaxed, the revenue implications are ambiguous and cannot be precisely defined.

We sum up our findings for the radial consumer price neutral reform impact on welfare and revenues in the Proposition 1.

Proposition 1: *Consider a small open and competitive economy that produces and consumes many tradable goods. Collection of consumption taxes generates administration costs of taxation with* $\delta \in (0,1)$*. A radial uniform marginal reduction of all tariffs accompanied by point-by-point offsetting increase in consumption taxes, such that consumer prices kept constant, improves both welfare and revenues only if the costs of tax administration do not exceed a critical threshold level:* $\delta < \tau' G_{pp} [E'_q]^{-1} = \tilde{\delta}$.

Conventionally, the literature suggests that the piecemeal reform of this type strictly increases welfare and revenues with the compensating adjustment of consumption taxes being practical instrument, when revenues are in concern. The reduction of import tariff or an export subsidy with constant consumer prices decreases production subsidy leading to better allocative efficiency and welfare gains. The cut in tariffs reduces production as producer prices decrease, whereas import volumes increase, since the amount of consumption and consumer prices are both unaffected. Thereby, the fall in revenues collected from tariffs is alleviated with the greater import volumes, which may yield positive revenue implications in combination with the increase in consumption taxes.

The Proposition 1 encompasses a strong condition that is necessary for positive outcomes of such coordinated tariff-tax reform as sufficiently high costs of administration ($\delta > \tilde{\delta}$) lead to losses in revenues and welfare. If the country is endowed with limited administrative capacity materializing into relatively low cost-efficiency, any amendment in tax rates may impose unsustainable extra

burden on tax authorities. The additional expenses incurred from administrative activities may outweigh the relative gains resulting from reform, or the tax authorities may fail to enforce and manage the new tax system leading to widespread tax evasion, low compliance, insufficient control and poor functioning[60] that altogether exacerbates the welfare and, consequently, revenues. Therefore, the existence of tax administration costs distorts economy from achieving gains associated with adoption of consumer-price-neutral reform. For instance, we can easily confirm that, in case of zero tax administration costs with $\delta = 0$, our results comply with standard findings in literature as the welfare effect specified in the equation (2.5) is unambiguously positive, while positive revenue implications are also secured and can be explicitly derived in equation (2.7) without any additional assumption on administration costs. Moreover, in order to secure the improvement in both welfare and revenues, the condition (2.6) demands strict inequality. In case of weak inequality ($\delta \leq \tau' G_{pp}[E'_q]^{-1} = \tilde{\delta}$), the administration costs might be equal to the critical level ($\delta = \tilde{\delta}$), which is sufficient only for revenue-enhancing reform as it implies that the post-reform welfare effect is zero ($du = 0$).

2.4.2 Selective coordinated tariff-tax reform

We consider the selective consumer-price-neutral reform that involves marginal reduction of import tariff on k^{th} commodity accompanied by the compensating adjustment in the consumption tax of this commodity such that the consumer price of the k[th] commodity kept constant, i.e. $dq_k = d\tau_k + dv_k = 0$.

1) In analogy with procedures employed under radial consumer-price-neutral reform, welfare effect for selective coordinated tariff-tax reform can be written from equation (2.5)[61]:

[60] For instance, Ethiopia could not exploit all the gains associated with VAT introduction due to incompetent administrative infrastructure, while the new tax system induced series of additional inefficiencies in the tax collection (Gashaw, 2015).

[61] We derive the welfare implications for selective reform by totally differentiating the revenue function, then substituting for dR in total differentiation of expenditure function, and simplifying the equation by noting that consumer prices kept constant ($dq_k = d\tau_k + dv_k = 0$). Thereby, we get:

$$E_u du = \underbrace{\left[(\tau' + (1-\delta)v')E_{qu}du - \delta E_{q_k}dv_\kappa - \tau' G_{pp_k}d\tau_\kappa - G_{p_k}d\tau_\kappa\right]}_{dR} + G_{p_k}d\tau_\kappa,$$

$$\Omega du = \delta E_{q_k} d\tau_k - \tau' G_{pp_k} d\tau_k \tag{2.8}$$

By the properties of the production revenue function $G(p_0,\ p)$, the supply function G_{p_k} is homogeneous of degree 0 in prices. As follows, the Euler theorem implies that $\sum_{j=1}^{N} p_j G_{p_j p_k} = 0$, which gives $G_{p_k p_k} = -\sum_{j\neq k}^{N} \frac{p_j}{p_k} G_{p_j p_k}$. By using, in addition, the reciprocity condition $G_{p_k p_j} = G_{p_j p_k}$, we can re-express the term $\tau' G_{pp_k}$[62] in the following way:

$$\tau' G_{pp_k} = \left[\sum_{j\neq k}^{N} \left(\frac{\tau_j}{p_j} - \frac{\tau_k}{p_k}\right) G_{p_j p_k}\right] p_j \implies \tau' G_{pp_k} = \left[\sum_{j\neq k}^{N} (\gamma_j - \gamma_k)\, G_{p_j p_k}\right] p_j, \tag{2.9}$$

where γ_j and γ_k are the indirect tax burden on good j and k, respectively (i.e. $\gamma_j = \frac{\tau_j}{p_j},\ \gamma_k = \frac{\tau_k}{p_k}$).

Thereby, with the use of equations (2.7) and (2.8) the post-reform welfare effect is given as:

$$\Omega \frac{du}{d\tau_k} = \left[\sum_{j\neq k}^{N} (\gamma_j - \gamma_k)\, G_{p_j p_k}\right] p_j - \delta E_{q_k}. \tag{2.10}$$

The left-hand side of equation (2.10) is greater than zero (see the proof derived in the case of radial coordinated tariff-tax reforms). Thus, the welfare implications are ambiguous and determined by the sign of the right-hand side. The term δE_{q_k} is positive as $\delta \epsilon (0,1)$ and $E_{q_k} > 0$ given the assumption that all commodities (including k) are domestically consumed, whereas signing the term $\left[\sum_{j\neq k}^{N} (\gamma_j - \gamma_k)\, G_{p_j p_k}\right] p_j$ requires specification of additional assumptions on substitutability and net production subsidy. The term $\left[\sum_{j\neq k}^{N} (\gamma_j - \gamma_k)\, G_{p_j p_k}\right]$>0 if the commodity k bears the highest indirect tax burden such that $\gamma_j < \gamma_k$ and the k^{th} commodity is a substitute in production to all other commodities implying that $G_{p_j p_k} < 0, \forall j \neq k$. Since both terms are greater than zero, their relative

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or re-arranging the terms gives:

$$\Omega du = -\delta E_{q_k} d\nu_\kappa - \tau' G_{pp_k} d\tau_\kappa, \text{ where } \Omega = E_u - (\tau' + (1-\delta)\nu') E_{qu}$$

[62] Since $\tau' G_{pp_k} = \tau_k G_{p_k p_k} + \sum_{j\neq k}^{N} \tau_j\, G_{p_j p_k}$, we get $\tau' G_{pp_k} = -\tau_k \sum_{j\neq k}^{N} \frac{p_j}{p_k} G_{p_j p_k} + \sum_{j\neq k}^{N} \tau_j\, G_{p_j p_k}$ by substituting $G_{p_k p_k}$ with $(-\sum_{j\neq k}^{N} \frac{p_j}{p_k} G_{p_j p_k})$, and applying the reciprocity rule.

weights define the sign of the welfare implications and can be expressed through the tax administration costs in a following way:

$$\delta < \frac{[\sum_{j\neq k}^{N}(\gamma_j-\gamma_k)G_{p_jp_k}]p_j}{E_{q_k}} = \tilde{\delta}. \quad (2.11)$$

The inequality (2.11) posits that a welfare improvement can be reached on a condition that tax administration costs do not exceed the critical value ($\tilde{\delta}$).

2) As follows, the impact on revenue of the selective consumer-price-neutral reform is given[63] by:

$$\frac{dR}{d\tau_k} = \left(E_u \frac{du}{d\tau_k} + G_{p_k}\right). \quad (2.12)$$

Yet again, the reform implications for the government revenues is possible to derive by assuming increasing post-reform welfare effect ($\frac{du}{d\tau_k} > 0$)[64] reflecting that all aforementioned conditions are satisfied. Since G_{p_k} is also greater than zero as all commodities (including k) are domestically produced, the term $\left(E_u \frac{du}{d\tau_k} + G_{p_k}\right) > 0$, implying revenue enhancement ($\frac{dR}{d\tau_k} > 0$).

The results obtained in this section are summarized in the Proposition 2.

Proposition 2: *Consider a small open and competitive economy that produces and consumes many tradable commodities. The collection of consumption taxes generates administration costs of taxation. Assume that the commodity k i) bears the highest indirect tax burden (i.e. highest net production subsidy), and ii) is a substitute in production to all other commodities, then there exists a critical value $\tilde{\delta}$, such that for $\forall\delta < \tilde{\delta}$,* the *selective consumer-price-neutral reform, which involves marginal reduction of tariff on a commodity k accompanied by a compensating amendment in consumption tax of k that keeps consumer price unchanged, improves both welfare and revenues.*

[63] The total differentiation of revenue function gives:

$$dR = (\tau' + (1-\delta)v')E_{qu}du - \delta E_{q_k}dv_\kappa - \tau' G_{pp_k}d\tau_\kappa - G_{p_k}d\tau_\kappa,$$

while we also have from (2.8) that:

$$(\tau' + (1-\delta)v')E_{qu}du = E_u du + \delta E_{q_k}dv_\kappa + \tau' G_{pp_k}d\tau_\kappa,$$

substituting the term, we get the final equation capturing the impact on revenues:

$$dR = E_u du - G_{p_k}d\tau_k$$

[64] Notably, without introduction of the assumption on welfare-improvement, the sign of the revenue implications is ambiguous.

The intuition behind the selective reform is straightforward. The reduction of the import tariff of a commodity with highest indirect tax burden diminishes the highest production distortion (i.e. production subsidy) in economy. The decrease in producer prices leads to decline in production of the kth commodity. The associated losses in revenues are alleviated by the increased production of other commodities due to substitutability of commodities in production. As consumption of all commodities remain unchanged, which is secured by offsetting increase in the consumption taxes, the reduction in domestic production of commodity k implies greater imports. Since the production distortion on all other goods increases with their output, the positive outcomes of the reform are achieved as the gains from decreasing the highest production distortion exceed in absolute values the increase in production distortion of all other goods. Thereby, the theoretical literature posits that this type of reform is welfare-improving and revenue-enhancing under the assumptions of substitutability and the highest net production subsidy (see Keen and Ligthard; 2002; Emran and Stiglitz, 2005 (case with no informal sector)). However, our results demonstrate once again that in the presence of the tax administration costs, the reform's implications are ambiguous. The standard assumptions are not sufficient to secure the increase in post-reform revenues and welfare, and the model requires specification of additional condition defining the critical value for tax administration costs ($\delta < \frac{[\sum_{j\neq k}^{N}(\gamma_j-\gamma_k)G_{p_j p_k}]p_j}{E_{q_k}} = \tilde{\delta}$). If the threshold condition is not satisfied such that $(\delta > \tilde{\delta})$ the welfare strictly decreases, while the impact on revenues is uncertain and determined by the relative size of terms in (2.12).

2.5 Producer-price-neutral reform

In this section, we introduce an extension to our analysis by deriving the impact on welfare and revenues of the radial producer-price-neutral reform. For this purposes, we define the new setting of the model that, for simplicity, assumes zero consumption taxes. As follows, the vector of producer price remains the same as in the initial definitions, while the vector of consumer prices

becomes $q = p^w + \tau \equiv [p_1^w + \tau_1,\ p_2^w + \tau_2,\ \ldots, p_N^w + \tau_N]$ with $(\tau < 0)$ standing for export tax. The government raises revenues by taxing trade and production:

$$R(\tau) = \tau'(E_q(q,u) - G_p(p)) + (1-\delta)\pi' G_p(p). \tag{2.13}$$

Therefore, we examine the welfare and revenue effects of radial reform of export taxes and production taxes involving the uniform marginal reduction of all export taxes ($d\tau = -\lambda(\tau) > 0$) by a small amount ($\lambda > 0$) accompanied with the offsetting increase in the production taxes ($d\pi > 0$) such that the producer prices are kept constant ($dp = d\tau - d\pi = 0$). Since the export taxes are defined as $\tau < 0$, decreasing it, algebraically, indicate that, τ increases.

