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International Trade Determinants of Unequal Exchange Through Panel Data Analysis. An Alternative View of International Development.

by

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I approach international development from an international relations perspective. To do so, I first review historical and current economic relationships between developed and developing countries. After confirming the existence of hidden value transfers flowing from low income to wealthy countries, I conduct a panel data analysis on 89 developing countries from 1985 to 2017. The main objective of my empirical analysis is to explore the determinants of unequal exchange present in the international economic system. I find that while openness to trade reduces unequal exchange, exporting to high income countries indeed entails an increase in the loss of value due to unequal exchange. This result is encouraging, since it opens the possibility of improving the way developed and developing countries interact in the international trade arena.

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1. Introduction

Imagine a downward spiral, and then imagine that the world looks like that spiral. In the center there is a tiny group of nations, with their economic mouths open, hungry for resources. At the edge of the spiral, with their pockets full of resources, the rest of nations spin and spin around the center. Here, at the edge, the spiral is powerful, almost like a hurricane. It drags countries' resources, which flow and flow into the hungry mouths that wait in the center. The spiral has been spinning for centuries. Soon, those at the edge will end up with nothing, the spiral will empty their pockets. In the center, however, the spiral looks calm and natural, as if resources had always flowed to the center, to feed the hungry mouths. The spiral has been spinning for centuries. Soon, those at the edge will end up with nothing, those at the core will have eaten everything.

The previous story exemplifies the approach to international development and illustrates the framework of this thesis. For centuries, international relations between countries have been shaped to locate high income nations in the core of the international economic system and middle and low income countries at the periphery, surrounding the core and providing it with resources. This core-periphery structure was clear during the colonial era, but, as this thesis will argue, part of this global economic structure remains still today.

Among the many consequences of the core-periphery global economic system, one of them is the unequal exchange in international trade. Put simply, unequal exchange happens when the location of creation of value and the location of capture of that value are not the same (Ricci, 2019). Driven by the core-periphery structure of the global economic system, this is exactly what happens in international trade when the global South interacts with the global North (Chaves, 2005; Cope, 2019; Emmanuel, 1972; Henderson et al., 2002; Hickel et al., 2021; Frank, 1966; Ricci, 2019). The term "unequal exchange" was first coined by Arghiri Emmanuel (1972), who in his book "Unequal exchange: A study of the imperialism of Trade" indeed quotes Marx to illustrate the base of the unequal exchange theory:

"If the free traders cannot understand how one nation can grow rich at the expense of another, we need not wonder, since these same gentlemen also refuse to understand how within one country one class can enrich itself at the expense of another". (Karl Marx, 1848. P. 223. Quoted by Emmanuel (1972, p.vii)).

According to Emmanuel (1972) and other theorists of unequal exchange (Chaves, 2005; Cope, 2019; Hickel et al., 2021; Frank, 1966; Ricci, 2019), every time a poor country engages in international trade with a rich country, two simultaneous transactions occur. An 'official' transaction, evidenced by the official records of both countries, in which the two parties agree on the exchange of, say, a certain commodity for a specific quantity of money. And, simultaneously, hidden in the official transaction, an 'unofficial' transfer of value flows from the poor country to the wealthy one, creating a systemic loss of potential resources for the global South at the same time as a continuous capture of value by the global North (Emmanuel, 1972). Two immediate consequences of this unequal relationship arise. The first consequence implies that gains from trade are not equitable for every

party, and that some countries gain more than others. The second consequence is that those gaining less from international trade are those located at the periphery of the economic system, the so called low and middle income economies.

Within this context, this thesis focuses on the unequal parts of international trade attending to several motivations. First, as developing countries are suffering the most from unequal exchange, addressing this part of international trade can have a direct impact on countries' development. In addition, there is consensus in the literature that engaging in international trade is necessary for economic growth (Acemoglu, Johnson & Robinson, 2005), poverty reduction and, in general, development (IMF, 2001). However, if we only focus on the positive impacts of international trade, the negative parts can never be improved. Finally, the traditional understanding of international development has mainly focused on countries' domestic conditions to explain why some countries are more developed than others, or which domestic conditions poor countries should improve if they are to develop. However, the existence of unequal exchange and the core-periphery global economic system tells a different story. It is not only domestic conditions, but international relations which causes development and underdevelopment of countries (Frank, 1966). For this reason, addressing development from an international trade perspective is crucial for a future equal global economic system and this is why this thesis takes this perspective.

In my study, I contribute to the development literature in two ways. First, I show the theoretical validity of unequal exchange literature in today's economic relationships between developed and developing countries. To do so, I review unequal exchange theories written during the 1950s to 1970s and relate them to today's international relations between developed and developing countries. My theoretical analysis indicates that, indeed, unequal relationships exist between the two groups. Secondly, to my knowledge, I conduct the first empirical analysis on the drivers of unequal exchange in international trade between developed and developing countries. To do so, I use data on the unrecorded value transfers from periphery to core economies caused by a specific mechanism of unequal exchange: distortions in the exchange rates system. To conduct the analysis, I have constructed a panel database of 89 developing countries from 1985 to 2017. Through random effects analysis, I find a dual impact of trade relationships with advanced economies. On the one hand, exporting high income economies entails an outflow of hidden value for developing countries, possibly limiting their gains from trade. On the other hand, in line with conventional economic wisdom (IMF, 2001), exporting to advanced economies has a long run positive impact for developing countries. As I will argue, this result is promising, since addressing those drivers of unequal exchange opens the possibility of enlarging the positive impacts of trade.

The rest of the thesis continues as follows: Section 2 digs deeper into the theoretical framework of unequal exchange. The section presents the basic theoretical foundations of unequal exchange, attending to historical and current relationships between the Global South and the Global North. Section 3 offers a review of empirical evidence quantifying unequal exchange. Section 4 focuses on the understanding and construction of unequal exchange happening in exchange rate markets, the main measure of unequal exchange for my empirical analysis. Section 5, presents the data and methodology. Sections 6 and 7 describe and discuss the main results. Section 8 concludes.

2. The Global Economic System, Unequal Exchange and International Development

2.1. Historical Origins of the Global Economic System

To understand the relevance of tackling international development from a global perspective, it is necessary to look at the historical origins of the global economic system during the mercantilist era (Ricci, 2021) and the spread of the capitalist and imperial economic structures during colonialism (Frank, 1966; Chaves, 2005; Hickel et al., 2021; Hickel et al., 2022).

Today, our understanding of international trade builds on classical trade theories, such as the ones developed by Ricardo, Adam Smith or Heckscher and Ohlin, which have taught us that trade is a natural, unbiased force, equalizing prices and leading economies towards their economic advantage. Within this view, the basic assumption tells us that whenever countries open up to trade, neutral trading forces will find the best way to equilibrate the needs of all parties. However, this has not always been the understanding of international trade. In fact, between the 16th and 18th centuries, where the roots of the current global economic system are to be found (Ricci, 2021), the approach to international trade fundamentally opposed the classical neutral view.

During the mercantilist era - i.e. between the 16th and 18th centuries -, Western economies, such as England, Holland and France, understood international commerce as unequivocally beneficial for one party while unprofitable for the other. For mercantilists, thus, the idea that trade is of equal common advantage was ruled out fundamentally and therefore efforts had to be made to ensure the winning position in the international arena. As such, countries consciously tried to engage in trade in their most advantageous way, trying to reap as much gains as possible from the others. During this time, it was common knowledge that economies had to use international markets for their own benefit (Ricci, 2021). Thus, mercantilist economies sought the stimulation of their domestic markets at the same time that tried to maximize gains from international commerce mainly by the imposition of import duties and export subsidies (Ricci, 2021). Actually, this ideological understanding of international trade is widely accepted by Keynesian and Marxist economics as one of the engines of the transition from a natural economy to a money economy based on the accumulation of capital (Harvey, 2003). During the mercantilist period, therefore, Western European countries started to slowly transform their economies into capital accumulation structures, fundamentally architected to capture wealth and resources. Moreover, back then, capital accumulation was based on transfers of value from accumulation by dispossession (Harvey, 2003), namely, the enclosure of national lands and foreign territories. In addition, the ultimate goal of the mercantilist economy was to ensure the enrichment of the monarchy, which justified the means of accumulation. It is in this mercantilist spoliation period that we find the origins of Western Economies first processes of capital accumulation and industrial modernization and the first aims to manipulate international trade (Ricci, 2021).