1) The total differentiation of the revenue function (2.13), while keeping in mind that $dp = 0$, yields:

$$dR = (\tau')E_{qu}du + E'_q d\tau + (\tau')E_{qq}d\tau - \delta G'_p d\tau \tag{2.14}$$

2) To derive the welfare effect, in analogy with the methodology used for consumer-price-neutral reforms, we totally differentiate the expenditure function (2.1) and substitute (2.14) for dR[65]:

$$[E_u du - (\tau')E_{qu}du] = [(\tau')E_{qq} - \delta G'_p]d\tau. \tag{2.15}$$

Noting that τ< 0 as an export tax, the post-reform welfare and revenue effect can be written as follows,

$$\left[\underbrace{E_u - (\tau')E_{qu}}_{>0}\right]du = \left(\underbrace{(\tau')E_{qq}}_{>0} - \underbrace{\delta G'_p}_{>0}\right)\lambda\tau. \tag{2.16}$$

The left-hand-side of the equation (2.16) is greater than zero. Since $\tau < 0$, the operation within brackets is algebraically a sum of two terms, where $E_u > 0$ as expenditure function is increasing in u, and $E_{qu} > 0$ assuming the absence of inferior goods in economy. Thereby, the welfare implications are determined by

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[65] The total differentiation of expenditure function gives:

$$E_u du - E'_q d\tau = dR + G'_p d\pi - G'_p d\tau,$$

where $G'_p d\pi - G'_p d\tau = 0$ as the reform keeps producer prices, hence, production unchanged (i.e. $dp = d\tau - d\pi = 0$). By substituting for dR the equation becomes:

$$E_u du + E'_q d\tau = \left[(\tau')E_{qu}du + E'_q d\tau + (\tau')E_{qq}d\tau - \delta G'_p d\tau\right],$$

where re-arranging of terms yields the equation (2.15).

the sign of the right-hand-side. The term $(\tau')E_{qq}$ is greater than zero as $\tau < 0$ and $E_{qq} < 0$ being negative semi-definite matrix dictated by the properties of expenditure function[66]. The second term $(\delta G'_p)$ is also positive as $\delta\epsilon(0,1)$ and $G'_p > 0$[67] assuming that all commodities are domestically produced. Therefore, the welfare gains are assured as long as the tax administration costs do not exceed the threshold level:

$$\delta < (\tau')E_{qq}[G'_p]^{-1} = \tilde{\delta}. \tag{2.17}$$

3) In the last step of our analysis, we derive the post-reform implications on government revenues[68]:

$$dR = E_u du + E'_q \lambda\tau \tag{2.18}$$

The equation (2.18) can be signed only by specifying additional assumption. As follows, the reform is revenue-enhancing ($dR = E_u du + E'_q \lambda\tau > 0$) only if the welfare effect in (2.16) is positive (du>0) entailing that tax administrative costs satisfy the threshold condition specified in (2.17).

We conclude our findings for the radial producer-price-neutral reform in the Proposition 3.

Proposition 3*: Consider a small open and competitive economy that produces and consumes many tradable commodities. The collection of production taxes generates administration costs of taxation with $\delta\epsilon(0,1)$. A piecemeal reform involving marginal uniform reduction of all export taxes with concomitant compensating rise in production taxes, such that producer prices of commodities remain unchanged, is welfare-improving and revenue-enhancing only if the costs of tax administration are lower than a threshold level ($\delta < (\tau')E_{qq}[G'_p]^{-1} = \tilde{\delta}$).*

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[66] i.e. $E(q_0, q)$ is concave is prices implying negative own-substitution terms.

[67] By properties of the revenue function, $G(p_0, p)$ is increasing in prices.

[68] In analogy with examination of piecemeal consumer-price-neutral reforms, the revenue impact is obtained by deriving the term $(\tau')E_{qu}du$ from equation (2.15) and substituting it in the equation (2.14):

$$dR = E_u du - (\tau')E_{qq}d\tau + \delta G'_p d\tau + E'_q d\tau + (\tau')E_{qq}d\tau - \delta G'_p d\tau,$$

that further simplifies to

$$dR = E_u du + E'_q d\tau.$$

Even though, producer-price-neutral reforms have not been as extensively popularized as coordinated tariff-tax reforms[69], due to relatively lower usage of the export taxes as an instrument in raising revenues, their practicability is verified in theoretical literature (viz. Keen and Ligthard, 2002; Emran, 2005; Hatzipanayotou et.al, 2011). In economic sense, the radial reduction of export taxes improves allocative efficiency by diminishing consumption subsidy, whereas production remains unaffected through offsetting adjustment in the production taxes. The volumes of exports expand with lower domestic consumption that also allows for partial recovery of revenue losses associated with decrease in export taxes. Furthermore, the specified reform yields revenue gains, which is attributable to increase in the production taxes, and welfare improvement achieved as a result of better consumption choices and reduction of consumption and trade distortions. Yet again, our findings demonstrate that applicability of such reform is dictated by the level of administrative infrastructure. Limited administrative capacity deter from reaching fruitful outcomes, as under plausible conditions (i.e. $\delta > \tilde{\delta}$), high tax administration costs induce welfare losses and ambiguous revenue implications in the post-reform period.

2.6 Concluding remarks

Through the history of the trade liberalization process, developing countries have faced a numerous challenges in the adoption of trade reforms. The existing literature identifies that administrative constraints constitute one of the main pitfalls restricting successful integration of trade policies and regulations. Low cost-efficiency of tax administration resulting from incompetence of tax officials, inadequate resources, inconsistent technical support and poor governance, prevent from transition towards more sophisticated tax systems with VAT adoption as an offsetting instrument for tax revenue losses. As developing countries are more prone to such inefficiencies, they remain heavily reliant on trade taxes in raising fiscal revenues.

Motivated by the absence of solid theoretical foundation of tax administration costs, we contribute to the literature by developing a theoretical

[69] See for instance Datta-Mitra (1997), Ebrill et al. (1999)

model of piecemeal trade reforms with tax administration costs. Based on the standard model of coordinated tariff-tax reforms, we derive the welfare and revenue implications of consumer-price-neutral radial and selective reforms and producer-price-neutral radial reform. In the framework of our analysis, we assume that part of governmental revenues is spent on administrative purposes for tax collection and coordination. As following, we derive sufficient conditions for welfare-enhancing and revenue-increasing piecemeal reforms with the costs of tax administration. Our findings reveal that the welfare and revenue implications of trade reforms are inconsistent, when taking into account the impact of tax administration costs. We show that tax administration costs determine the effectiveness of piecemeal trade reforms. Specifically, we identify that sufficiently high administrative costs, such that the threshold conditions are not satisfied, result in negative welfare and revenue implications.

Our study is particularly relevant for developing economies with straightforward policy implications. We emphasize that the standard recommendations and implementation of piecemeal trade reforms demands a detailed analysis of tax administration structure. The improvement of the administrative efficiency through appropriate tax administration reforms is prerequisite condition for successful implementation of trade liberalization reforms. Challenging countries should develop tools and algorithms for identification and estimation of the wide range of tax administration expenses. These practices should be accompanied by the comprehensive legal system defining anti-corruptive measures and transparent control mechanisms of tax officials, and facilitating enforcement of tax regulations and taxpayers' compliance. Furthermore, as efficiency of tax administration is directly related with human resources, the competence of staff in the public sector should be ensured though the continuous training and education.

In the context of our analysis, we do not consider the existence of informal sector in economy. However, developing economies are characterized with large informal sector due to industry domination of large corporations in the formal sector and high barriers in entry, law leakages, low prosecution, bribery and corruption. Therefore, it can be predicted that the introduction of

the informal sector to the model will significantly increase the threshold level of tax administration costs as the consumption and production tax revenues are collected over narrower tax base.

Chapter III: Exploring the role of informational distance and religious proximity in international finance

3.1 Introduction

Since the late 1960s, the financial literature has established that portfolio diversification through cross-border investments results in welfare gains when compared to investments in domestic assets only. Nevertheless, these benefits, in terms of higher returns and lower associated risks, may not be sufficient for investors, who prefer investing in home markets (Grubel, 1968). Such preferences are primarily driven by the persistence of informational frictions in foreign markets arising from differences in historical background, financial and legal practices, bureaucratic procedures, judicial system, institutional characteristics and cultural aspects (Brennan and Cao, 1997; Portes and Rey, 2005; Guerin, 2006; Amiram, 2012; Owen and Yawson, 2013; Lane and Milesi-Firretti 2008; Aggarwal et al., 2012). These information asymmetries induce investors' home bias and divert patterns of investment flows to the same extent as if returns in local markets were much higher compared to foreign ones (French and Poterba, 1991). Even within highly integrated economies, these information asymmetries still distort investment activities (Balta and Delgado, 2009). Therefore, investors' choices abroad are dictated by the degree of familiarity with foreign markets (Graham et al., 2009; Portes and Rey, 2005; Amiram, 2012).

In this study, we introduce a new indicator for measuring informational distance between countries and examine its impact on the patterns of bilateral cross border investment activity. Specifically, we use data on the depth of credit information from the World Bank's Doing Business survey and construct an index based on the Kogut and Singh (1988) formula to measure informational distance in cross country portfolio investments. Thereby, we place the spotlight on the impact of credit market frictions and regulations on international portfolio investment flows, a topic which remains relatively unexplored in the present financial literature.

The credit information index reflects the degree of informational opaqueness and financial frictions in the country. The banking literature

emphasizes that credit information sharing mechanisms considerably reduce information asymmetries and, as such the perceived risk of investors (Kusi and Ansah-Adu, 2015). Effective information collection and dissemination improves the quality and availability of loans by mitigating adverse selection (Pagano and Jappelli 1993; Kusi and Ansah-Adu, 2015) and moral hazard issues due to reputational incentives (Pagano and Jappelli 1993). It also reduces the possibility of charging higher rents on borrowers (Jappelli and Pagano, 2002) and facilitates greater transparency in credit markets which, in turn, controls for over-indebtedness (Bennardo et al., 2015). Therefore, in the context of the present study, greater informational distance between countries indicates the persistence of financial imperfections and information asymmetries across markets with a negative effect on cross border investments.

Furthermore, we investigate whether these negative effects stemming from information asymmetries are alleviated by religious proximity. The theory suggests that common religious affiliations foster reciprocal trust by mitigating prejudice (Jackson and Hunsberger, 1999; Daniels and von der Ruhl, 2010; Chuah et al., 2014; Chuah et al., 2016; Hellmanzik and Schmitz, 2017). In turn, high-trusting environments are associated with lower transaction costs (Zak and Knack, 2001), greater political stability, stronger legislative power, and more favourable conditions for economic activities (Knack and Keefer, 1997). In addition, religiously proximate countries exhibit greater cultural similarity, which yields a familiarity effect for investors (Aggarwal et al., 2012; Hellmanzik and Schmitz, 2017).

In the international finance literature, the gravity model has been well established for examining the determinants of cross border investment flows (Portes and Rey, 2005; Portes et al., 2001; Guerin, 2006; Aviat and Coeurdacier, 2007; Lane and Milesi-Ferretti, 2008; Okawa and Wincoop, 2012). The standard gravity-type variables reflect the familiarity aspect for investors. Less distant countries are more closely interconnected due to historical and cultural ties, proximate institutional and legal characteristics (Portes and Rey, 2005). Moreover, the geographical distance variable captures the information costs as learning about the distant market requires more inputs and time (Guerin, 2006).

The standard gravity model has been extended along cultural, political, legal and technological dimensions (Guerin, 2006; Aggarwal et al., 2012; Hellmanzik and Schmitz, 2017).

In this study, we adopt the augmented gravity model with double fixed effects and assess the role of informational distance and religious proximity in international portfolio investment flows using a world sample over the 2010 – 2014 time period. In line with the literature, we control for the impact of gravity-type variables, historical ties, legal environment, and established trade links. To provide a more detailed analysis of geographical patterns of investment, we classify origin and destination countries in accordance with the level of economic development. Furthermore, we examine the varying degree of information sensitivity of different types of portfolio investments, namely investments in debt securities and investments in equity and fund shares.

To construct our dataset, we use data on bilateral portfolio investments flows from the IMF's Coordinated Portfolio Investment Survey and the credit information index from the World Bank's Doing Business project. Our dataset includes a maximum of 35,307 observations for 11,340 country pairs with 70 origin and 162 destination countries.

Our empirical findings shed useful insights in better understanding the patterns of international portfolio investments. First, we show that investors' decisions to invest abroad are negatively affected by the presence of information asymmetries between countries. Specifically, we document that a one unit increase in the informational distance index leads to a 10.19% reduction in the bilateral portfolio investment holdings *ceteris paribus*. Second, we find that greater religious proximity reduces informational barriers between countries and increases the willingness of investors to invest in foreign assets. This is in line with the theory suggesting that greater religious proximity strengthens mutual trust (Guiso et al, 2003; Daniels and von der Ruhl, 2010; Guiso et al, 2009; Chuah et al, 2016) and encourages international investment activity (Knack and Keefer, 1997; Guiso et al, 2008; Guiso et al., 2009). Third, in accordance with the gravity model, we show that geographical distance is negatively correlated with international capital flows, whereas the economic size

of origin and destination countries facilitates bilateral portfolio investment flows. Furthermore, greater familiarity with foreign markets (as evidenced from the presence of trade relations, common currency, colonial history and legal origin) encourages financial investments abroad. Fourth, we find that the spatial allocation of portfolio investments is dictated by the level of economic development of origin and destination countries. In particular, we document that the distorting effect of informational distance on investment decisions is stronger when considering investments between advanced and emerging countries. At the same time, religious proximity seems to significantly shape investment choices in emerging economies, suggesting that greater trust and cultural similarity is a prerequisite for international financial investments among emerging countries. Finally, we show that the information sensitivity of investments in debt securities and investments in equity and fund shares varies with the level of economic development of source and home countries.

We examine the robustness of our empirical findings using an alternative estimation technique, namely the Pseudo-Poisson Maximum Likelihood (PPML) estimator with high-dimensional fixed effects. PPML overcomes the problem of zero observations in the dataset and produces heteroscedasticity consistent estimates. The PPML results confirm the heterogeneous negative effect of information asymmetries on international capital flows. Yet, these negative effects are (partly) alleviated when the corresponding countries exhibit greater religious proximity. We further support these findings using an alternative indicator reflecting common religious denominations between origin and destination countries. Next, we confirm that our results remain robust even after controlling for shallow vis-à-vis deep market integration, thus highlighting the importance of informational distance and religious proximity in otherwise integrated markets. Last, we examine whether our main findings continue to hold after accounting for diversification motives. The results from this exercise show that the risk diversification motive holds only in the case of equity investments from advanced to emerging countries, whereas, in general, the willingness to engage in cross-border investment activity is rather dictated by positive comovements of business cycles among countries.

The rest of the chapter is organized as follows: in Section 3.2 we review the relevant literature. In Section 3.3, we present the empirical specification of the augmented gravity model. Section 3.4 describes the data. The empirical results are presented in Section 3.5. Finally, section 3.6 concludes the chapter.

3.2 Literature Review

3.2.1 Information asymmetries

The financial literature suggests that investors tend to be home biased when weighting their investment decisions. International investments require information about the political environment, accounting standards, legal system, individual rights and institutional quality in destination countries (Owen and Yawson, 2013). Therefore, the propensity to invest in home markets arises from informational frictions that distort cross border transactions and encourage domestic investments (Brennan and Cao, 1997; Portes and Rey, 2005; Amiram, 2012; Owen and Yawson, 2013). As such, the volume of foreign investments is negatively related to information asymmetries across countries.

Brennan and Cao (1997) theoretically underpin that the informational advantage of local investors, which is accumulated over time, allows them to respond to changing domestic market conditions more accurately and timely. As foreign investors are less well-informed, they revise the means of their predictive distributions by more than local investors. This implies that when there is a positive (negative) signal about the payoffs on the domestic market, foreign investors invest more (less) in the domestic market portfolio than local investors. Therefore, foreign purchases of the market portfolio are positively associated with concurrent portfolio returns. The validity of this finding is empirically reinforced. The analysis of the portfolio investment flows between the USA and 16 emerging economies reveals that purchases by the US investors are positively correlated with market returns. Furthermore, it is shown that US investors trade with time lags as they are less informed about foreign markets, compared to local investors.

Graham et al. (2009) show that investors are expected to diversify their portfolio in multiple foreign markets when they possess more knowledge upon

these markets and consider themselves as competent. Within this setting, Amiram (2012) suggests that the implementation of International Financial Reporting Standards facilitates the transmission of transparent, accurate and standardized financial information, which, in turn, is associated with greater foreign investments. At the empirical front, Owen and Yawson (2013) introduce an index which measures the cost of information gathering after controlling for the physical distance and relative strength of economic activity in the country. Their findings confirm that the volume of international transactions decreases with increasing costs of information accumulation.

The effective financial intermediation can alleviate information asymmetries through the development of information sharing institutions in the banking sector. These institutions enhance the accumulation, management, storage and disclosure of information while reducing the perceived investors' risk (Kusi and Ansah-Adu, 2015). Building upon the adverse selection model, Pagano and Jappelli (1993) show that credit bureaus and registries alleviate informational differences across lenders and allow for better loan allocation and higher aggregate volume of credit. Jappelli and Pagano (2002) further argue that credit information sharing eases credit constraints as banks charge more competitive interest rates due to the absence of any informational advantages. Moreover, it reduces the moral hazard by disciplining borrowers to repay the credit, since their reputation is at balance. Finally, credit information sharing discourages banks from engaging in unethical practices and corruptive behavior (Barth et al., 2004), facilitates loan accessibility to the private sector across all levels of economic development (Kusi and Ansah-Adu, 2015), prevents over-borrowing as credit rating information is available to all lenders (Bennardo et al., 2015), and relates to a lower probability of banking crises (Büyükkarabacak and Valev, 2012). Conclusively, the existing literature points to the importance of developing credit information sharing mechanisms as an effective means in alleviating informational frictions and improving the attractiveness of foreign investments.

3.2.2 The gravity model

The gravity model provides a suitable framework in the analysis of portfolio investment flows as it accounts for information asymmetry using alternative measures of geographical distance. Historically, the model has been implemented for estimating the bilateral trade volumes with the "goodness of fit" amounting to 70 percent and more (Lewer and Van den Berg, 2007). The first theoretical background for the gravity equation was developed by Anderson (1979), who utilized the properties of expenditure systems with Cobb-Douglas and constant elasticity of substitution (CES) preferences.

The standard gravity model defines that the total trade between two countries is determined by the country-pair's economic masses and is decreasing in the distance between them. The model is further extended to encompass the cultural, spatial and institutional effects (Lewer and Van den Berg, 2007). As follows, the typical equation for gravity model has the following form:

$$M_{ij} = \alpha_k Y_i^{\beta_k} Y_j^{\gamma_k} N_i^{\xi_\kappa} N_j^{\varepsilon_\kappa} d_{ij}^{\mu_k} U_{ijk} \qquad (3.1)$$

where M_{ij} stands for a trade volume of good k from country i to country j, Y_i and Y_j are the gross national product of country i and j, respectively, N_i and N_j are the i and j's population, and d_{ij} is a geographical distance between countries. Lastly, the term U_{ijk} denotes the error term that is lognormally distributed (Anderson, 1979).

With regard to the international financial transactions, Okawa and Wincoop (2012) provide theoretical foundation for the use of gravity model. In their setting, investors can choose among different types of financial assets classified according to the degree of incorporated risk. By assuming the existence of financial frictions stemming from information asymmetries, they derive the gravity equation for bilateral asset holdings. Even though the theoretical justification for the application of the gravity model in the estimation of cross border asset flows has been relatively recently documented, the empirical studies in the field date back from the early 2000s. Portes and Rey (2005), for instance, apply the standard gravity model for analysing the impact of informational frictions on bilateral portfolio investments. By using the market

capitalization to measure the relative weight of financial markets, they implement the model for a sample of 14 developed countries. Their findings suggest that the model is well-fitted for explaining cross-border financial transactions at least at the same extent as for estimating bilateral trade flows. More specifically, they find that the volume of international portfolio investments decreases with greater geographical distance between source and destination countries. This effect is anticipated as spatial proximity allows for better exchange of information and cultural connectedness. In addition, they incorporate variables that accurately reflect information exchange among countries. They show that more frequent overlapping in trading hours, existence of bank branches and greater volume of phone calls mitigate informational frictions and, thereby, facilitate international financial transactions. These findings remain qualitatively unchanged in a series of robustness checks including alternative estimation techniques, the instrumentation of market capitalization and the incorporation of regional dummies. Portes et al (2001) verify the fitness of gravity model when examining international asset transactions between the USA and 40 advanced and emerging economies. They accentuate that geographical proximity allows for better information accumulation and transmission due to easier access to countries, higher possibility of language knowledge and more frequent media exposure. Thereby, distance is a significant proxy for information asymmetries. However, they point out that the relevance of geographical proximity diminishes in relatively low informationally opaque markets, such as the US Treasury bill market.

The implementation of the gravity model in international portfolio investment analysis induced an expanding field of research in financial literature. More recently, researchers have focused on the heterogeneity of international portfolio investment determinants across countries and regions. Lane and Milesi-Firretti (2008), for instance, find that in emerging economies, bilateral equity portfolio investment is strongly correlated with trade links and the history of colonial relations, whereas in OECD countries, bilateral investment flows are mostly the outcome of greater financial integration. Guerin (2006) contributes to the understanding of spatial allocation of investment flows by examining bilateral international transactions between the North-North, North-

South and South-North. The author shows that common language, higher level of economic development in destination countries and common borders facilitate bilateral portfolio investment flows across all country pairs. Surprisingly, the geographical distance exerts a statistically significant negative impact on financial flows only for the North-North combination. Furthermore, additional gravity variables such as landlockiness and latitude discourage investors from engaging in bilateral financial transactions throughout all specifications.

3.2.3 Enhancing trust through religious affiliations

In his seminal paper, Arrow (1972) states: "*virtually every commercial transaction has within itself an element of trust, certainly any transaction conducted over period of time. It can be plausibly argued that much of the economic backward-ness in the world can be explained by the lack of mutual confidence*". Trusting someone involves assessment of the probability that the person will perform in accordance with the expectations, and will not cause any damage and even act favourably. Therefore, cooperation among agents requires sufficient level of mutual trust (Gambetta, 1988). In societies characterized by high levels of trust, transaction costs are lower as fewer resources are devoted for inspection of agents, enforcement of contracts (Zak and Knack, 2001), and protection from infringement of property rights (Knack and Keefer, 1997). A high trusting environment creates a constructive basis for forecasting, assessment of prosperous investments, innovation and acquisition of physical capital. It also fosters greater trust in government, authorities and central bank that may result in more politically involved society, which helps to build economically conductive policies and eases the enforcement and adoption of regulations. Moreover, it reduces credit constraints through expansion of informal credit relations, which is especially important in cases, where collateral is not readily available, or when economies endure from underdeveloped financial intermediation. Therefore, a higher level of trust generally facilitates economic activities including the volume of investments (Knack and Keefer, 1997).

Within this context, Guiso et al. (2008) design a theoretical framework which examines how trust shapes investors' behaviour in terms of portfolio

decisions. Their model assumes that investors observe in advance the "true" distribution of payoffs. Nevertheless, investors are also exposed to the risk that their investment payoffs will vanish due to the probability of unfavourable incidents, such as cheating from the company or broker agency. It follows that investors maximize their utility by allocating their wealth between two assets. The first asset is a safe one with defined returns, while the second one is the risky asset, which is denoted as stock and encompasses both the probability of failure and indeterminate returns. By assuming zero participation costs, they derive the trust threshold suggesting that only investors with sufficiently high trust will purchase stocks. This result justifies why a considerable share of the population opts out from investing in stocks. Furthermore, the costs of stock market participation exacerbate the non-participation rate as the level of trust, required for purchasing stocks, amplifies. Guiso et al. (2008) test the model implications at the individual level for Dutch households and Italian bank customers, and at the aggregate level for 26 countries. They verify that investors with greater trust in others have higher probability of purchasing stock or other risky asset, and allocate larger part of their wealth in it. Similarly, they find limited stock investments in low trusting countries; a fact that implies greater ownership concentration in the stock market.

Trusting others involves subjective attitudes and perceptions defined by personal characteristics (Guiso et al, 2008). To investigate the varying degree of trust across individuals and countries, the corresponding literature reveals that different religious backgrounds explain to a large extent this variation (Guiso et al, 2003; Daniels and von der Ruhl, 2010; Guiso et al, 2009; Chuah et al, 2016). Thereby, it is important to identify why and how religious upbringing influences trust and, consecutively, economic outcomes.

Religion is a social institution that forms beliefs, attitudes, traits, and values. It also fosters traditions and practices, and guides how individuals react to different events and how they collaborate with others (Irons, 2001). In this context, it shapes the economically-relevant behaviour including work ethics, educational approaches and spending habits (Iannaccone, 1998), and implies

good morale, hard work, dedication, prudence, truthfulness and compassion (Lewer and Van den Berg, 2007; McCleary and Barro, 2006).

On the flip side, religion might discourage involvement in short-term economic deals due to accentuation on the religious orientation of gaining the spiritual harmony rather than achieving immediate benefits (Lewer and Van den Berg, 2007). Moreover, religion can be associated with a larger shadow economy as it sustains informal transactions (Schneider et al., 2015). These effects diverge across different religious cultures. For instance, McCleary and Barro (2006) argue that economic activity is mainly limited in Muslim states due to the tendency of their governments to enforce constraining laws and regulations. Schneider et al. (2015) find that the share of informal economy is relatively greater in Orthodox Christian countries, while Grier (1997) shows that Protestantism facilitates economic development through greater GDP growth and real per capita income.

Adherence to a certain religion involves commitment to behave in accordance with its ethical principles, to maintain intrareligious relationships and to cooperate with other members of the community (Irons, 2001). As individuals consider their religion being the only true foundation for morality and beliefs (Jackson and Hunsberger, 1999), members of one religious group tend to exhibit in-group favouritism and prejudice towards non-members either consciously or unconsciously (Jackson and Hunsberger, 1999, Irons, 2001). Such preferences and discrimination exacerbate in the presence of nonreligious groups, interreligious conflicts and/or strong identification with a group (Hunsberger and Jackson, 2005). Chuah et al. (2014) test this theory in the repetitive "prisoner's dilemma" experiment, where two players select to either cooperate or defect in every phase of a ten-round game. They conclude that common religious affiliation is sufficient to create the intragroup cooperation and promote favouritism. However, the outgroup discrimination can be diminished through identification of other social categories such as ethnicity, age, race and gender.

Sharing common religious views can enhance mutual trust through alleviation of prejudice. Daniels and von der Ruhl (2010) examine the validity of

this hypothesis among US citizens. By drawing information from the General Social Survey, they reveal that individuals have a propensity to discriminate in trusting others (non-members of religious community) dependent on their religious affiliation and participation in the religious events. Due to the strength of network ties within each religious denomination, this impact varies across religions. As such, black Protestants, fundamentalists and Catholics build strong intragroup networks and, thereby, trust relatively more members of these religious communities than out-group individuals. In contrast, Liberal Protestants have less intensive ties within their religious affiliation and demonstrate greater trust of others in society, in general. With regard to the degree of religiosity, all individuals tend to trust more when they actively participate in religious services. Qualitatively similar results are obtained by Guiso et al. (2003). By extracting data from the World Value Survey that covers 66 independent countries, they also show that the level of generalized trust is more prominent across religious people and varies across different religious affiliations. As such, they show that members of the Christian family demonstrate greater trust when frequently attending religious services, and this effect is more pronounced among Protestants rather than Catholics. Further evidence linking the religious background and trust is provided by Chuah et al. (2016) in their experimental study conducted in Malaysia, China and the UK. Their trust game is designed as a series of interactions, where participants decide whether to trust their co-participants or not (by sending or not sending money), while co-participants choose to be trustworthy (by returning some amount of money) or untrustworthy (by failing to return any money). Chuah et al. (2016) show that participants believe that more religious people are associated with greater trustworthiness. Their findings confirm that participants, who adhere to a particular religious belief, trust more their peers. This is further strengthened with the degree of participants' religiosity. In this regard, Guiso et al. (2009) conduct a comprehensive study exploring determinants of bilateral trust across country-members of the European Economic Area. Their study encompasses a range of explanatory variables, reflecting informational and cultural effects, drawn from the Eurobarometer surveys. They find that greater religious proximity, calculated by the chance that two random residents of two countries

share similar religious affiliation, significantly enhances bilateral trust. Furthermore, they show that a higher level of trust increases bilateral trade, foreign direct investment and foreign portfolio investments.