During the colonial era, Western Europe expanded its accumulation process by taking almost absolute control of, and deeply transforming, the international economic system. During this period, European economies forcibly and intentionally integrated colonized territories into the global economic system under conscious unequal terms. As such, colonies directly contributed to the development of their metropolis by providing them with free land, free labor and free natural resources, what enhanced Western economies' growth at the expense of the colonies' development (Chaves, 2005; Hickel et al., 2021; Hickel et al., 2022; Frank, 1966;). The result of this system of value extraction was the development of a global economic structure in which resources continuously flowed to a minority of countries, the 'core', from the rest of the world, the 'periphery'. Even though almost all countries are today free from colonial domination, we have ended up with an international economic system based on two historical legacies: one developed during the mercantilist era, that taught countries to shape the international trade arena to their own benefit. And one developed during the imperialist era, that indeed entailed the transformation of the international trade arena into an unequal system of value extraction, designed to benefit the core at the expense of the periphery. The core of the system is what we now know as advanced or high income countries, while the large set of today's low and middle income economies are located in the periphery of the system. It is precisely within this unbalanced global scenario that unequal exchange theory finds an explanation to the different levels of development, and why it is essential to understand it if international development is to be really addressed.

This relationship of domination and value absorption continues to define the global economy in the post colonial era, and as the next subsection will show, core countries still rely on the appropriation of resources from the periphery to ensure their development (Hickel et al., 2022). Therefore, when core and periphery countries engage in international trade, they still do it within an unequal economic structure that levels the field towards high income countries and that impedes the neutral trade forces imagined by Ricardo and Heckscher and Ohlin to equilibrate international gains. In fact, it might be precisely because of unequal exchange that international trade has come to be seen as equally advantageous for everyone engaging in it. Once the economy had been deliberately structured in a way that allowed Western Europe to dominate the global economics sphere, it was probably uncomplicated for this elite of countries to experience high benefits from trade, and to conclude that these results had to be the same for everyone (Chang, 2008).

Within this understanding of an unequal global economic structure the next subsection explains the basic mechanisms through which unequal exchange occurs in international trade.

2.2. Theoretical Framework of Unequal Exchange and Current State of International Economic Relationships

As already explained, the basic premise of unequal exchange theory to explain countries' development are the hidden transfers of value flowing from the periphery to the core. These value transfers are hidden because they are part of the global economic system, but they do not appear anywhere but in the development level of countries. For unequal exchange theory, hidden transfers of value occur because prices are kept artificially low in poor countries. At first sight, the fact that prices are lower in poor countries might seem natural. However, being part of the international economic system, they are also the result of historical and current economic relationships between core and periphery (Chaves, 2005; Cope, 2019; Hickel et al., 2021; Frank, 1966; Ricci, 2019) that allow wealthy economies to benefit from large sources of cheap resources while causing a continuous loss of value for poorer economies.

For Emmanuel (1972), who first introduced the term unequal exchange, wage differentials between core and periphery are the main mechanism through which prices are kept low and unequal exchange happens in international trade. Even though wages might be originally lower in poorer countries, Emmanuel emphasized that institutional reasons prevent them from competitive equalization. To build his theory, Emmanuel modified the classical trade theory model introduced by Ricardo¹ by introducing the international mobility of one of the factors of production, capital, while maintaining the immobility of the other factor, labor, as he claimed that it better described the reality of a capitalistic economy. The immobility of labor confined wages to the national level, unable to equalize in competitive equilibrium and thus condemned to remain low in poorer countries. For Emmanuel, the main explanation for differing national wage levels is found in the different levels of bargaining power of trade unions, historically lessened in the periphery by the coercive forces during the colonial period (Emmanuel, 1972). However, the institutional mechanism keeping them low, i.e. preventing international trade forces to act, were legal and cultural barriers imposed by the core to Global South labor mobility. For Emmanuel, the 'institutionally' lower levels of wages drove general lower price levels in the periphery causing unequal exchange in its economic interactions with the core. If wages are not allowed to equalize, prices in the core are kept high while prices in the periphery are kept low. Therefore, in international markets, core countries take advantage of cheap peripheral labor in the form of cheaper imports.

In fact, Emmanuel's basic ideas seem to somehow relate to today's world. On the one hand, financial globalization has grown bigger and more mobile in the last decades (Schmukler et al., 2017). On the other hand, it is a reality, as shown by Umana-Dajud (2019), that workers from periphery countries experience more mobility restrictions than workers coming from high income countries, and that these restrictions causally affect trade flows and welfare in the Global South. Actually, some of

¹ In Ricardo's theory, both factors of production, capital and labor, are completely mobile domestically but immobile internationally. Within his framework, however, there are no international wage differentials since wages are always fixed at a universal subsistence level (Ricci, 2020).

today's salient scholars focusing on development studies, such as Nathan Nunn (2019) and Dani Rodrik (2018), have raised awareness on the reality of international labor markets being intentionally kept away from competitive forces and have, indeed, advocated for higher labor mobility between developed and developing countries as an effective development 'prescription'.

Before Emmanuel, another type of unequal exchange had been simultaneously identified by Raul Prebisch (1949) and Hans Singer (1950) by directly looking at trade patterns between the core and the periphery of the global economy. During the first half of the 20th century, the international division of production and labor, supported by traditional trade theory such as the Ricardian and Heckscher-Ohlin models, had driven peripheral countries to specialize in the production and export of primary commodities. In contrast, the industrial tradition of advanced economies had driven their specialization in the production and export of manufactured products. Analyzing this international division of production, Prebisch, writing from Argentina, and Singer, writing from England, empirically observed a long run downward trend of the terms of trade of primary commodities with respect to manufactured goods. This downward tendency forced periphery countries to export an ever increasing quantity of primary products to be able to maintain the level of manufactured imports from wealthy countries, which had direct consequences for the economic development of periphery economies (Prebisch, 1949; Singer; 1950).

The two main reasons behind the worsening of primary products' terms of trade were differences in income elasticities between primary and manufactured goods, and the nature of prices in the two sectors. Primary commodities are more income inelastic than manufactured goods, meaning that their demand does not infinitely increase with income growth (ECLAC, 2012). Therefore, when income increases, the share of demand for primary goods tends to decrease. On the other hand, peripheral countries exported primary products at competitive prices while imported manufacturing goods at monopolistic prices (Ricci, 2021). This happened because primary products produced in different domestic markets are highly similar, and thus close substitutes, being forced to compete in international markets. On the other hand, the main reason for monopolistic prices, stressed by Singer (1950), was the market power of large corporations that were able to influence international markets by imposing monopolistic prices. Once more, the forces of international trade imagined by Ricardo and Heckscher Ohlin were prevented from acting as per Prebisch and Singer observations.

The Prebisch-Singer theory was developed looking at the first decades of the past century, yet, some features resemble current aspects of international merchandise markets. Today, the emergence of global value chains and increasing presence of multinational corporations have blurred the clear international division of labor and production that Prebisch and Singer observed during the first half the twentieth century (Jacks et al, 2010). Nevertheless, the competitive character of commodity markets, subject to volatile international prices, still affects developing countries today. In fact, multilateral organizations such as the United Nations and the OECD continuously stress the importance of avoiding, or if too late to avoid, abandoning export commodity dependence as a source of domestic income, as it directly hinders countries' economic growth (Nkurunziza, 2019). On the other hand, the increasing strength of multinational corporations is undeniable. Today, empirical analysis shows that the bargaining power of multinational corporations has grown large (Vitali et al., 2011) and that they are able to exercise control over prices and move away from

competition (Cope, 2019). Furthermore, another clear example of monopolistic power is the fact that today global North corporations own 97% of patents, having an almost total control over technological access (Chang, 2008).

Furthermore, the Prebisch-Singer theory offered an insightful view of the economic relationship between the center and the periphery of the global economy. During a contraction of the business cycle, core economies suffer economic recession, unemployment rises, income falls and demand for primary products from the periphery fall as well. Given the substitutability nature of primary commodities and the competitive feature of these markets, lower demand forced supply to adjust by lowering prices. Therefore, when the expansion of the cycle starts again, periphery countries are in a weakened bargaining power position. This means that developing countries are forced to adjust to rich countries' demand conditions.

This domination-subordination relationship in which emerging economies depended on rich countries' conditions inspired the Dependency and World Systems theories during the 1960s and 1970s (Ricci, 2021). These theories emphasized the conception of a global economy that, as already explained, simultaneously enriches the center while impoverishes the periphery (Frank, 1966). For the Dependency theory, the agricultural and industrial traditions of periphery and core, respectively, are incited, once more, by their colonial past. Once again, the comparative advantage proposition of traditional trade theory is altered by history, making the initial playing conditions unequal.