To this extent, an emerging strand of the literature emphasizes the role of religion in explaining economic outcomes (Guiso et al., 2003; Guiso et al., 2009; McCleary and Barro, 2006; Lewer and Van den Berg, 2007; Aggarwal et al., 2012). Guiso et al. (2003) outline that, in general, adherence to religious denomination and participation in religious services foster attitudes that are beneficial for economic growth. Lewer and Van den Berg (2007) find that common religion tends to increase bilateral trade volumes. Nevertheless, this result is not uniform across different religions and does not hold for Islamic or Hindu states. Felbermayr and Toubal (2010) reveal that religious proximity explains bilateral trade flows in differentiated goods across European countries. Lucey and Zhang (2010) suggest that behavioural patterns arising from common religious beliefs induce convergence in the equity market correlations. They show that, in the case of 23 emerging economies, adherence to the same religious denomination increases the stock market comovement among country pairs. Aggarwal et al. (2012) attempt to disentangle the cultural effect on the foreign portfolio investment flows from the traditional gravity forces. To this end, they examine a wide set of cultural dimensions, including a dummy for common religious affiliation. Their findings confirm that common religion offsets the negative impact of informational frictions on foreign portfolio investments for 174 source and 50 destination countries. Hellmanzik and Schmitz (2017) provide another notable contribution in this field and argue that bilateral trust among countries is higher when they share a common religion. By employing the religious proximity index, they find that bilateral portfolio investment flows among 52 source countries and 83 host countries are increasing with greater religious similarity. As such, they conclude that religious proximity (among other cultural proximity variables) is important when analysing investment flows as it significantly reduces cross-border information asymmetries.

3.3 Empirical Specification

Following the seminal paper by Portes and Rey (2005), the application of the modified gravity model for the estimation of international financial asset flows has become popular in international finance literature as it significantly explains bilateral economic transactions[70] and allows for further extensions though the incorporation of institutional, political, cultural and economic indicators.[71] Thereby, we employ in our analysis an augmented gravity model to investigate whether geographical decomposition of bilateral portfolio investments can be explained by religious proximity and informational opaqueness in credit markets. In line with Lane and Milesi-Firretti (2008), our baseline empirical model includes the adopted "double-fixed effect" approach and takes the following form:

$$\log(Invest_{ij,t}) = \alpha_0 + \alpha_1 INF\_Dist_{ij} + \alpha_2 RELIG_{ij} + \alpha_3 Z_{ij,t} + \varphi_i + \varphi_j + \tau_t + \varepsilon_{ij,t} \quad (3.2)$$

The dependent variable in our analysis is $\log(Invest_{ij,t})$ which indicates the logs of million US dollars of total investment holdings from the origin country *i* to destination country *j* in year *t.* The explanatory variable $RELIG_{ij}$ stands for religious proximity between countries *i* and *j*. In line with Guiso et al (2009), we assume that common religious affiliation enhances bilateral trust among countries, and, thereby, facilitates investment flows. The variable INF_Dist_{ij} denotes the difference in informational opaqueness between the credit markets of countries *i* and *j*. We consider this variable to be an appropriate proxy for information asymmetries across countries, as it directly reflects the transparency and availability of information in credit markets. The banking literature posits that the existence of credit information sharing instruments allows for better information dissemination, improves the credit quality and quantity, and contributes to the development of sound financial systems across countries (Pagano and Jappelli, 1993, Bennardo et al., 2015, Kusi and Ansah-Adu, 2015). Therefore, we expect that a greater informational distance discourages investors from engaging in international transactions as it signifies the

[70] Portes and Rey (2005) show that the gravity model explains up to 70% of the variation in bilateral equity flows. This explanatory power is very similar to bilateral trade estimations.
[71] See for instance the works of Portes et al. (2001), Lane and Milesi-Firretti (2008), Guerin (2006), Aggarwal et al. (2012).

imperfections in local financial markets and the presence of informational frictions.

Next, we incorporate the set of control variables, denoted by vector $Z_{ij,t}$, that captures information and transaction costs. Based on the extant literature, we include a set of standard variables capturing the gravity effect. These include $\log(dist_{ij})$, i.e. the log of geographical distance between the largest cities (in terms of population) of countries *i* and *j*, $tdiff_{ij}$ the time difference between countries *i* and *j*, and $contiguity_{ij}$, which is a dummy variable taking the value of 1 when countries i and j share common borders, and zero otherwise. Geographical proximity is relevant for explaining bilateral economic relations since neighbouring countries are more likely to build historical and cultural interconnectedness, have better media coverage, easier physical access and overlapping trading time, and thus lower transactional and informational costs (Portes and Rey, 2005, Portes et al, 2001). Furthermore, we include dummies for common legal origin ($comlegal_{ij}$), past colonial relations ($colony_{ij}$) and common currency ($comcur_{ij}$). Common currency lowers transaction costs by eliminating the risks associated with volatilities in foreign exchange markets (Guerin, 2006). Past colonial relations capture not only historical ties, but they also identify linguistic roots as occupied countries tend to learn the language of the colonizer (Melitz and Toubal, 2014). Common legal origin implies greater institutional similarity among countries (Lane and Milesi-Firretti, 2008) which, in turn, yields greater familiarity for foreign investors (Guerin, 2006). In a similar vein, greater similarity in legal practices signifies lower cross border transaction fees (Helmanzik and Schmitz, 2017). Following the gravity literature, we also take into account the impact of the economic size of the corresponding countries by including the logs of gross domestic product (*l_GDPo* and *l_GDPd*) and logs of population (*l_POPo* and *l_POPd*) of both origin and destination countries (Anderson, 1979, Lewer and Van den Berg, 2007). We further control for the effect of trade volumes on equity holdings by incorporating the logs of bilateral imports (l_import_{ij}). Greater bilateral imports imply lower costs of trade resulting in relatively more intensive competition among local and foreign firms. Thereby, investors tend to hedge against risk by purchasing equity of foreign

firms that are rivals to the local ones. This, in turn, leads to a reduction in investors' home bias (Coeurdacier, 2009). In addition, we incorporate the linguistic proximity index ($lp1_{ij}$), as greater similarity guarantees the ease of communication and better understanding (Hellmanzik and Schmitz, 2017), while different languages create pitfalls and demand more involvement in accumulation of information about foreign markets (Aviat and Coeurdacier, 2007).

Furthermore, we account for unobservable time-invariant factors that influence bilateral investment holdings by incorporating the origin- and destination-country fixed effects through the dummy variables, φ_i and φ_j, respectively. These fixed effects control for unobservable heterogeneity among origin countries in their willingness to invest abroad and explain why some destination countries are more appealing for foreign investors. Moreover, as suggested by Coeurdacier and Martin (2009), the inclusion of double country fixed effects removes the cross-sectional "omitted price" bias stemming from multilateral resistance terms (MRTs). MRTs refer to the relation of bilateral barriers on economic transactions to the barriers that origin and destination countries face with all their trading partners (Okawa and Wincoop, 2012). MRTs are affected by the transaction costs, which are determined by the extent of information asymmetries among countries (Coeurdacier and Martin, 2009). Finally, we incorporate the time dummy τ to control for time-specific effects. Last, ε_{ij} stands for the residual term.

We also carry out our analysis in separate regressions for equity and debt holdings. In line with the literature[72], we re-estimate equation (3.2) for each type of portfolio investment with the logs of investments in debt securities ($l\_debtsec_{ij,\tau}$) and logs of investments in equity and share funds ($l\_equity_{ij,\tau}$) standing for the dependent variables.

Next, we attempt to solve the problem of zero-valued observations that compose a considerable fraction of our dataset (14,904 out of 35,307 observations of total bilateral portfolio investments carry a zero value). This issue cannot be addressed by the linear transformation of the gravity-type

[72] See for instance Helmanzik and Schmitz (2017), Aggarwal et al (2012).

models since the logarithm of zero is not defined. Furthermore, dropping the zero-valued observations, that are not randomly distributed, can lead to the loss of significant information.[73] Therefore, truncation of the sample will result in sample selection bias (Burger et al., 2009), whereas censoring the dependent variable by replacing zeros with a small positive value can yield misleading estimations (Flowerdew and Aitkin, 1982). Last, the log-normal model assumes that the variance of the error terms is homoscedastic across all country pairs (Burger et al., 2009). However, even minor variations between actual and expected values prior to the logarithmic transformation of variables may produce considerable variations in the estimation of the model (Flowerdew and Aitkin, 1982), thereby yielding inconsistent and inefficient estimates in the presence of heteroscedasticity (Santos Silva and Tenreyro, 2006). Santos Silva and Tenreyro (2006) argue that the estimation of gravity-type models in levels is preferable and show that the Poisson pseudo maximum likelihood (PPML) estimator successfully overcomes both aforementioned issues. Therefore, to examine the robustness of our baseline findings, we also use the PPML methodology and estimate the following specification:

$$Invest_{i,j,t} = \exp\left(\alpha_0 + \alpha_1 INF\_Dist_{ij} + \alpha_2 RELIG_{ij} + \alpha_3 Z_{ij,t} + \gamma_{i,t} + \gamma_{j,t} + \tau_t\right) + \varepsilon_{ij,t} \quad (3.3)$$

In equation (3.3), the dependent variable, $Invest_{i,j,t}$, refers to portfolio investments (total, equity, debt) in levels from the origin country *i* to the destination country *j* at time *t.* The main explanatory variables of our interest, the informational distance indicator and common religion index remain unchanged. Vector $Z_{ij,t}$ includes the geographical distance between countries *i* and *j*, the linguistic proximity index, time difference, and the dummy variables for contiguity, colony and common legal origin. Equation (3.3) also incorporates country-year fixed effects for the origin ($\gamma_{i,t}$) and the destination country ($\gamma_{j,t}$). These fixed effects capture the time-varying country-specific effects that may influence total bilateral portfolio investments flows, but are omitted from the analysis. We also take into account the impact of (unobserved) time-variant

[73] For instance, some country pairs may not have any bilateral economic transaction in a particular time period or the zero values may occur due to the rounding up of the small values of the transactions (Santos Silva and Tenreyro, 2006).

macroeconomic phenomena that influence all country pairs through the inclusion of time dummies, τ_t. The $\varepsilon_{ij,t}$ is the idiosyncratic error term.

In robustness checks, we employ an alternative variable for measuring commonality in religious beliefs. By deriving information on major religious denominations from the World Value Survey, we construct a dummy variable ($Religion\_dummy_{ij}$), which takes the value of 1 when the prevalent share of population in origin and destination countries adheres to a certain religious denomination (i.e. Catholicism, Protestantism, Orthodox, Islam, Hinduism).

Furthermore, we explore the impact of deep vis-à-vis shallow forms of integration on international financial flows. As such, we create the dummy variable EU_dummy which takes the value of 1 when both origin and destination countries are members of the European Union (deep integration), and the dummy variable RTA which takes the value of 1 in the presence of a regional trade agreement between the origin and destination country. The existence of trade agreements signifies some degree of economic integration (shallow integration) that lowers costs associated with cross-border transactions including the costs of gathering information about foreign markets (Guerin, 2006).

Finally, we investigate whether investors pursue risk diversification motives when acquiring foreign equity. As such, we incorporate in our analysis a variable which measures the comovement between equity markets ($Covariance_{ij}$) of country *i* and country *j*. The covariance of equity market returns is estimated over the five-year period (2010-2014) and remains time-invariant for each country pair. In line with Portes and Rey (2005), we argue that investors are encouraged to diversify their portfolio holdings, when the business cycles of foreign markets exhibit low or negative correlation with their own country's cycle.

3.4 Data and Definitions

Our dataset covers 70 origin countries (34 advanced and 36 emerging countries) and 162 destination countries (34 advanced and 128 emerging

countries). The sample period spans from 2010 to 2014. Thereby, our dataset includes a maximum of 35,307 observations of total bilateral portfolio investments for 11,340 country pairs (70 x 162). Tables 15 and 16 list the origin and destination countries classified according to their level of economic development.

Table 15: List of origin countries

Advanced Countries		Emerging Countries	
Australia	Japan	Argentina	Lebanon
Austria	Korea Rep.	Bahamas	Malaysia
Belgium	Latvia	Bahrain	Mauritius
Canada	Lithuania	Bangladesh	Mexico
China: Hong Kong	Malta	Barbados	Mongolia
Cyprus	Netherlands	Belarus	Pakistan
Czech Republic	New Zealand	Bolivia	Panama
Denmark	Norway	Brazil	Philippines
Estonia	Portugal	Bulgaria	Poland
Finland	Singapore	Chile	Romania
France	Slovak R.	Colombia	Russia
Germany	Slovenia	Costa Rica	Saudi Arabia
Greece	Spain	Egypt	South Africa
Iceland	Sweden	Honduras	Thailand
Ireland	Switzerland	Hungary	Turkey
Israel	UK	India	Ukraine
Italy	USA	Indonesia	Uruguay
		Kazakhstan	Venezuela

Table 16: List of destination countries

Advanced Countries	Emerging Countries			
Australia	Albania	Egypt	Malaysia	Seychelles
Austria	Algeria	El Salvador	Maldives	Solomon Islands
Belgium	Angola	Equatorial Guinea	Mali	South Africa
Canada	Antigua and Barbuda	Eritrea	Marshall Islands	Sri Lanka
China, P.R.: Hong Kong	Argentina	Ethiopia	Mauritania	St. Kitts and Nevis
Cyprus	Armenia	Fiji	Mauritius	St. Lucia
Czech Republic	Azerbaijan	Gabon	Mexico	St. Vincent and the Grenadines
Denmark	Bahamas	Gambia, The	Moldova	Sudan
Estonia	Bahrain	Georgia	Mongolia	Syrian Arab Republic
Finland	Bangladesh	Ghana	Mozambique	Taiwan Province of China
France	Belarus	Grenada	Myanmar	Tajikistan
Germany	Belize	Guatemala	Namibia	Tanzania
Greece	Benin	Guinea	Nepal	Thailand
Iceland	Bhutan	Guinea-Bissau	Nicaragua	Togo
Ireland	Bolivia	Guyana	Niger	Trinidad and Tobago
Israel	Bosnia and Herzegovina	Honduras	Nigeria	Tunisia
Italy	Botswana	Hungary	Oman	Turkey
Japan	Brazil	India	Pakistan	Uganda
Korea, Republic of	Brunei Darussalam	Indonesia	Panama	Ukraine
Latvia	Bulgaria	Iran	Papua New Guinea	United Arab Emirates
Lithuania	Burkina Faso	Iraq	Paraguay	Uruguay
Malta	Burundi	Jamaica	Peru	Uzbekistan
Netherlands	Cabo Verde	Jordan	Philippines	Venezuela
New Zealand	Cambodia	Kazakhstan	Poland	Vietnam
Norway	Cameroon	Kenya	Puerto Rico	Zambia
Portugal	Chile	Kyrgyz Republic	Qatar	Zimbabwe
Singapore	China, P.R.: Mainland	Lao's	Romania	
Slovak Republic	Colombia	Lebanon	Russian Federation	
Slovenia	Congo, Republic of	Lesotho	Rwanda	
Spain	Costa Rica	Liberia	Samoa	
Sweden	Cote d'Ivoire	Libya	San Marino	
Switzerland	Croatia	Macedonia	Sao Tome and Principe	
UK	Dominican Republic	Madagascar	Saudi Arabia	
USA	Ecuador	Malawi	Senegal	

The data for total bilateral portfolio investment holdings, which includes investments in long- and short-term debt securities, as well as investments in equity and fund shares, is obtained from the IMF's Coordinated Portfolio Investment Survey (CPIS). In Table 17, we report the total amount in million USD of investment holdings accumulated over the sample period for the twenty countries with highest propensity to invest and for the twenty most attractive for investment destination countries. As follows, the USA engages the most in cross-border transactions. During the 2010 – 2014 period, USA citizens held more than 33 trillion USD of portfolio investments abroad, whereas the foreign holdings in the country amounted to 29 trillion USD. The second-ranked country, the UK, invested and attracted nearly two times less than the USA. Generally, the ranking lists include mostly high-income countries, with the exception of China and Cameroon.

Table 17: Top 20 investing and attractive destination countries

Top investing countries		Top attractive destinations	
USA	33204217.6	USA	29070043.87
UK	15304724.6	UK	15655596.97
Japan	12901475.8	France	10897595.42
France	11495852.44	Germany	10278565.86
Germany	10835252.01	Netherlands	8573399.815
Ireland	9592644.387	Japan	5986356.593
Netherlands	7423244.974	Italy	5888214.141
Canada	4437810.052	Ireland	5807291.31
Norway	4227601.336	Spain	4423564.895
Switzerland	4044750.938	Australia	4285182.346
Italy	3320173.705	Switzerland	3499288.114
China: Hong Kong	3138798.502	Cameroon	3117479.639
Singapore	2762826.465	China	3061863.72
Belgium	2570321.135	Sweden	2639956.124
Australia	2412553.024	Canada	2277793.73
Sweden	2053136.295	Brazil	2114305.768
Spain	1597572.044	Korea Rep.	1982280.801
Denmark	1592150.304	Belgium	1868433.722
Austria	1440293.129	Austria	1717983.01
Finland	1276347.258	China: Hong Kong	1612570.701

Next, we compute the proxy for informational distance, which is based on the depth of credit information index. The historical data for the index is available from the Doing Business project of the World Bank. This index reflects the regulations and practices that influence the availability, extent and range of credit information collected by the credit bureau or credit registry. The pre-2014 methodology scales the index from 1 to 6, with higher values corresponding to greater information availability.

We compute the informational difference between country *i* and *j* based on Kogut and Singh (1988) formula, which was originally designed for the computation of cultural difference indices. Our index is in essence a variance-adjusted squared difference of credit information index and it takes the following form:

$$INF\_Dist_{ij} = \frac{(cii_i - cii_j)^2}{var_{cii}} \qquad (3.4)$$

where cii_i and cii_j stand for the depth of credit information index *(cii)* in country *i* and *j*, respectively, whereas var_{cii} denotes the variance of the *cii* across the sample for the specific year.

The data for distance, common legal origin, contiguity, common currency, colonial relation, religious proximity, and regional trade agreements are collected from the CEPII gravity database. The gross domestic product (in constant 2010 USD) and population data are extracted from the World Bank's World Development Indicators database. Data for bilateral imports are obtained from the Direction of Trade Statistics database of the IMF, which reports CIF imports for every destination country in million USD. The information on linguistic proximity is retrieved from Melitz and Toubal (2014).

For robustness purposes, we use two additional variables. First, we compute the covariances of stock market returns. To this end, we use data from the World Bank Global Financial Development dataset which estimates annual averages of stock market indexes based on daily reports by Bloomberg. Second, we construct an alternative measure for religious closeness which is a dummy variable based on information from the World Values Survey (Wave 6). This

dummy takes the value of 1 if the majority of the population in each country pair adheres to the same religious denomination and 0 otherwise.

Table 18 provides the definitions and sources of variables included in the analysis and Table 19 reports the summary statistics. The average total bilateral investment holdings amount to 4 billion USD, whereas the corresponding mean values for debt securities and equity holdings are 2.369 billion USD and 1.956 billion USD, respectively. The mean informational difference is 1.3, suggesting relatively small informational distance between origin and destination countries. On average, the countries included in our sample are relatively not religiously interconnected, as the mean for religious proximity equals 0.16. As concern trade relations, the average volume of imports in our sample amounts to 1,348 million USD. Moreover, countries in our dataset are relatively distantly located with the average geographical distance between country pairs being equal to 7,641.794 km.

Table 18: Variable definitions and sources

Variable – definition	Source
$Invest_{ij}$ – total bilateral portfolio investment holdings of residents of country *i* in country *j* in millions USD.	IMF CPIS
$Debtsec_{ij}$ – total holdings in debt securities of residents of country *i* in country *j*.	IMF CPIS
$Equity_{ij}$ – total holdings in equity and share funds of residents of country *i* in country *j*.	IMF CPIS
$Dist_{ij}$ – geographical distance between largest cities of country *i* and *j* in kilometers.	CEPII GravData
Inf_Dist_{ij} – the difference in informational accessibility and transparency of *i* and *j*'s credit markets. The index is computed with the use of depth of credit information index and the Kogut-Singh formula. Higher values correspond to larger differences.	World Bank, Doing Business
$Contiguity_{ij}$ – dummy variable that takes the value of 1 if countries *i* and *j* share common borders.	CEPII GravData
$Colony_{ij}$ – dummy variable that takes the value of 1 if countries *i* and *j* have a common colonial history.	CEPII GravData
$Comcur_{ij}$ – dummy variable that takes the value of 1 if countries *i* and *j* have a common currency.	CEPII GravData
$Relig_{ij}$ – religious proximity index between countries *i* and *j*, which is computed based on shares of Catholics, Protestants and Muslims. It takes values between 0 and 1, with higher values indicating that two countries have the same religious affiliation or the majority of population adheres to a certain religion.	CEPII GravData
$Comleg_{ij}$ dummy variable that takes the value of 1 if countries *i* and *j* have a common legal origin (Scandinavian, UK, German, French or Spanish).	CEPII GravData
RTA_{ij} – dummy variable that takes the value of 1 if countries *i* and *j* have signed a Regional Trade Agreement.	CEPII GravData
GDP – Gross Domestic Product in constant 2010 USD.	World Bank, WDI
Population – the total amount of residents in a country.	World Bank, WDI
$Imports_{ij}$ – CIF bilateral imports from country *i* to country *j* in millions USD.	IMF, Direction of Trade Statistics
EU_dummy – dummy variable that takes the value 1 if both origin and destination countries are members of European Union.	CEPII GravData
Lp1 – linguistic proximity index that measures the similarity of *i* and *j's* languages based on *Etnologue* classification of languages that distinguishes them in accordance with language tree, branches and sub-branches.	Melitz and Toubal (2014)
$Religion\_dummy_{ij}$ – dummy variable that takes the value of 1 if the majority of the population in countries *i* and *j* share a common religious denomination.	World Value Survey
$Covariance_{ij}$ – covariance of annual returns on the stock market indices of countries *i* and *j* over the entire period 2010 – 2014.	World Bank, Global Financial Development

Table 19: Summary Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Total Portfolio Investments (in millions USD)	35,371	4014	34360	-1056	1300000
Logs of Total Portfolio Investments	35,359	2.421372	3.152508	-4.4295	14.1112
Debt Securities (in millions USD)	33,847	2369.477	20459.46	-110.6822	885957.4
Logs of Debt Securities	16,433	3.970116	3.400803	-31.86106	13.69442
Fund Shares & Equity (in millions USD)	31,589	1956.919	19207.39	-3634.297	978137.3
Logs of Fund Shares & Equity	15,033	3.096991	4.020283	-16.81281	13.79341
Informational Distance	54,350	1.296181	1.512584	0	4.547149
Religious proximity index	54,033	0.1642432	0.2441253	0	0.991009
Geographical Distance (km)	54,350	7641.794	4485.61	7	19772
Language Proximity Index	48,879	0.8406882	1.273901	0	6
GDP in origin countries (in millions USD)	55,494	835000	2030000	4410	16200000
GDP in destination countries(in millions USD)	54,591	435000	1500000	157	16200000
Population in origin countries	55,494	58900000	159000000	283700	1300000000
Population in destination countries	54,936	42400000	150000000	32553	1360000000
Logs of GDP in origin countries	54,350	26.15299	1.704121	22.20725	30.41865
Logs of GDP in destination countries	53,460	24.55655	2.247774	18.87254	30.41865
Logs of Population in origin countries	54,350	16.52258	1.724947	12.55567	20.98224
Logs of Population in destination countries	53,800	15.89872	1.931982	10.39063	21.03389
Bilateral Imports in millions USD	48,389	1348.716	8307.457	1.00E-06	347798
Logs of Bilateral Imports	48,389	3.038831	3.741947	-13.81551	12.75938
Common Currency	54,033			0	1
Regional Trade Agreement Dummy	53,827			0	1
EU Dummy	53,698			0	1
Colony	54,350			0	1
Common legal origin	54,350			0	1
Common religion dummy	55,308			0	1
Covariance of equity returns	24,527	112.3742	330.7155	-7003.894	3984.208

3.5 Empirical analysis

3.5.1 Baseline results

In line with Portes and Rey (2005) and Guerin (2006), we employ pooled OLS[74] for the estimation of our baseline regression (3.2). Both the dependent variables (total portfolio investment, investments in debt securities, investments in fund shares and equity) and a number of control variables (geographical distance, bilateral imports, GDP and population in origin and destination countries) are in natural log form.

Table 20 reports the estimated coefficients and robust standard errors (in brackets) clustered at the country pair level. All specifications include origin– and destination–country fixed effects, as well as time dummies, to control for unobservable time–invariant heterogeneity across countries and time–variant common shocks.

Column 1 of Table 20 represents the most parsimonious model as it incorporates only the variables of interest and a small set of standard gravity controls. In contrast, Column 3 includes the full set of controls and represents our preferred specification. In accordance with our prior expectations, informational distance enters with a negative and highly significant (at the 1% significance level) coefficient. This finding confirms that greater difference in information sharing discourages investors from cross-border transactions. Specifically, a one unit increase in informational distance reduces *ceteris paribus* bilateral portfolio investment holdings by 10.19% [(exp(-0.097)-1)*100]. This is a sizeable economic effect given that the mean value of the log of total portfolio investments is 2.42 with a standard deviation of 3.15.

Next, we find that the religious proximity variable carries a positive coefficient (0.945 in column 3). So, a one standard deviation increase in religious proximity (=0.244) increases *ceteris paribus* portfolio investment flows by 25.93% [(exp(0.945*0.244)-1)*100]. As such, consistent with our prior expectations described in Section 2, our baseline results suggest that religious

[74] The panel fixed effects model cannot be employed as it absorbs time-invariant variables. Thereby, the impact of gravity-type variables (distance, contiguity, time difference, colony, etc.) cannot be estimated as these variables remain unchanged over the observed time period.

proximity increases the propensity to invest in foreign markets (Knack and Keefer, 1997; Guiso et al, 2008; Guiso et al., 2009) by favouring reciprocal trust that diminishes informational frictions (Guiso et al., 2009; Chuah et al., 2016).