Related to the agricultural and commodity specialization of the periphery, ecologically unequal exchange theory looked at the capture of resources by core and periphery. For this school of thought, unrecorded value transfers are not only hidden in lower prices or agricultural specialization, but also in the direct use of natural resources, such as land and energy (Dorninger et al., 2021). This pattern of resource extraction is once more a consequence of the colonial era. The core's domination of the global economic system has indeed allowed this group of countries to satisfy their consumption needs by expanding their extractive frontiers and capturing large volumes of natural resources outside their borders, outsourcing and incrementing environmental degradation and climate change consequences in the peripheral areas of the economic system (Hornborg, 1998). Indeed, the unequal exchange in this case lies in this pattern of core countries discriminatingly utilizing resources while peripheral countries bearing the consequences. Looking at empirical findings, this seems to be the case nowadays, since the core economies of the US, the European Union and Japan are the main importers of key commodities directly related to biodiversity threats in peripheral economies such as Indonesia, Madagascar or Cameroon (Lenzen et al., 2012).

Finally, at the end of 1990s, Gernot Köhler identified a mechanism of unequal exchange by analyzing the international exchange rate system. Since this is the main measure of unequal exchange of my empirical analysis, I fully explain it in Section 4.

2.3. Unequal Exchange Versus the Current View of International Development

The interactive explanation of countries' development offered by the core-periphery economic structure contrasts with the mainstream economic view of international development. While the latter is rather static and centered in domestic conditions, the former focuses on the international dynamics that create wealth and poverty.

The conventional approach to international development has mainly focused on countries' current internal characteristics to explain their economic performance (Frank, 1966; Ricci, 2019). In the last decades, mainstream economists have dived into countries' history to explain internal characteristics such as institutions (Acemoglu et al., 2001), income per capita (Nunn, 2008) or conflict environment (Michalopoulos & Papaioannou, 2013), but not to explain how these countries's history has also shaped their international economic position. Under the current development approach, poorer countries are thus defined as poor because they suffer from intrinsic bad characteristics, inefficiencies that according to conventional economic wisdom prevent economic growth from taking off (Nunn, 2019). On the contrary, the unequal exchange theory and the core-periphery view of the global economic system emphasized the conception of a global economy that simultaneously enriches the center while impoverishes the periphery (Frank, 1966).

The current understanding of international development has driven both policy makers and the academia in the field to try to 'solve' these alleged inefficiencies through policy intervention. A particular type of policy intervention, foreign aid, has been understood as a crucial tool to address developing countries' poor economic performance (Nunn, 2019; Hickel et al., 2021) and therefore significant amounts of money, goods and services have flowed from core to periphery as an attempt to fix poor countries' internal problems (Nunn, 2019). However, this external flow of resources will not have the desired effect as long as it continues to be embedded in an unequal economic system. In fact, a specific type of foreign aid, tied aid, can be interpreted as a current example of an interaction between core and periphery that has proved more beneficial to the donor than to the periphery economy. Evidence shows that tied aid has been used by core economies as an export promotion system, increasing their volumes of trade while raising prices in periphery countries (Clay et al., 2019).

The contrast between the two views of development can be illustrated by looking at the typical economic terms used to refer to countries in the two schools of thought. On the one hand, today's conventional economic terms, such as high-income and low-income, developed or developing, advanced and emerging, somehow evoke countries' inner development states, separate from their interactions with the rest of the world. Generally, when we think of high income/developed/advanced economies, we think of high income per capita, consolidated welfare states, inclusive and democratic institutions, strong manufacturing sectors and so on. Meanwhile, low income/developing/emerging countries suffer from 'bad' geographic conditions, political instability, weak institutions, and large low-productivity sectors. Therefore, both high and low income countries

are defined as such by their internal characteristics. On the other hand, the core-periphery structure implies that some countries are rich because they are at the core of the system and thus ‘receivers’, while others are poorer or less developed because they are located at the periphery of the global economic system, forming the ‘givers’. Therefore, the core-periphery terminology sheds light over the dynamics that creates development and underdevelopment (Frank, 1966) and that should be addressed if a country's destiny is to be changed. In fact, the previous section has shown that when one looks closer at how developed and developing countries interact, it seems clear that countries’ domestic characteristics might not be the end of the story (Nunn, 2019; Hickel et al., 2021; Dorningen et al., 2021, Hickel et al., 2022, Hekmaptour et al., 2022).

3. Literature Review on Empirical Quantifications of Unequal Exchange

Given the theoretical consensus that the main flows of unrecorded value transfers happen in a periphery-to-core direction, the empirical literature on unequal exchange has mainly focused on quantifying the size of the loss of value for the periphery in international trade.

During the 1970s-1980s, while the theoretical frameworks of unequal exchange were being developed, the lack of statistical data and proper methodologies posed challenges to put numbers to the impact of the unequal conditions present in international trade transactions (Köhler, 1998; Ricci, 2019). Yet, some scholars tried to quantify it. As such, Samir Amin estimated the value of developing countries’ exports to the advanced economies if wages had not been underrated in the developing world, assuming the same levels of productivity. He calculated that in 1966, instead of 35 billion dollars, developing countries’ exports should have been valued at 57 billions. Therefore, Amin concluded that developing countries’ unrecorded value transfers to advanced economies amounted to 22 billion dollars in 1966 (Amin, 1976) or about 15% of the joint GDP of these countries.

At the end of the 1990s, the publication of new data on price levels, such as the one contained in the Penn World Tables, opened the possibility of new methodologies and quantifications of the size of unequal exchange.

Indeed, in 1998, Köhler took advantage of the data displayed by the Penn World Tables to hypothesize that the exchange rate system is a mechanism of unequal exchange. Considering Purchasing Power Parity (PPP) exchange rates as the fair value of a country’s currency, Köhler concluded that developing country’s market exchange rates were set below their fair level. Since a detailed explanation of the methodology for Köhler’s calculations is offered in the next section, here I comment on his main results. The main impact of currency undervaluation, according to Köhler, is that the experienced purchasing power of poorer countries is significantly lower than their fair purchasing power (as measured by PPP rates). Therefore, when engaging in trade with an economy

whose currency is not undervalued, periphery countries transfer value in the form of ‘cheaper’ exports to these countries whose currencies are not undervalued. Köhler quantified this value lost (gained) by the periphery (core), in this case non-OECD (OECD) countries, in 1,06 trillion for the year 1993, accounting for 21,2% of non OECD countries joint GDP and 5,7% of OECD’s joint GDP figures.

Following the same technique, Hickel, Sullivan, & Zoomkawala (2021) updated Köhler’s work, including a larger set of countries and a time series running from 1960 to 2017. In this case, they divide center and periphery by the IMF’s classification of advanced and emerging economies. Using Köhler’s technique the authors found that during the studied period, emerging economies transferred more than 62 trillion USD of unrecorded value to the advanced economies. This drain suffered by the south was not constant over the years, it increased dramatically from the mid 1980s until the 2008 global financial crisis.

Recently, new input-output data and the popularity of unequal exchange in ecological economics has eased the task of quantifying the impact of unequal exchange in international trade.

Dorninger et al. (2021) focused on the material aspects of international trade, and through environmental input-output data identified the locations of origin and destination of raw materials, energy, labor and land. For the period 1990 to 2015, the authors concluded that “compared to their population, [high income] countries net appropriate a disproportionately large share of materials, energy, land, and labor through international trade” (Dorninger et al., 2021, pp. 5). And that this appropriation accelerated from 1990 to 2008, matching Hickel et al. (2021) finding of unrecorded value transferred through exchange rate distortions. Dorninger et al. (2021) result was later monetized by Hickel, Dorninger, Wieland and Suwandi (2022) in 242 trillion USD.

Finally, other studies, more aligned with conventional economic wisdom, have focused on quantifying the amount of unequal exchange attending directly to financial flows between core and periphery economies. In 2015, the Global Financial Integrity (GFI) research institute aggregated financial flows going in both directions, from core to periphery and from periphery to core. To do so, they added up all official and illicit bilateral flows available. For the official flows, they looked at financial and trade flows recorded in countries’ Balance of Payments accounts, including remittances, workers’ transfer as well as foreign aid and debt forgiveness. The illicit financial flows came from tax avoidance and miss invoicing estimations. GFI (2015) results showed that, net of financial inflows, developing countries transferred 3 trillion dollars in recorded transfers and more than 13 trillion dollars in illicit outflows to high income countries from 1980 to 2012. These figures were recently confirmed by the United Nations Conference on Trade and Development (UNCTAD, 2020) using a similar methodology for the years 2000 to 2017. The UNCTAD concluded that “For the past two decades, net financial resource transfers between developed and developing countries have typically favored the former and disadvantaged the latter” (UNCTAD, 2020, p. 1). Once more, GFI and UNCTAD results confirm that developing countries are net creditors to high income countries.

After this review of empirical evidence on unequal exchange, it seems plausible that unequal exchange exists between core and periphery and that the stream of value indeed flows in a periphery-to-core direction. It seems plausible, as well, that interactions with other countries might

indeed be related with development, and that therefore we might not need to focus only on domestic conditions to address it.

For this reason, I contribute to the development literature by focusing on the unequal part of international trade. Using data from Hickel et al. (2021) on unequal exchange caused by exchange rate distortions, I conduct, to my knowledge, the first empirical analysis on the drivers of unequal exchange. To do so, I provide a random effects panel data analysis of 89 developing countries from 1985 to 2017. The next section extends the theory of unequal exchange through exchange rate distortion and presents the construction of my main measure of unequal exchange.

4. Unequal Exchange Through Price Distortions

As already stated, the main measure of unequal exchange in international trade used in this study is the unrecorded value transfers by peripheral countries given the undervaluation of their currencies. This measure was first proposed by Gernot Köhler in 1998, who calculated the value transferred by a set of countries in 1995. In 2021, Jason Hickel, Dylan Sullivan and Huzaifa Zoomkawala, updated Köhler's work by publishing the value loss (gained) by the periphery (core) through this measure of unequal exchange during the period 1960 – 2017 for a larger set of countries. These data form my main explanatory variable². The following subsection explains both the theoretical framework of this measure of unequal exchange and the construction of the data.

4.1. Market Exchange Rates versus Purchasing Power Parity

One important feature of international trade is the exchange of money. To engage in international trade, a country needs to buy or sell its currency in exchange for another, and then exchange this for the goods and services traded in international markets. As the Bank of England (2020) puts it, “an exchange rate is just a price: the price of one country's currency in terms of another country's currency”. Money is therefore a measure of value (Köhler, 1998) that will affect a country's strength in international markets. This concept of money as a measure of value is the main explanation for the understanding of periphery currencies' undervaluation as an indicator of unequal exchange (Ricci, 2021). Countries that are given less value than others in international markets are also given less value to their currencies (Köhler, 1998).

² I am grateful to Dylan Sullivan to share it with me and allow me to build on their work and continue understanding the mechanisms of unequal exchange in international trade

Two important ways to measure how a country’s currency is valued are Market Exchange Rates (MER) and Purchasing Power Parity (PPP). MER tells us “rates at which units of one currency are exchanged for units of another currency” (Köhler, 1998, p. 146). It is the effective exchange rate used in international transactions. On the other hand, PPP compares currencies in reference to the same basket of goods specified in different countries. It is the rate at which currencies experience the same purchasing power (Hickel et al., 2021). While core countries’ currencies tend to have the same valuation in MER and PPP, in peripheral countries’ currencies there is a gap between the two values, finding generally that MER are undervalued with respect to PPP.

The example Köhler (1998) illustrates perfectly this difference:

TABLE 1. TWO VALUATIONS OF GNP PC.
MER vs PPP in 1992.

Countries	Method 1	Method 2	Differentials
	Market Exchange Rates (USD)	PPP	(PPP/MER)
	(1)	(2)	(3)
USA	23,120	23,240	1.01
Germany	23,030	20,610	0.89
Uk	17,790	16,730	0.94
Australia	17,260	17,350	1.01
Brazil	2,770	5,250	1.90
Russia	2,510	6,220	2.48
China	470	1,910	4.06
India	310	1,210	3.90
Bhutan	62	630	10.16
Mozambique	60	570	9.50

Source: Köhler (1998) from World Bank, *World Development Report 1994*, p.162 - 220

Table 1 shows GNP pc in 1992 for a list of selected countries. In column 1, GNP pc is valued in USD applying nominal market exchange rates (meaning, the calculation of their GNP pc in their currency has been exchanged to the USD using MER). In column 2, the same GNP pc is valued in PPP with the so-called “international dollar” (same calculation but exchanging to international dollars using PPP exchange rates between domestic currency and international dollars). Finally, column 3 calculates the ratio between PPP and MER.

While wealthy countries, such as the USA, UK, Germany and Australia show very similar values in both calculations, countries such as China, India, Bhutan or Mozambique, do not. For instance, when India’s GNP pc is calculated at MER, its value is 310 USD per capita. However, when using PPP exchange rate, it goes up to 1.210 international dollars, almost 4 times bigger. As the next subsection shows, for Köhler (1998) and Hickel et al. (2021), PPP should be considered the ‘fair’

value of money. Given the systematic finding that the gap between PPP and MER is not random, but that instead follows the core-periphery global structure, this existing gap between MER and PPP is an explanation for unequal exchange in international trade in the literature. While core countries show up in the international market with fairly valued currencies, periphery countries have to use undervalued currencies, losing value in every transaction they carry internationally, since they are forced to sell cheaper than what the fair value of their currency would allow.

At this point three main questions arise: why is there a difference between MER and PPP in some countries and not in others? Why is this difference important? If the MER is the exchange rate used in international trade relations, why should we consider PPP as the “real” value of currencies? The first two answers have been partially answered; some currencies, typically those from underdeveloped countries, are undervalued in the international exchange rate market with respect to its fair value - proxied by PPP - and some currencies, typically those from developed countries, are not undervalued. This creates a value gap in some countries but not in others that contributes, as we will see, to the unbalancing of the international playing field towards the developed countries.

Answering the last question requires more detail and understanding of how the PPP are constructed. Therefore, the next subsections present a simplified version of PPP exchange rates construction and how the gap between MER and PPP can be interpreted as international unequal exchange.

4.1.1. PPP as Fair Currency Value

The basic theoretical foundation of PPP is the Law of One Price (LOOP), that says that under the hypothetical assumptions of no trade barriers (transaction or transportation costs, tariff barriers, etc.) the price of an identical commodity will be the same in any location. According to the LOOP, when price differentials exist, arbitrage opportunities and competitive forces will eventually equalize prices across locations (Samuelson, 1994), but as we have already seen, counter forces exist in the international trade arena that impede prices equalization.

Simplified, PPP rates are calculated in terms of a common basket of goods and services to all countries, adjusted for the fact that the LOOP mechanisms cannot operate under the presence of non-traded goods (Samuelson, 1994). Once this basket is defined, it is valued in every country's local currency so as to maintain the same purchasing power across countries, and PPP exchange rates are calculated according to these domestic valuations. Therefore, the rationale is not to apply market exchange rates (MER), but to calculate those exchange rates that maintain the value of the items included in the basket in each country. To illustrate this, I now offer an example for the United States and Colombia from the 1970 PPP calculation. For each item in the basket, the following ‘statement’ applies: 1 USD of item ‘A’ of the US basket costs 14.2 pesos of the same item ‘A’ in the Colombian basket. 1 USD of item ‘B’ of the US basket costs 10.9 pesos in Colombia, etc. Items are eventually aggregated and PPP exchange rates are calculated: 1 USD from the US costs 8.1 Colombian pesos (Köhler, 1998).

Given that the basket is the same in both countries, an exchange rate of 1:8.1 between the USD and the Colombian peso means that both currencies maintain the same purchasing power, this is, one American can buy with one dollar what one Colombian can buy with 8.1 pesos. However, when one looks at the Market Exchange Rate (MER) between the two currencies, one finds that it is indeed 1:18.35, meaning that there is no real purchasing power parity between the two currencies, and that what an American can buy for one dollar, a Colombian can buy for 18.35 pesos instead of for 8.1 pesos. The gap between PPP rate, 8.1, and MER, 18.35, is thus 2.3. This means that for every transaction between the US and Colombia, a Colombian will pay 2.3 times more pesos to be able to buy one dollar in international markets. On the contrary, the US will acquire 2.3 times more pesos than it would have gained had the Colombian peso been rated at the purchasing power parity with the US. This means that the purchasing power that Colombia experiences through the market exchange rates system is lower than it should be under PPP rates. Finally, since the US dollar does not experience this gap between MER and PPP (as Table 1 shows), the country does not need extra dollars to trade in international markets. The fact that countries like Colombia lose value when trading in international markets while others like the US do not is the main rationale behind the understanding of exchange rates deviations as a mechanism of unequal exchange.