Table 20: Bilateral portfolio holdings: Baseline results

	1	2	3
Informational distance	-0.088***	-0.086***	-0.097***
	(0.025)	(0.026)	(0.026)
Religious proximity	1.135***	1.043***	0.945***
	(0.144)	(0.142)	(0.150)
Distance	-1.397***	-1.039***	-1.034***
	(0.038)	(0.067)	(0.068)
GDP (destination)	0.210*	0.170	0.166
	(0.122)	(0.211)	(0.211)
GDP (origin)	0.986**	1.110***	1.332***
	(0.395)	(0.420)	(0.419)
Population (origin)		0.015	0.021
		(0.944)	(0.946)
Population (destination)		-0.133	-0.129
		(0.211)	(0.214)
Bilateral imports		0.236***	0.225***
		(0.023)	(0.024)
Common currency		0.789***	0.802***
		(0.125)	(0.125)
Contiguity		-0.002	-0.102
		(0.156)	(0.162)
Time difference		0.005	0.001
		(0.015)	(0.016)
Colony			0.443***
			(0.148)
Linguistic proximity			0.010
			(0.031)
Common legal origin			0.151**
			(0.063)
Constant	-25.609**	-29.761*	-35.849**
	(11.008)	(17.175)	(17.204)
Observations	20,153	19,679	19,358
R-squared	0.73	0.73	0.73

Notes: The table reports the estimated coefficients and robust standard errors clustered at the country pair level (in brackets). The dependent variable is total bilateral portfolio investments in natural logs. All regressions are estimated with origin- and destination-country fixed effects and time dummies. ***, **, * denote statistical significance at the 1%, 5%, and 10 % level, respectively.

The modified gravity model specified in equation (3.2), proposes that bilateral portfolio flows are driven by the size (GDP) of the origin and destination

economy as well as the physical distance between the two countries. In Table 20 this proposition holds in column 1 where both GDP estimated coefficients carry the expected positive signs (at the 10% significance level or better) while physical distance has a highly significant negative effect. Therefore, we confirm that more distant countries experience greater information asymmetries translating into lower cross border investment flows. Further, in columns 2 and 3, we document that bilateral imports, the presence of a common currency, common colonial history and common legal origin encourage bilateral financial investments.

In Table 21, we decompose the full sample by splitting portfolio investment flows into (i) advanced and emerging origin and destination countries vis-à-vis the total sample of countries (columns 1 – 4), and (ii) all possible combinations of advanced and emerging origin and destination countries (columns 5 – 8).[75] The estimation of separate regressions allows us to analyse the heterogeneous role of the variables of interest in these subsamples. Evidently, informational distance negatively affects bilateral investment holdings when the origin countries are advanced (emerging) and the destination are emerging (advanced) countries (columns 6 and 7). This may be indicative of the fact that investors from advanced (emerging) countries base their entry to foreign markets on their ability to trade profitably off of their information, i.e. their information must exceed the cost of entry. Although theoretically one may expect that the impact of informational distance is significant among emerging countries, due to the variance in the comprehensiveness and accuracy of information for evaluating a financial investment, this is not confirmed in our estimations. We also find that religious proximity seems to matter particularly when the hosts are emerging countries (columns 4 and 6), thereby highlighting the role of religion in overcoming informational asymmetries in the specific group of countries. Among the rest of the gravity model variables, physical distance, bilateral imports and common colonial history maintain their sign and statistical significance.

[75] We classify countries into advanced and emerging according to IMF classification.

Table 21: Bilateral portfolio holdings: IMF classification

Origin country Destination country	Adv All 1	Eme All 2	All Adv 3	All Eme 4	Adv Adv 5	Adv Eme 6	Eme Adv 7	Eme Eme 8
Informational distance	-0.111***	-0.042	-0.065	-0.088***	0.007	-0.131***	-0.213***	0.017
	(0.032)	(0.046)	(0.048)	(0.030)	(0.052)	(0.036)	(0.079)	(0.050)
Religious proximity	0.330**	0.659**	0.055	1.125***	-0.100	0.664***	0.115	0.401
	(0.167)	(0.280)	(0.224)	(0.197)	(0.220)	(0.257)	(0.498)	(0.370)
Distance	-0.631***	-1.270***	-0.709***	-1.196***	-0.299***	-0.991***	-1.558***	-1.225***
	(0.084)	(0.123)	(0.102)	(0.101)	(0.096)	(0.143)	(0.238)	(0.151)
Time difference	0.012	-0.058**	-0.045**	0.027	-0.023	0.065***	-0.024	-0.079**
	(0.017)	(0.026)	(0.022)	(0.021)	(0.024)	(0.025)	(0.040)	(0.035)
GDP (destination)	2.569***	-0.223	0.167	0.557	3.510***	1.721***	-0.088	0.523
	(0.374)	(0.206)	(0.207)	(0.403)	(0.644)	(0.562)	(0.201)	(0.468)
GDP (origin)	3.359***	0.735	1.116**	1.376**	2.568***	3.658***	0.038	1.647
	(0.490)	(0.855)	(0.528)	(0.641)	(0.589)	(0.748)	(1.154)	(1.279)
Population (origin)	0.416	1.144	-0.657	0.285	-2.201	3.845*	0.708	1.408
	(1.385)	(1.197)	(1.371)	(1.312)	(1.667)	(2.131)	(1.812)	(1.625)
Population (destination)	-1.060	0.182	-0.273	-0.435	-1.255	-0.838	-0.020	-0.438
	(0.806)	(0.171)	(0.345)	(0.344)	(1.906)	(0.868)	(0.300)	(0.346)
Bilateral imports	0.308***	0.122***	0.288***	0.205***	0.517***	0.249***	0.128***	0.135***
	(0.034)	(0.031)	(0.041)	(0.029)	(0.059)	(0.041)	(0.049)	(0.039)
Contiguity	0.075	-0.329	-0.161	0.074	-0.189	0.251	-0.469	-0.063
	(0.183)	(0.291)	(0.219)	(0.237)	(0.193)	(0.352)	(0.580)	(0.337)
Colony	0.515***	0.833**	0.711***	0.400**	0.464**	0.529**	0.984**	0.670
	(0.140)	(0.362)	(0.221)	(0.204)	(0.193)	(0.208)	(0.411)	(0.574)
Linguistic proximity	0.043	0.026	0.059	0.028	0.071*	0.091	0.032	0.036
	(0.036)	(0.055)	(0.040)	(0.045)	(0.041)	(0.061)	(0.086)	(0.073)
Common currency	0.800***	-1.248	1.020***	-0.798	1.081***	-0.134	-0.712	-3.082**

	(0.124)	(0.947)	(0.139)	(0.808)	(0.143)	(0.646)	(0.784)	(1.336)
Common legal origin	0.219***	0.086	0.191**	0.149*	0.265***	0.155*	0.223	0.134
	(0.068)	(0.111)	(0.089)	(0.087)	(0.099)	(0.094)	(0.157)	(0.160)
Observations	12,371	6,987	8,273	11,085	4,923	7,448	3,350	3,637
R-squared	0.81	0.54	0.80	0.65	0.86	0.73	0.60	0.50

Notes: The table reports the estimated coefficients and robust standard errors clustered at the country pair level (in brackets). The dependent variable is total bilateral portfolio investments in natural logs. All regressions include a constant and are estimated with origin- and destination-country fixed effects and time dummies. ***, **, * denote statistical significance at the 1%, 5%, and 10 % level, respectively.

In Table 22, we further decompose the sample by splitting equity and debt investment into all possible combinations of advanced and emerging origin and destination countries. The results indicate that bilateral investments in equity and fund shares are strongly affected by the informational distance (column 2). The magnitude of this relation is rather solid with a one unit increase in the informational difference leading to 17.94% reduction in the bilateral holdings of equity and fund shares markets, *ceteris paribus*. We also document that the impact of informational difference on bilateral debt holdings is marginally significant (at the 10% significance level) and the estimated effect rather small (-4.92%) (column 1). Thus, our findings confirm that investments in debt securities appear to be less informational intensive than investments in equities (Helmanzik and Schmitz, 2017).

In columns 3 – 10, we report the estimation results for all alternative country pairs classified according to their level of economic development. In the case of debt investments, the largest negative (and statistically significant) coefficient on informational distance is found if the origin countries are emerging and the hosts are advanced countries. Instead, for equity investment the corresponding coefficient is highly significant only when the source countries are advanced and the hosts are emerging countries. Taken together, these findings point out that the informational intensity of portfolio investments varies not only with the type of investment, but also with the level of economic development of source and destination countries.

Interestingly, although religious similarity seems to exert a significant positive effect for both types of portfolio investment holdings (columns 1 and 2), a more meticulous analysis suggests that this finding is more evident when the origin countries are advanced and the destination countries are emerging (columns 4 and 8). These findings accord with the estimation results reported in Table 21 and provide evidence that cross-border investments from advanced to emerging countries are significantly explained by structural factors such as cultural proximity.

Table 22: Bilateral debt and equity investment holdings: IMF classification

Origin country	All	All	Adv	Adv	Eme	Eme	Adv	Adv	Eme	Eme
Destination country	All	All	Adv	Eme	Eme	Adv	Adv	Eme	Eme	Adv
Dependent variable	Debt	Equity	Debt	Debt	Debt	Debt	Equity	Equity	Equity	Equity
	1	2	3	4	5	6	7	8	9	10
Informational distance	-0.048*	-0.165***	0.004	-0.047	0.044	-0.254***	0.042	-0.198***	-0.022	-0.148
	(0.027)	(0.036)	(0.057)	(0.038)	(0.049)	(0.079)	(0.053)	(0.050)	(0.068)	(0.091)
Religious proximity	0.801***	1.071***	-0.045	0.587**	0.682*	-0.027	-0.005	0.743**	-0.483	0.398
	(0.148)	(0.195)	(0.231)	(0.259)	(0.361)	(0.504)	(0.281)	(0.347)	(0.505)	(0.554)
Distance	-0.892***	-0.906***	-0.256***	-0.731***	-0.784***	-1.199***	-0.291**	-0.894***	-1.405***	-1.544***
	(0.065)	(0.085)	(0.097)	(0.135)	(0.137)	(0.248)	(0.124)	(0.184)	(0.231)	(0.253)
Time difference	-0.009	-0.018	-0.063**	0.021	-0.080**	-0.047	0.024	0.046	-0.151***	-0.078*
	(0.015)	(0.019)	(0.026)	(0.024)	(0.034)	(0.043)	(0.027)	(0.033)	(0.051)	(0.043)
GDP (destination)	0.421**	0.185	4.526***	2.753***	0.242	0.080	0.226	0.604	1.483***	-0.031
	(0.210)	(0.243)	(0.813)	(0.596)	(0.385)	(0.222)	(0.796)	(0.704)	(0.481)	(0.257)
GDP (origin)	0.339	1.828***	2.588***	3.057***	-0.498	-1.914	1.924***	0.736	4.506*	2.481*
	(0.462)	(0.578)	(0.775)	(0.816)	(1.244)	(1.207)	(0.653)	(1.112)	(2.322)	(1.373)
Population (origin)	2.235*	3.043**	-0.299	13.196***	3.716	-0.714	1.656	16.730***	0.724	4.330**
	(1.281)	(1.201)	(1.797)	(2.354)	(2.386)	(2.258)	(1.539)	(2.915)	(2.273)	(1.940)
Population (destination)	-0.633***	0.058	-0.250	-2.966***	-0.237	-0.408	2.062	1.001	-1.227***	0.371
	(0.239)	(0.217)	(2.058)	(1.110)	(0.442)	(0.349)	(2.540)	(1.210)	(0.351)	(0.409)
Bilateral imports	0.201***	0.237***	0.458***	0.229***	0.135***	0.068	0.549***	0.263***	0.112*	0.052
	(0.024)	(0.034)	(0.054)	(0.042)	(0.038)	(0.051)	(0.076)	(0.061)	(0.067)	(0.060)
Contiguity	-0.010	0.319*	-0.197	0.217	0.064	0.066	0.426*	0.318	-0.224	-0.303
	(0.149)	(0.189)	(0.186)	(0.428)	(0.281)	(0.541)	(0.237)	(0.509)	(0.430)	(0.597)
Colony	0.201	0.739***	0.525***	0.039	1.181**	0.816**	0.573**	0.794***	1.614**	0.969**
	(0.153)	(0.173)	(0.200)	(0.217)	(0.576)	(0.381)	(0.236)	(0.246)	(0.696)	(0.437)

Linguistic proximity	0.036	0.032	0.115***	0.121**	0.057	0.000	0.077	0.107	0.189**	-0.128
	(0.030)	(0.036)	(0.042)	(0.055)	(0.067)	(0.094)	(0.052)	(0.083)	(0.091)	(0.099)
Common currency	1.384***	-0.383***	1.193***	-0.190	-3.302***	-0.287	0.268	0.040	-2.174**	-1.540
	(0.125)	(0.145)	(0.145)	(0.442)	(1.119)	(0.587)	(0.163)	(0.702)	(1.012)	(1.154)
Common legal origin	0.065	0.118	0.336***	0.090	0.034	0.171	0.060	0.251**	-0.282	0.386**
	(0.060)	(0.079)	(0.096)	(0.085)	(0.150)	(0.147)	(0.114)	(0.127)	(0.206)	(0.178)
Observations	15,963	14,221	4,586	5,974	2,706	2,697	4,349	4,966	2,290	2,616
R-squared	0.72	0.73	0.83	0.72	0.50	0.55	0.86	0.72	0.54	0.64

Notes: The table reports the estimated coefficients and robust standard errors clustered at the country pair level (in brackets). The dependent variable is in natural logs. All regressions include a constant and are estimated with origin- and destination-country fixed effects and time dummies. ***, **, * denote statistical significance at the 1%, 5%, and 10 % level, respectively.