The gap between PPP and MER is known in the literature as the Exchange Rate Distortion Index (ERDI), and is calculated by the ratio MER/PPP . The higher the ratio, the higher the undervaluation suffered by a country's currency and the higher the value transferred in international transactions. Table 2 shows the top and bottom twenty economies according to their average ERDI size in the period 1985 - 2017, the time frame of this study. Interestingly, there is a clear distinction between the two rankings: the top twenty are all periphery economies while the bottom twenty are all core economies. Similarly to the example of Colombia before, the Vietnamese Dong exchange rate against the dollar was on average 4.83 higher than its PPP exchange rate between 1985 and 2017. Consequently the country has paid 4.83 times more due to the undervaluation of its exchange rates than it should have paid under PPP exchange rates.

TABLE 2. TOP 20 AND BOTTOM 20 COUNTRIES BY ERDI

Average estimates for the period 1985 - 2017

Top 20 Countries by ERDI	ERDI (MER/PPP)	Classification	Bottom 20 Countries by ERDI	ERDI (MER/PPP)	Classification
(1)	(2)	(3)	(4)	(5)	(6)
Viet Nam	4.83	Periphery	Bermuda	0.75	Core
Myanmar	4.51	Periphery	Norway	0.90	Core
Ukraine	3.58	Periphery	Denmark	0.98	Core
Nepal	3.57	Periphery	Switzerland	0.95	Core
Armenia	3.47	Periphery	Japan	0.96	Core
Belarus	3.46	Periphery	Sweden	0.97	Core
Lao People's Dem. Rep.	3.45	Periphery	Finland	1.02	Core
Pakistan	3.43	Periphery	Iceland	1.08	Core
Bhutan	3.42	Periphery	United Kingdom	1.11	Core
China	3.41	Periphery	France	1.12	Core
Republic of Moldova	3.40	Periphery	Luxembourg	1.13	Core
Azerbaijan	3.38	Periphery	Germany	1.13	Core
Sri Lanka	3.26	Periphery	Austria	1.15	Core
Bangladesh	3.16	Periphery	Netherlands	1.15	Core
Burundi	3.14	Periphery	Belgium	1.17	Core
Cambodia	3.13	Periphery	Ireland	1.18	Core
Sierra Leone	3.09	Periphery	Australia	1.26	Core
India	3.07	Periphery	United States of America	1.27	Core
Georgia	3.05	Periphery	Italy	1.29	Core
Guinea	2.97	Periphery	Canada	1.30	Core

Source: Author's calculation following Hickel et al. (2021). ERDI numbers are calculated using GDPo price levels in Penn World Tables version 9.1.

Note: Euro countries do not show same ERDI given the time series calculation starting in 1985. Before the adoption of the euro as single currency, each country's ERDI is calculated for their own domestic currency.

4.2. Estimation of Unrecorded Value Transfer Through Exchange Rates Distortion

Using the previous rationale, in 1998, Köhler proposed a way to quantify the amount of unrecorded value lost by countries due to exchange rate distortions. The equation is the following:

$$(1) \quad UVT_{it} = MER_{it} * x_{it} - (MER_{it}/PPP_{it}) * (MER_{it} * x_{it}) \rightarrow$$

$$(2) \quad \rightarrow UVT_{it} = X_{it} - ERDI_{it} * X_{it}$$

Where the Exchange Rate Distortion Index or $ERDI_{it} = MER_{it}/PPP_{it}$, giving the value of the price distortion between MER and PPP for each country in each year. As already stated, the MER_{it}/PPP_{it} ratio is expected to be close to 1 for core countries, while higher than one for periphery countries. X_{it} are exports valued in a reference currency, in this case, USD, using nominal market exchange rates (MER). $ERDI_{it} * X_{it}$ represents therefore the fair value of exports, i.e, the value of exports at PPP level. Therefore, the ERDI can be interpreted as the factor by which a country's currency exchange rate would have to change to achieve its fair purchasing power. For those countries experiencing undervaluation, the term $ERDI_{it} * X_{it}$ is going to be higher than the real value at which exports were traded in international markets (X_{it}), indicating that they have suffered a loss of value driven by exporting 'cheaper', or below the value under a fair exchange rate system. This loss of value is represented by T_{it} , the difference between the market value and the fair value of exports. Intuitively, this loss of value has been captured by someone else: the buyer of those undervalued exports, who is buying cheaper. For core economies, we should expect T_{it} to be close to zero, since their currencies are not undervalued and therefore they export at their fair value. For periphery economies, however, this difference is generally negative, since, as Table 2 shows, their currencies are undervalued when compared to PPP rates.

To illustrate how these price distortions drive transfers of value between countries, take the example between Colombia and the US in section 4.1.1 and recall that Colombia's ERDI in 1970 was $18.35/8.1 = 2.3$. In that year, Colombia exported goods to the US for 9,670 million pesos or: $(1/18.35)*9,670 = 527$ million USD. However, if the Colombian peso had not been undervalued by a factor of 2.3, Colombia's exports would have been worth: $2.3*527$ million USD = 591 million USD. Therefore, in 1970, Colombia lost $527 - 591 = -64$ million USD. Applying the formula of equation (1):

$$2,3*527 - 527 = -64 \text{ million USD.}$$

This means, as well, that the US has benefited from the undervaluation of the Colombian peso, gaining the same 64 million USD that Colombia has lost. This is the main mechanism to calculate the value transferred by countries due to deviations in exchange rates. In his work, Köhler concludes that: "When a low-income country (with a structurally distorted currency value, see [Table 2]) trades with a high-income country, the high-income country gains a quantity of real value which does not show up in any account and the low-income country loses a quantity of real value which does not show up in any account". (Köhler, 1998, p. 160). This conclusion of 'hidden' value transfers driven by an unequal exchange rate system is the basic justification to claim that international trade interactions are not equitable, and that some gain more than others. Moreover, the evidence shown in Table 2 that periphery countries generally experience higher rates of price distortion coincide with the general finding of unrecorded value transfers flowing from the periphery to the core of the economic system.

5. Data and Methodology

To calculate the determinants of unequal exchange in international trade, I have constructed an unbalanced panel containing annual data of 89 periphery countries from 1985 to 2017. Table A1 in Appendix A shows the list of 89 periphery countries included in the regression analysis. Since I am interested in the value lost by peripheral countries due to unequal exchange, I restrict the sample to those countries classified as emerging economies by the IMF, generally referred to periphery countries in the literature I am following (Hickel et al, 2021).

5.1. Dependent Variable: UVT share

The main dependent variable of this study, Unrecorded Value Transfers as a share of GDP (UVT share), comes from Hickel et al. (2021) and builds on the previous section's explanation. To calculate it, the authors use IMF DOTS data on exports from each periphery economy to the set of advanced economies from 1960 to 2017. The Exchange Rate Deviation Index (ERDI) is calculated using price levels of domestic absorption reported in the Penn World Tables (PWT) dataset, version 9.1. The PWT calculates price levels of each country's local currency with the ratio PPP/MER, indicating how much higher or lower a country's local currency is relative to the USD. To calculate ERDIs, the inverse of the price levels reported by the PWT are used, as we are interested in the ratio MER/PPP³.

Finally, each country's ERDIs are weighted proportionally to their role in global unequal exchange as measured by their share of exports to the advanced economies. This way it is ensured that price levels of larger countries in terms of volumes of trade, such as China, are given more importance when assessing the extent to which periphery countries' price levels have been undervalued.

Equation (2) from Section 4.2 is applied using export weighted ERDIs to calculate each country's value transferred to advanced economies due to unequal exchange in exchange rates markets. As already mentioned in Section 3, using this method Köhler (1998) calculated that periphery countries transferred 1.06 trillion dollars to core economies in 1993. Similarly, Hickel et al. (2021) found that from 1960 to 2017, periphery countries transferred 62 trillion USD to core economies.