3.5.2 Robustness checks

We examine the robustness of our results by employing an alternative estimation technique. Specifically, we re-estimate our gravity model (equation 3.3) with the use of the Poisson Pseudo-Maximum Likelihood Model (PPML) with high–dimensional fixed effects (Correia et al., 2020). All estimations include origin–year and destination–year fixed effects. The inclusion of these country–year fixed effects absorbs the size variables (GDP, and population) from the structural gravity model, as well as all other observable and unobservable country–specific characteristics, which vary across these dimensions.

In column 1 of Table 23 we report the results for total bilateral portfolio investments for all country pairs. Strikingly, the informational distance variable becomes statistically insignificant. In columns 2 – 5 we estimate equation (3.3) for different country pairs classified in accordance with their level of economic development. We document that informational distance is particularly important for investments originating from emerging countries (columns 4 and 5). The corresponding coefficients are negative and significant at the 1% and 5% level, respectively. Specifically, a one unit increase in informational distance between emerging (origin) and advanced (destination) countries implies a reduction of approximately 53% [(exp(-0.428)-1)*100] in total portfolio investments. The corresponding effect among emerging countries is 26.5%. We, further, confirm that informational distance is more important (in terms of economic and statistical significance) for equity than debt investments (columns 6 and 7). Investments in debt securities are better explained by other structural factors, such as the physical distance, the presence of common legal origin and currency, trade links, past colonial relations and linguistic proximity.

Religious proximity retains its positive sign and statistical significance, thereby verifying that greater cultural similarity leads to more intensive bilateral total, debt or equity portfolio investment activity (columns 1, 6 and 7). Nevertheless, this effect seems to be stronger for bilateral investments among advanced (column 2) and among emerging (column 5) economies.

Overall, the PPML estimates validate that informational distance distorts investors' decisions to acquire foreign portfolio investment assets, while

religious proximity encourages cross border financial transactions. Furthermore, they confirm that these effects are country dependent and vary with the degree of information sensitivity of portfolio investments.

Table 23: Bilateral portfolio holdings: PPML estimates

Origin country	All	Adv	Adv	Eme	Eme	All	All
Destination country	All	Adv	Eme	Adv	Eme	All	All
Dependent variable	Total	Total	Total	Total	Total	Debt	Equity
	1	2	3	4	5	6	7
Informational distance	-0.125	0.045	-0.098	-0.428***	-0.235**	-0.151*	-0.206**
	(0.093)	(0.100)	(0.083)	(0.112)	(0.118)	(0.087)	(0.101)
Religious proximity	0.833***	0.726***	0.111	-0.985	2.702***	0.764***	1.205***
	(0.210)	(0.234)	(0.327)	(0.608)	(0.703)	(0.204)	(0.304)
Distance	-0.084	-0.081	-0.301**	-0.905***	-0.480**	-0.193***	0.076
	(0.065)	(0.070)	(0.136)	(0.255)	(0.206)	(0.059)	(0.093)
Time difference	-0.051**	-0.032	-0.002	-0.063*	-0.174***	-0.055***	-0.067**
	(0.020)	(0.022)	(0.025)	(0.037)	(0.055)	(0.018)	(0.026)
Bilateral imports	0.123**	0.178***	0.021	0.170***	0.259***	0.155***	0.035
	(0.049)	(0.053)	(0.073)	(0.056)	(0.070)	(0.048)	(0.057)
Contiguity	0.429***	0.224*	1.517***	-0.443	0.774***	0.236*	0.887***
	(0.165)	(0.115)	(0.321)	(0.401)	(0.265)	(0.137)	(0.229)
Colony	-0.161*	-0.192*	0.056	1.682***	2.289**	-0.233**	0.019
	(0.094)	(0.099)	(0.167)	(0.326)	(0.990)	(0.106)	(0.094)
Linguistic proximity	-0.050*	-0.043*	0.124	0.141	-0.204***	-0.068**	0.012
	(0.027)	(0.026)	(0.091)	(0.167)	(0.071)	(0.026)	(0.040)
Common currency	0.958***	0.946***	-0.833	0.840	-4.333***	0.825***	0.667***
	(0.118)	(0.127)	(0.590)	(0.587)	(1.263)	(0.121)	(0.147)
Common legal origin	0.070	0.230***	0.054	0.265	-1.381***	0.201**	-0.155
	(0.100)	(0.078)	(0.112)	(0.202)	(0.272)	(0.097)	(0.106)
Observations	31,092	5,071	12,516	4,060	8,599	28,714	27,329
Pseudo R-squared	0.96	0.96	0.95	0.89	0.90	0.95	0.96

Notes: The table reports the estimated coefficients and robust standard errors clustered at the country pair level (in brackets). The dependent variable is in levels. All regressions include a constant and are estimated with origin – year and destination – year fixed effects. ***, **, * denote statistical significance at the 1%, 5%, and 10 % level, respectively.

3.5.3 Common religion dummy

Our results so far suggest that greater religious similarity increases the propensity to invest in foreign markets. To verify the validity of this correlation, we employ an alternative indicator capturing the commonality of the dominant religious affiliations between countries. Thereby, we substitute the religious proximity index with the common religion dummy variable.

In Table 24, we incorporate the common religion dummy and re-estimate our regressions for different types of bilateral portfolio holdings. In columns 1 – 3, we report the coefficients estimated with pooled OLS, whereas in columns 4 – 6, we use the PPML with high-dimensional fixed effects estimator.

Foremost, our baseline results (column 1) confirm that common religious affiliations between origin and destination countries lead to greater bilateral portfolio investment flows. The coefficient of common religion dummy (0.718) is positive and statistically significant at the 5% level. However, when we conduct a separate analysis for bilateral debt and equity holdings (columns 2 and 3), we show that the effect of common religion prevails only for investments in equity holdings. The PPML results, reported in columns 4 – 6, reinforce this finding and highlight the importance of common religion affiliation in cross border equity investments.

We also verify the statistically significant, negative effect of informational distance on foreign investments patterns in all specifications. The remaining control variables enter with the expected sign. Among gravity-type variables, geographical distance and time difference reduce international investment activity, whereas common borders, existing trade relations and common legal origin facilitate cross border financial transactions. Our results for past colonial relations are unstable and less conclusive.

Table 24: Bilateral portfolio holdings: common religion dummy

Estimation technique	Pooled OLS	Pooled OLS	Pooled OLS	PPMLHDFE	PPMLHDFE	PPMLHDFE
Dependent variable	Bilateral investments (logs)	Debt (logs)	Equity (logs)	Total bilateral investments	Total debt	Total equity
	1	2	3	4	5	6
Informational distance	-0.102***	-0.052*	-0.172***	-0.157*	-0.179**	-0.241**
	(0.027)	(0.028)	(0.036)	(0.095)	(0.087)	(0.107)
Common religion	0.718**	0.482	0.999**	0.832*	0.526	1.553***
	(0.334)	(0.375)	(0.460)	(0.452)	(0.529)	(0.491)
Distance	-1.062***	-0.919***	-0.934***	-0.073	-0.185***	0.091
	(0.068)	(0.065)	(0.085)	(0.066)	(0.061)	(0.095)
Time difference	-0.003	-0.012	-0.020	-0.049**	-0.050***	-0.070**
	(0.016)	(0.015)	(0.019)	(0.021)	(0.018)	(0.027)
Bilateral imports	0.226***	0.203***	0.240***	0.132***	0.173***	0.023
	(0.024)	(0.024)	(0.034)	(0.050)	(0.047)	(0.061)
Common currency	0.856***	1.423***	-0.308**	1.087***	0.945***	0.853***
	(0.124)	(0.125)	(0.143)	(0.111)	(0.116)	(0.144)
Contiguity	-0.088	-0.003	0.340*	0.449***	0.242*	0.930***
	(0.163)	(0.151)	(0.188)	(0.167)	(0.137)	(0.239)
Colony	0.506***	0.263*	0.801***	-0.157*	-0.228**	0.025
	(0.148)	(0.154)	(0.176)	(0.094)	(0.103)	(0.098)
Linguistic proximity	0.048*	0.071**	0.075**	-0.006	-0.027	0.070*
	(0.029)	(0.029)	(0.035)	(0.026)	(0.025)	(0.038)
Common legal origin	0.201***	0.110*	0.175**	0.124	0.252***	-0.079
	(0.063)	(0.059)	(0.078)	(0.096)	(0.093)	(0.100)
GDP (destination)	0.145	0.392*	0.179			
	(0.211)	(0.208)	(0.242)			
GDP (origin)	1.385***	0.382	1.843***			
	(0.420)	(0.462)	(0.580)			
Population (origin)	0.008	2.201*	3.009**			
	(0.944)	(1.280)	(1.196)			
Population (destination)	-0.125	-0.612***	0.051			
	(0.206)	(0.234)	(0.215)			
Constant	-36.397**	-46.786**	-102.841***	10.836***	10.689***	10.264***
	(17.202)	(21.539)	(22.193)	(0.709)	(0.656)	(0.993)
Observations	19358	15963	14221	31092	28714	27329
Pseudo Rsquared				0.9593	0.9507	0.9603
Rsquared	0.7313885	0.7187231	0.7277049			

Notes: The table reports the estimated coefficients and robust standard errors clustered at the country pair level (in brackets). In Columns 1-3, the regressions are estimated with pooled OLS and include origin- and destination-country fixed effects and time dummies. The dependent variables are total bilateral investments, bilateral investments in debt securities and bilateral investments in equity and fund shares, respectively, all in natural logs. In columns 4-6, the regressions are estimated using PPML with high-dimensional fixed effects and include country-year dummies. The dependent variables are total bilateral investments, total investments in debt securities and total investments in equity and fund shares, respectively. All regressions include a constant. ***, **, * denote statistical significance at the 1%, 5%, and 10 % level, respectively.

3.5.4 The impact of deep vis-à-vis shallow integration

In this subsection, we check the robustness of our findings when both origin and destination countries have entered a market integration scheme. Market integration reduces information asymmetries across countries, and thus lowers transaction costs (Guerin, 2006). To this end, we distinguish between "deep" and "shallow" integration. Following Lawrence (1996), Campos et al. (2019) and Bruno et al. (2021), we define shallow integration in terms of free trade area, whereas deep integration refers to both political and economic inter-linkages between countries. The latter is exemplified by the European Union especially after the implementation of the single market in 1993. Therefore, we incorporate in our model two dummy variables reflecting the European Union (EU) membership (deep integration) and signed Regional Trade Agreements (RTAs) (shallow integration). In Table 25, we re-produce the PPML estimates with high dimensional fixed effects (equation 3.3).

In the estimates reported in Table 25, we investigate the impact of the EU membership and RTAs on the patterns of total bilateral portfolio investments (column 1 and 2), investments in debt securities (column 3) and investments in equity and fund shares (column 4). First, we document that our main findings remain robust. Specifically, greater informational distance discourages investors from purchasing foreign capital, while mutual trust (measured by religious proximity) increases their willingness to engage in cross-border transactions. Next, we find that deep integration (EU dummy) significantly amplifies the level of foreign holdings of capital with the corresponding coefficient being highly significant (columns 1 and 2). In contrast, shallow integration (RTA dummy) seems to play no role in attracting foreign financial investments (columns 2 and 3). Nevertheless, a more detailed analysis suggests that the role of deep and shallow integration in investment choices varies with different types of portfolio investments. Specifically, we find that deep integration matters only for investments in foreign debt securities, whereas the existence of RTAs strongly encourages foreign investments in equity and fund shares. Taken together, these findings suggest that although market integration reduces investors' home bias, informational distance and religious proximity continue to play an important, independent role in their investment choices.

Table 25: Total Bilateral Portfolio Investments: deep vis-à-vis shallow integration (PPML estimates)

	Total Portfolio Investment	Total Portfolio Investment	Debt Securities	Equity&Fund Shares
	1	2	3	4
Informational distance	-0.188**	-0.191**	-0.186**	-0.259***
	(0.092)	(0.093)	(0.089)	(0.097)
Religious proximity	1.490***	1.495***	1.273***	1.717***
	(0.206)	(0.208)	(0.205)	(0.292)
Geographical distance	0.007	0.015	-0.100	0.120
	(0.066)	(0.068)	(0.067)	(0.089)
Time difference	-0.054***	-0.045***	-0.049***	-0.045**
	(0.020)	(0.017)	(0.016)	(0.023)
Bilateral Imports	0.095*	0.096*	0.124**	0.035
	(0.052)	(0.053)	(0.055)	(0.057)
Contiguity	0.502***	0.493***	0.308**	0.844***
	(0.164)	(0.154)	(0.132)	(0.207)
Colony	-0.040	0.004	-0.062	0.137
	(0.105)	(0.125)	(0.146)	(0.111)
Linguistic proximity	-0.076***	-0.071**	-0.085***	0.010
	(0.029)	(0.031)	(0.029)	(0.046)
Common legal origin	0.116	0.107	0.227**	-0.141
	(0.099)	(0.104)	(0.101)	(0.105)
EU membership	0.875***	0.799***	0.635***	0.256
	(0.162)	(0.202)	(0.203)	(0.179)
RTA		0.166	0.227	0.342**
		(0.192)	(0.200)	(0.161)
Constant	10.272***	10.095***	10.139***	9.430***
	(0.769)	(0.778)	(0.700)	(1.011)
Observations	31092	31092	28714	27329
Pseudo Rsquared	0.9582	0.9583	0.9497	0.9611

Notes: The table reports the estimated coefficients and robust standard errors clustered at the country pair level (in brackets). The dependent variables are in levels. All regressions include a constant and are estimated with origin – year and destination – year fixed effects. ***, **, * denote statistical significance at the 1%, 5%, and 10 % level, respectively.