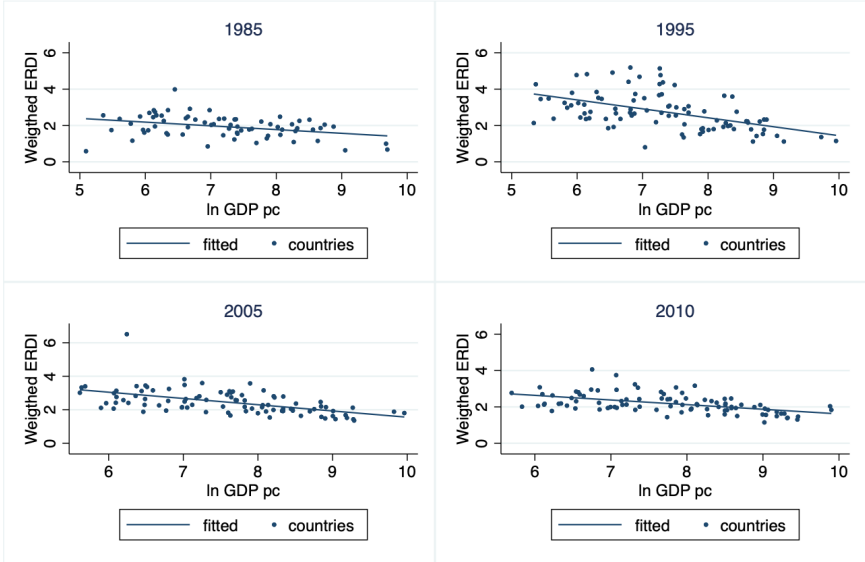
At this point, it is important to highlight two important challenges when empirically studying unequal exchange in international trade. On the one hand, given that value transfers from unequal exchange are structurally hidden in the global economic architecture, they are by definition difficult to identify and discern from natural tendencies. Moreover, since unequal exchange theory is a rather heterodox view of the global economic hierarchy, it has been less studied and subject to political and

³ Specifically, Hickel et al. (2021) use the inverse of the variable `pl_da` to calculate ERDI.

philosophical debates to a greater extent than the neoliberal understanding of economics. On the other hand, even though Table 2 showed a correspondence between the size of price distortions and periphery countries, the link with country's income is not so direct. As such, Figure 1 plots the relationship between the natural logarithm of GDP per capita of those countries included in my sample and their weighted ERDI in selected years. Even though one can somehow observe a mild negative correlation between the two variables, indicating that the higher the income per capita of a country, the lower the deviation between MER and PPP, the relationship is not at all clear. Indeed, international trade has gains for countries engaging in it that probably overweight the negative impact of unequal exchange, difficulting the study of the impact of inequality in international trade (Hickel et al., 2021). When periphery economies trade internationally, they lose value by exchanging their exports below their fair value, but, as well, reap part of the benefits from international trade. In fact, the correct interpretation for unrecorded value transfers using this measure of unequal exchange can be understood as what the periphery could have earned from international trade, in this particular case, had their currencies not been undervalued.

Furthermore, the previous result is crucial for the understanding of the motivation of this thesis. I do not argue that trade between countries should not occur, or that trade between core and periphery economies are fundamentally negative for the latter group. Instead, I argue that there is room for improvement in the way developed and developing countries engage in international trade, and that not all countries benefit the same, as conventional economic thinking might argue.

Figure 1 Weighted ERDI



Source: Author's calculation from PWT 10.1 and World Bank's WDI database

5.2. Method

As already stated, the main goal of my empirical analysis is to explore the determinants of unequal exchange in international trade. I exploit the panel structure of the database by constructing a random effects model of the basic form below and three different specifications:

$$(3) \quad \begin{aligned} UVTshare_{it} = & \alpha_{1it} tradeopen_{it} + \sigma'_{it} trcore_{it} + \mu'_{it} trperiphery_{it} + \\ & + \alpha_{2it} wERDI_{it} + \alpha_{3i} borderc_i + \Lambda'_{it} GVC_{it} + \alpha_{4it} ln GDP pc_{it} + \\ & + \delta'_{it} econrelations_{it} + \psi'_i + \zeta'_i + \gamma'_t + \upsilon_{it} \end{aligned}$$

The dependent variable, share of Unrecorded Value Transfers ($UVTshare_{it}$), measures the value transferred by periphery economies to core economies due to unequal exchange in international trade. Specifically, it measures the value transferred due to unequal exchange as a share of GDP for country i in year t . Given the undervaluation of peripheral economies' exports, it has a negative sign, indicating the value lost by each peripheral country.

Given the basic assumption of unequal exchange taking place in the international trade arena, I mainly focus on indicators of economic relationships between core and periphery with the goal of opening the possibility of improving those areas that create more inequality. As such, $tradeopen_{it}$ measures countries' exposure to international trade and it is constructed as the value of exports plus imports to the rest of the world as a share of GDP. Measuring trade openness is important to understand if international trade alone drives unequal exchange. In this case, the expected sign is ambiguous, since openness to trade brings both gains from trade and loss of value for periphery economies. However, as already stated, the assumption that gains from trade outsources the losses from unequal exchange raises expectations of finding a negative relationship between trade openness and the dependent variable. $trdecore_{it}$ is a vector measuring exports of country i in time t to core economies. In the baseline specification, $trdecore_{it}$ measures the volume of exports of periphery country i to the set of advanced economies, as defined by the IMF, in year t as a share of country i GDP. In a second specification, the vector is disaggregated into exports to selected core economies, namely the US, the European Union, Japan and Australia. Hickel et al. (2021) define the growth of unequal exchange due to the increase in the volume of exports to the core as extensive growth. In their work, the authors analyze this relationship graphically. Including this variable in the regression, however, allows to deeply analyze one of the basic hypotheses of unequal exchange literature.

Next, $trperiphery_{it}$ is a vector measuring within-periphery trade by volume of exports of periphery country i to the IMF's set of emerging economies in year t as a share of country i 's GDP. In a second specification, $trperiphery_{it}$ is disaggregated into exports to China and to the rest of periphery economies. $wERDI_{it}$ is the weighted Exchange Rate Deviation Index (ERDI) for country i in year t .

The goal of this variable is to assess if growth in the share of unrecorded value losses is driven by higher price distortions. This is known in the literature as intensive growth of unequal exchange (Hickel et al., 2021). $borderc_i$ is a dummy variable that takes the value 1 if the periphery country has a common border with a core economy. The goal of this variable is to measure long term trade relationships between core and periphery. The intuition behind this variable is that, as international trade analysis shows, distance is an important predictor of trade flows between two countries (Baier & Standaert, 2020). Therefore, it is expected that those peripheral countries surrounding the center of the global economy have a longer tradition of trade with core countries. This way we can distinguish between short and long run effects of trade with the core of the global economic system. Next, GVC_{it} is a vector of variables that intend to measure a country's presence in Global Value Chains (GVC) and its impact in unrecorded value transferred in international trade. Measuring global value chain presence is important, since it is one of the main trends of international trade in the last decades and one of the recent tools to accelerate development. The very basic concept of global value chains is the disaggregation of production, in which countries 'add value' to intermediate goods by completing or contributing to different stages of production (Ravenhill, 2014). Therefore, the GVC vector includes the variables agriculture, manufacturing and services value added, which measure the share of value added production in the three sectors to countries GDP. The share of industry VA is the one left out of the regression analysis. These variables are subject to limitations. Ideally, presence in GVC would have been measured by trade in value added, i.e., share of exports of value added production, instead of share of production in value added, since part of the value added production might not be part of global value chains. For instance, if a country grows its own wheat, processes it to produce flour and sells the flour within their borders, it has produced value added, but has not participated in GVC. Therefore, they are likely to be overestimated. However, given the growing importance of GVC in international trade, and the fast incorporation of periphery countries to these transnational production systems, it is likely that part of the share of value added output belongs to GVC production and therefore I have decided to include them in the regression equation.

Country's income is accounted for by $\ln GDP pc_{it}$, the natural logarithm of GDP pc. Despite the clear relationship between currency undervaluation and the periphery status of a country, we cannot infer the same clear relationship between income per capita and the share of unrecorded value transfers. The main reason, as already explained, is the dual effect of international trade on periphery economies. Next, $econrelations_{it}$ is a vector of two variables, Official Development Assistance (ODA) as a share of GDP and Foreign Direct Investment (FDI) as a share of GDP, that accounts for economic relationships between core and periphery other than trade. In the case of ODA, the rationale behind this variable is the finding in the literature that foreign aid attends many times to the donor's strategic and commercial goals more than to the recipient's needs (Nunn, 2019). Since the core economies are the main beneficiaries of the unequal relationships with the periphery and also the main ODA donors, it is interesting to assess how this relationship works towards unrecorded value transfers. On the other hand, FDI serves to observe how private interventions affect the

dependent variable. In this case, the flow is not only core-periphery but also periphery-periphery. Therefore, the main interest is in getting some intuition on the role that private investment and corporations might play as a determinant of unrecorded unequal exchange.