3.5.5 Risk diversification motive in equity markets

The financial literature posits that investors draw greater benefits from international portfolio diversification when the comovements between financial assets of two countries are low or negative (Portes and Rey, 2005). Thus, in this final exercise we control for the risk diversification motive in cross border equity holdings. To this end, we incorporate the covariance between annual equity returns in origin and destination countries in the set of controls, and report the results in Table 26.

Our pooled OLS results in column 1 show that, in contrast to the diversification motive, the covariance variable enters with a positive sign in our baseline regression.[76] Interestingly, this counterintuitive finding holds while controlling for information frictions, religious proximity and geographical distance (all variables are highly significant at the 1% significance level). Taken together, these results suggest that investors prefer to invest in markets which are informationally, culturally and geographically *close* to them, i.e. in markets which are more likely to exhibit positive comovements with their home country's business cycle.

The PPML results shed further light on this issue. Specifically, the detailed analysis in columns 2 – 6 shows that the baseline findings are somewhat unstable when classifying origin and destination countries as advanced and emerging. Notably, the risk diversification motive holds only for equity investment flows from advanced to emerging countries. Specifically, in column 4, the covariance variable is negative and highly significant (at the 1% significance level), while both distance variables enter with a (significant) negative sign.

Overall, we conclude that there is weak evidence for a diversification motive in international equity investments when we control for information frictions. As such, we view the results from this exercise as less robust than our results on the informational distance and religious proximity reported in Tables 20 –23.

[76] The covariance variable is statistically significant at the 10% level.

Table 26: Bilateral equity holdings: Risk diversification

Estimation technique	Pooled OLS	PPMLHDFE	PPMLHDFE	PPMLHDFE	PPMLHDFE	PPMLHDFE
Origin country	All	All	Adv	Adv	Eme	Eme
Destination country	All	All	Adv	Eme	Adv	Eme
Dependent variable	Logs of equity	Total equity	Total equity	Total equity	Total equity	Total equity
	1	2	3	4	5	6
Informational distance	-0.116***	-0.186	0.009	-0.346**	-0.681**	-0.216
	(0.042)	(0.117)	(0.110)	(0.136)	(0.314)	(0.237)
Religious proximity	1.004***	1.206***	1.010***	0.145	0.119	1.233
	(0.205)	(0.303)	(0.341)	(0.296)	(0.735)	(0.828)
Covariance of equity returns	0.001*	0.001**	0.000	-0.002***	-0.001	0.003*
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Distance	-0.770***	0.073	0.058	-0.375***	-0.200	-1.076***
	(0.089)	(0.094)	(0.096)	(0.130)	(0.256)	(0.291)
Time difference	-0.027	-0.070***	-0.028	-0.017	-0.224***	-0.530***
	(0.020)	(0.027)	(0.029)	(0.022)	(0.037)	(0.085)
Bilateral imports	0.357***	0.023	0.114*	-0.088	0.181**	0.246**
	(0.041)	(0.059)	(0.060)	(0.093)	(0.081)	(0.109)
Common currency	-0.294**	0.656***	0.729***	-0.814	2.474**	
	(0.144)	(0.150)	(0.154)	(0.654)	(1.111)	
Contiguity	0.170	0.890***	0.653***	1.640***	-1.135	0.613
	(0.202)	(0.232)	(0.129)	(0.298)	(0.873)	(0.473)
Colony	0.570***	0.027	-0.059	0.151	1.604***	2.083
	(0.183)	(0.094)	(0.103)	(0.156)	(0.348)	(1.351)
Linguistic proximity	0.023	0.014	-0.017	0.094	-0.082	-0.434***
	(0.039)	(0.040)	(0.033)	(0.102)	(0.333)	(0.154)
Common legal origin	0.181**	-0.155	-0.034	0.031	0.712***	-1.687***
	(0.082)	(0.106)	(0.087)	(0.074)	(0.230)	(0.355)
GDP (destination)	-0.388					
	(0.456)					
GDP (origin)	1.375**					
	(0.543)					
Population (origin)	2.703**					
	(1.192)					
Population (destination)	1.795					
	(1.137)					
Constant	-104.867***	10.230***	9.584***	14.012***	9.717***	19.131***
	(26.773)	(0.977)	(0.862)	(1.807)	(2.541)	(2.545)
Observations	11947	16747	4740	5366	3109	3453
Pseudo Rsquared		0.9569	0.9700	0.9637	0.9277	0.9679
Rsquared	0.7665812					

Notes: The table reports the estimated coefficients and robust standard errors clustered at the country pair level (in brackets). The dependent variable in Column 1 is total bilateral investments in equity and fund shares in natural logs. The dependent variable in Columns 2-6 is total bilateral investments in equity and fund shares. In Column 1 the regression is estimated with pooled OLS and includes origin- and destination-country fixed effects and time dummies. In Columns 2-6, the regressions are estimated using PPML with high-dimensional fixed effects and include country-year dummies. All regressions include a constant. ***, **, * denote statistical significance at the 1%, 5%, and 10 % level, respectively.

3.6 Concluding remarks

In this paper, we empirically investigate the role of informational distance and religious proximity in shaping the patterns of bilateral portfolio choices. We employ a world sample containing information about bilateral portfolio flows for almost all advanced and emerging economies over the 2010 – 2014 period.

Our main findings suggest that international portfolio investment activity is strongly correlated with the scope, accessibility and quality of credit information available in foreign markets. Specifically, we find that the informational distance between advanced and emerging countries discourages bilateral portfolio investment flows. In contrast, religious proximity, which translates into cultural interconnectedness and mutual trust, significantly increases the willingness of investors to engage in cross border portfolio investments. The latter effect is more evident for portfolio investments flowing into emerging markets, thereby suggesting that investors rely on cultural familiarity and trust when investing in foreign emerging countries. We reinforce the validity of these results by employing a more efficient estimation technique, an alternative measure of religious proximity, and controlling for market integration (shallow or deep) and risk diversification motives.

These findings yield significant implications for future research and for policy. First, they emphasize the importance of policies and practices to support well-functioning institutions for collecting and sharing credit information. These institutions are essential for reducing the credit informational distance observed between advanced and emerging markets and for increasing bilateral portfolio investment flows. Second, our results highlight that cultural proximity, and the concomitant mutual trust, dictates the behaviour of investors in debt and equity transactions especially in emerging countries. As such, it becomes crucial to understand the determinants of investors' perception of trustworthiness of emerging capital markets. In our future research agenda, this issue can be refined by using

more specific trust measures, should they become available, such as the investors' trust in financial institutions and markets.

Conclusion

In the course of globalization process, academics and policymakers have well recognized the benefits of international trade in promoting economic development across countries. The opening to international markets yields specialization and productivity gains, allows for positive externalities in terms of knowledge and technology spillover effects, creates opportunities for product diversification and innovation and improves accessibility to world factor markets (Krugman, 1979; Grossman and Helpman, 1990; Young 1991; Dornbusch, 1992; Sachs and Warner, 1995; Krugman et al., 2002). However, because penetration and expansion into foreign markets entails sunk costs (e.g. setting up distribution networks and tailor-making products to suit the needs of each foreign market) and special financial needs, exports are determined by external financing accessibility (Foley and Manova, 2015). Hence, well-functioning financial institutions facilitate firms' access to more sources of financing that are essential to support their export activity (Kletzer and Bardhan, 1987; Beck, 2002, 2003).

Chapter I of the present thesis provides useful contributions to the international economics literature. Guided by the information theory, we argue that bank market power can encourage export activity through relationship lending instruments that alleviate credit constraints and information asymmetries between potential borrowers and lenders (Petersen and Rajan, 1995; Boot and Thakor, 2000; Marquez, 2002; Caminal and Matutes, 2002). Using the Lerner Index to describe the bank market structure, we assess the impact of bank market power on aggregate exports for a world sample over the 1997 – 2010 period. In line with our priors, we find that greater bank market power promotes export activity at the country level. Nevertheless, this effect becomes evident only when a country achieves a certain level of economic development. Furthermore, by distinguishing between transparent and informationally opaque countries, we document that the effect of bank market power on aggregate exports is stronger in markets characterized by higher information asymmetries. Finally, we conduct a more meticulous examination of the bank market structure influence on export intensity in low and middle

income countries by using firm level export data. The results from this exercise concord with the findings at the country level analyses which suggest the absence of a statistically significant effect of bank market structure on exports in developing countries.

Chapter II investigates another issue related to trade policy in developing countries. In these countries, the trade liberalization process has been actively ongoing for the past 40 or more years following the World Bank's and IMF's recommendations. Nevertheless, developing economies are still far from complete integration into international markets and partially retain trade barriers (Rajaram, 1992; Ebrill et al., 1999; Keen and Lockwood, 2010). Historically, trade taxes have been a primary source of government revenues in these countries. Thereby, the enforcement of trade liberalization reforms requires an offsetting mechanism, such as broadening the tax base and adopting VAT, to sustain fiscal balance (Datta-Mitra, 1997; Hatzipanayotou et al., 1994; Keen and Ligthart, 2002). However, the recent literature stresses that tax administration inefficiencies impede the elimination of tariffs and export taxes and renders the introduction of more complex tax systems infeasible (Emran, 2005; Boadway and Sato, 2009).

Chapter II contributes to the international trade literature by designing an intuitive theoretical framework for analysing the welfare and revenue implications of piecemeal trade reforms in the presence of tax administration costs. In line with Hatzipanayotou et al. (1994) and Keen and Ligthart (2002), our model draws on the standard model of coordinated producer-price-neutral radial reform and consumer-price-neutral radial and selective reform. The costs of tax administration are introduced as the part of revenues consumed during collection and coordination of consumption and production taxes. We, then, define the sufficient conditions for welfare-improving and revenue-enhancing effects of trade reforms. Specifically, we show that excessive tax administration costs can induce welfare and revenue losses resulting from piecemeal trade reforms. Thereby, we theoretically confirm that poor-functioning tax administration systems impede economies from successful implementing piecemeal trade reforms and integrating into the world market.

Chapter III focuses on the patterns of international portfolio choices. Recognizing that information asymmetries associated with foreign markets determine investors' behaviour, we introduce a novel informational distance indicator which measures bilateral differences in credit market opacity. At the same time, we assess whether religious similarity encourages cross border portfolio investments due to greater cultural interconnectedness and mutual trust.

The empirical model in Chapter III augments the standard gravity model by incorporating the bilateral informational distance indicator and bilateral religious proximity along with a set of control variables capturing the influence of economic size, geographical distance, historical and cultural ties, legal practices and established trade relations. The analysis considers bilateral portfolio flows between 70 origin and 162 destination countries over the 2010 – 2014 period. The baseline results show that informational distance significantly discourages international portfolio investment activity. This effect seems to be stronger for equity than for debt investments, indicating the larger information sensitivity of equity investments. Nevertheless, the negative implications of informational frictions are mitigated by greater religious proximity between countries. The latter finding accords with the literature which suggests that religious similarity fosters reciprocal trust (Guiso et al, 2003; Daniels and von der Ruhl, 2010; Guiso et al., 2009) and facilitates cross-border investment activity (Knack and Keefer, 1997; Guiso et al., 2008; Guiso et al., 2009). Next, we document that the determinants of bilateral equity and debt holdings vary across different groups of countries. Specifically, we show that the negative impact of informational distance is more prominent for investment decisions between advanced and emerging countries. In contrast, financial investments between emerging countries seem to be primarily driven by religious proximity, thereby highlighting the role of mutual trust and cultural similarity in international portfolio holdings in this group of countries.

Our baseline findings hold when using alternative (and more precise) estimation techniques, or a different measure of religious commonality. Moreover, we confirm our main findings after taking into account the impact of

shallow and deep market integration. In our final exercise, we control for the risk diversification motive of investors. The results suggest that investors based on advanced economies pursue risk spreading strategies only when investing in emerging countries' equities. In general, investment decisions are rather dictated by the familiarity effects with foreign countries as captured by the institutional, geographical and cultural characteristics.

The three chapters of this thesis contribute to the international economics literature and provide important policy recommendations for advanced and developing economies. Chapter I highlights the role of banks in providing external financing to exporters, especially in informationally opaque markets. The findings suggest that policymakers, and especially those located in relatively informationally opaque markets, should encourage banking institutions to invest in relationship lending schemes as a means to alleviate informational frictions during the internationalization process of exporting firms.

The theoretical predictions of Chapter II show that the possible welfare and revenue improvements of trade reforms are ambiguous in the presence of tax administration costs. In particular, we find that the positive welfare and revenue implications of trade reforms in developing countries are realizable only when sufficient conditions for the critical value of tax administration costs are met. Thereby, developing countries should implement policies for improving the efficiency of their tax administration systems through legal and judicial reforms and the development of complementary technological infrastructure. These policies should be further accompanied by measures which ensure the quality of tax administration personnel.

The findings of Chapter III suggest that credit market transparency significantly increases the propensity to invest in foreign financial assets. As such, policymakers should introduce regulations and adopt practices aiming at establishing efficient information sharing institutions. At the same time, building a high trusting environment is found to be critical for cross border financial investments, especially among emerging countries. This provides some guidance as to which countries might be the most promising destinations for foreign

investors. As such, it becomes crucial to understand the determinants of investors' perception of the trustworthiness of the equity and debt markets

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