Finally, to account for invariant endogeneity potentially impacting the dependent variable, region, country and year dummies, represented in the equation by ψ'_i , ζ_i and γ_t , respectively, have been subsequently added. As already commented, Table A1 in the Appendix displays the list of countries and regions included in the specification.

The estimation of equation three is done through panel data random effects estimation. The random effects estimation is relevant for several reasons. First, given the heterogeneous group of countries and the long time series of the data - thirty five years - it is plausible that, apart from time invariant country characteristics, such as geography, specific historical events not captured in the data might have affected unequal exchange other than the covariates included in the regression. For example, along the years, some countries might have suffered industrialization processes, wars, political changes, etc. that might affect currency valuation, GDP and export volumes across time but that are not year specific across the sample (like a global financial crisis, for example, would be). For this reason, including year and country fixed effects would not be enough to control for these confounding factors. In fact, the descriptive statistics analysis in the next section shows that time-specific domestic events, such as civil wars, explain maximum and minimum values in several variables. Therefore, including random effects account for these types of endogenous, time-variant and country-specific factors. Secondly, the random effects estimator allows to control for countries' time invariant characteristics - by including country dummies - at the same time that allows to include specific time-invariant characteristics to be observed in the regression analysis. This is relevant for this study, since we are interested in observing long-term trade relationships that are captured by a time invariant variable, the border dummy. As well, the random effects estimator allows to include regional dummies in the specification, which are relevant given the large sample of countries and potential heterogeneity of geographical areas.

Finally, some limitations and challenges arise from my specification. First, Unrecorded Value Transfers (UVI) calculations only account for value transfers from merchandise exports, leaving aside services, which in the last decades have become an increasing part of international trade (UNCTAD, 2021). Thus, the dependent variable does not account for the complete rising complexity of international trade (Jacks et al., 2010) and cannot capture the whole picture of international trade between core and periphery. Second, in this study, UVT only estimates the value transferred due to currencies' undervaluation. Therefore, it does not account for all the different dimensions of value transferred by the periphery to the core illustrated in Section 3. This is, it does not account for unequal exchange in terms of wages, land use, resources, pollution, etc. (Hickel et al, 2022). In addition, the empirical analysis does not include the value transferred by periphery to core through the overvaluation of imports from core economies. Given the undervaluation of periphery currencies seen in Table 2, importing becomes more expensive for them. This also entails a transfer of value to the North that is not accounted for in this study. One of the reasons for limiting the study to exports comes from the different methods of recording the monetary value of volumes of

exports and imports. Whereas available data on exported goods is extensively found in Free on Board (FOB) terms, this is, without including freight and insurance costs, available import data usually includes these added costs. This different valuation of exports and imports increases the recorded value of imports, posing a challenge to calculate the real value transferred through currency undervaluation. For these reasons, the share of UVT included in this study likely underestimates the real value transferred from the global South to the global North and therefore the real size of unequal exchange in international trade.

On the other hand, currency undervaluation brings a loss of economic resources due to the undervaluation of exports, but also an increase in the volume of exports for those selling abroad (Rodrik, 2008). This means that undervaluation entails a simultaneous loss and gain of resources. A priori, it seems pertinent to ask which of the two effects is bigger. It is likely that gains outweigh losses, otherwise countries would not engage in trade at all and we would not find an extensive literature on how countries have benefited from international trade (Rodrik, 2008). Despite not denying the existence of gains from trade, this thesis only addresses the losses from undervaluation. The theoretical argumentation of this study focuses on undervaluation as a driver of unequal exchange, and therefore, the concern is not on which of the two effects - loss or gain from undervaluation - is higher, but on how to make the international arena a more equitable 'place'. Therefore, to address the question of undervaluation being more or less beneficial for Global South countries, the relevant counterfactual would be to ask by how less global South countries would be exporting under a fairer valuation of currency rates and if the higher price of these less exports would compensate for the lower volume of sales.

Furthermore, I focus on unrecorded value transfers from periphery to core, but I acknowledge the possibility of the existence of potential unrecorded value transfers flowing from core to periphery⁴ or within the periphery. In the first case, since the literature finds that historically these unrecorded value transfers have mainly happened in a periphery-to-core direction, and that they are a reason behind the development and underdevelopment of countries (Frank, 1966), it is valuable to focus on this direction of transfers. Moreover, even in the hypothetical case that the core-to-periphery unrecorded value transfers offset the losses caused by periphery-to-core transfers⁵, this does not take away the importance of studying the former, since, as already stated, addressing them could increase the potential benefits of international trade for the group of peripheral countries in a meaningful way. Furthermore, studying periphery-core transfers offers the possibility of studying a group of countries with fairly undervalued currencies against a group of currencies with fairly valued currencies. However, in the case of within-periphery value transfers, the existence of bilateral value transfers poses challenges to discern who gains more from who. For example, if Brazil transfers

⁴By unrecorded value transfer I refer to a transfer or value in terms of unearned resources (such as monetary). Therefore, I do not refer to positive spillovers from advanced economies' actions, such as increased education in certain colonized areas (Cogneau, & Moradi, 2014; Valencia Caicedo, 2019), since these spillovers do not entail a loss for those advanced economies generating the spillover.

⁵ This, however, does not seem plausible given the increasing between-country inequality (and the fact that core countries are consistently richer than periphery countries). If core countries had been transferring value in an unrecorded way on a regular basis, we would not expect to observe the observed trend of the rich getting richer and the poor getting poorer.

unrecorded value to the rest of periphery economies, what conclusion can we draw? Is anyone else transferring value to Brazil? Despite the relevance of these questions, I have also opted to leave them out of the scope of this study as I base the empirical analysis on the theoretical understanding of unequal exchange happening within the core-periphery global economic structure.

Finally, my sample includes 89 countries located in very different locations with very different contexts. Even though I include regional controls in my specification, it is likely that regional specific drivers exist that explain unrecorded value transfers in a more context-specific way, necessary to extract relevant policy implications. Nevertheless, a comprehensive study like this one can serve as a starting point for further research in unequal exchange regression analysis.

5.3. Descriptive Statistics

Table 3 displays the descriptive statistics of the variables used to identify determinants of unequal exchange in international trade as measured by Unrecorded Value Transfers as a share of GDP (UVT share).

On average, the 89 periphery countries in my sample lost more than 5.4% of their GDP due to unequal exchange in the exchange rates system between 1985 and 2017. Liberia shows the biggest loss of value, transferring value for more than 100% of its GDP in 1995, coinciding with one of the country's most fragile periods during its first civil war (Momodu, 2016). On the other hand, Iraq experienced the lowest unrecorded value lost in 1996.

On average, the trade openness to GDP ratio was about 68% for the set of peripheral economies in my study. This is generally lower than world's averages. For instance, in 1985 at the beginning of the period of study, the world's trade openness average was 70.5%, reaching 78% and 88% in 1995 and 2006, respectively. In 2017, the last year of this study, the world's average trade openness ratio was 90.8% (The Global Economy, 2022), while the one in my sample was 75%.

From 1985 to 2017, the 89 countries exported merchandise products to the group of core economies for an average of 12% of their GDP. Of that 12%, the share of exports to the selected core economies, namely the US, the European Union (EU) net of peripheral economies, Japan and Australia, accounted for 9,2%. From these selected countries, the highest share of exports goes to the EU, about 6%. This is plausible since the EU is the world's biggest trading bloc, being the first trading partner of more than 80 countries (European Commission, 2022).

Looking now at within-periphery exports, the share of exports to other emerging economies accounts, on average, for 8% of the sampled countries' GDP. This lower average share of exports within periphery economies than to core economies is consistent with the global economic structure explained in Section 2, in which the natural stream of resources flows from periphery to core. In 1992, Armenia showed the lowest share of exports to other periphery economies while Syria exported the highest share of its GDP in 2008, formed mostly by fuel exports (WITS, 2022). From that 8%, about 1% corresponds to exports to China.

TABLE 3. DESCRIPTIVE STATISTICS

89 Periphery Countries. 1985 - 2017

Variable	Definition (1)	Construction (2)	Mean (3)	Std. Dev. (4)	Min. (5)	Max. (6)	Source (7)
UVT share periphery	Unrecorded Value Transfers as a share of GDP for periphery	$UVTit/GDPit$	-0.054	0.097	-1.716	-0.000	Hickel et al., 2021
Tradeopen	Trade Openness	$(total\ Xit + total\ Iit) / GDPit$	0.684	0.484	0.011	5.837	Author's calculation from IMF DOTS & WDI
Share of Exports to Core	Exports from each periphery country to core countries as a share of GDP	Xit to advanced economies / $GDPit$	0.121	0.139	0.000	1.790	Author's calculation from IMF DOTS & WDI
Share of Exports to Periphery	Exports from each periphery country to other periphery countries as a share of GDP	Xit to emerging economies / $GDPit$	0.083	.0943	0.000	1.278	Author's calculation from IMF DOTS & WDI
Share of Exports to China	Exports from each periphery country to China as a share of GDP	Xit to CHN / $GDPit$	0.010	0.031	0.000	0.466	Author's calculation from IMF DOTS & WDI
Share of Exports to the US	Exports from each periphery country to the US as a share of GDP	Xit to US / $GDPit$	0.025	0.044	0.000	0.493	Author's calculation from IMF DOTS & WDI
Share of Exports to EU	Exports from each periphery country to EU (excluding EU periphery countries) as a share of GDP	$(Xit$ to EU - Xit to BGR, HRV, HUN, POL, ROU) / $GDPit$	0.058	0.084	0.000	1.043	Author's calculation from IMF DOTS & WDI
Share of Exports to Japan	Exports from each periphery country to Japan as a share of GDP	Xit to JPN / $GDPit$	0.009	0.019	0.000	0.238	Author's calculation from IMF DOTS & WDI
Share of Exports to Australia	Exports from each periphery country to Australia as a share of GDP	Xit to AUS / $GDPit$	0.002	0.006	0.000	0.180	Author's calculation from IMF DOTS & WDI
Weighted ERDI	Weighted Exchange Rate Distortion Index	$(1/pL_{da})$ weighted for peripheral exports	2.449	0.904	0.545	9.850	Hickel et al., 2021 from PWT 9.1
Share of Agriculture VA	Value added production in agriculture as a share of GDP		0.185	0.130	0.003	0.790	WDI
Share of Manufacturing VA	Value added production in manufacturing as a share of GDP		0.138	0.065	0.002	0.446	WDI
Share of Services VA	Value added production in services as a share of GDP		0.475	0.100	0.109	0.805	WDI
Ln GDP pc	Natural logarithm of GDP pc it		7.505	1.077	5.067	10.001	WDI
Share of ODA	Net official development assistance received as a share of GDP	Net flow $ODAit/GDPit$	0.060	0.084	-0.005	0.889	Author's calculation from WDI
Share of FDI	Foreign direct investment, net inflows (% of GDP)		0.032	0.533	-0.286	10.334	WDI
Border Dummy	Dummy variable identifying semi-periphery countries	=1 if country i has a shared border with at least one advanced	0.296	0.457	0	1	Author's calculation

This means that within-periphery exports excluding China were, on average for the study period, 7% of the sampled countries' GDP. The country that exported the highest share to China was the Congo in 2008, only one year after China signed its biggest trade agreement in the Sub-Saharan African continent with the Congolese government (Marysse & Geenen, 2009).

The average weighted Exchange Rate Deviation Index (ERDI) for the period and for this set of peripheral economies is 2.45. This means that, on average, sampled countries' exports would have been twice as high had they been rated in parity with the USD, namely, at PPP rates.

Moving forward in the variables description, the value added variables have been included as an imperfect measure of presence in global value chains (GVC). On average, services value added output shows the highest share, accounting for more than 47% of GDP. Services value added include a very heterogeneous group of services, such as transport, hostelry, bank and real estate services or publicly provided services, therefore it is plausible that it accounts for the highest share of value added production. On the other hand, the share of agriculture and manufacturing value added output were, on average, 18.5% and 13.8%, respectively.

Next, official development assistance (ODA) inflows as a share of GDP intends to measure foreign aid presence in the sampled countries. On average for the period, it accounted for about 6% of countries' GDP. This average is slightly higher than World Bank's calculations for the same period for similar groups of countries. According to the World Bank's World Development Indicators database, the share of ODA received by low and middle income countries as a percentage of their Gross National Income was about 4% (WDI, 2022). The differences might be attributed to differences in the grouping of countries and in countries included in my sample. In my sample, in 1994, Rwanda received the highest share of ODA - 88% of its GDP -, coinciding with the great tensions caused by the country's genocide against the Tutsis (United Nations, 2022).

Finally, the average foreign direct investment (FDI) flows as a percentage of GDP was 3.2%, with some economies experiencing outflows of FDI.

6. Results

Table 4 shows the determinants of unequal exchange taking into account the complete sample, this is, 89 countries from 1985 to 2017. As explained in the previous section, the dependent variable, $UVTshare_{it}$ or share of Unrecorded Value Transfers, measures the value transferred by periphery economies to core economies as a share of each periphery economy's GDP. All columns include regional dummies, columns 1 and 4 include country dummies to control for time-invariant endogeneity at the country level while columns 2 and 5 include year dummies to control for time-specific endogeneity. Finally, columns 3 and 6 include region, country and time dummies together. This sequence of controls present in Table 4 is repeated in Tables 5 and 6. From now on, I will refer to these controls as region, country and year fixed effects. The baseline specification, where only regional fixed effects are included, is not reported in the main body of the paper since

there are no significant differences with respect to the more robust specifications including year and country fixed effects. Finally, the coefficients of the regional dummies are not reported, since the focus of this study is to have a global view of drivers of unequal exchange for the periphery as a whole. However, both the baseline specification and coefficients for regional dummies can be found in Appendix B.

TABLE 4. DETERMINANTS OF UNEQUAL EXCHANGE. FULL SA
RANDOM EFFECTS REGRESSION. 1985 - 2017

Dependent variable: UVT/GDP	(1)	(2)	(3)	(4)	(5)	(6)
Trade Openness	-0.033*** (0.003)	-0.042*** (0.003)	-0.046*** (0.003)	0.012*** (0.003)	0.006*** (0.002)	0.010*** (0.003)
Share of Exports to Core				-0.337*** (0.007)	-0.322*** (0.006)	-0.330*** (0.007)
Share of Exports to Periphery				0.085*** (0.008)	0.073*** (0.008)	0.075*** (0.008)
Weigthed ERDI	-0.010*** (0.001)	-0.009*** (0.001)	-0.010*** (0.001)	-0.014*** (0.001)	-0.013*** (0.001)	-0.013*** (0.001)
Border Dummy	-0.015 (0.011)	0.018** (0.009)	0.005 (0.011)	0.013*** (0.004)	0.010*** (0.004)	0.013*** (0.004)
Share of Agriculture VA	0.024* (0.013)	0.029** (0.013)	0.025* (0.014)	0.059*** (0.009)	0.053*** (0.009)	0.056*** (0.009)
Share of Manufacturing VA	-0.071*** (0.018)	-0.023 (0.018)	-0.028 (0.018)	-0.045*** (0.012)	-0.042*** (0.011)	-0.041*** (0.012)
Share of Services VA	0.059*** (0.011)	0.056*** (0.010)	0.045*** (0.011)	0.022*** (0.007)	0.020*** (0.007)	0.020*** (0.007)
Ln GDP pc	0.004 (0.003)	-0.018*** (0.003)	-0.022*** (0.003)	0.010*** (0.002)	0.002 (0.002)	0.006** (0.002)
Share of ODA	0.014 (0.013)	0.029** (0.013)	0.029** (0.013)	0.008 (0.008)	0.013 (0.008)	0.012 (0.009)
Share of FDI	0.035***	0.024*	0.026**	-0.055***	-0.049***	-0.054***
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	No	Yes	Yes	No	Yes
Year Fixed Effects	No	Yes	Yes	No	Yes	Yes
Observations	2,200	2,200	2,200	2,177	2,177	2,177
Number of Countries	89	89	89	87	87	87

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable: UVT/GDP is constructed following the formula: $T = (X - ERDI \cdot X) / GDP$

Going back to Table 4, the first three columns include trade openness as the main indicator of a country's trade, whereas the last three columns include the shares of exports to core and periphery countries. Notice that these three variables are not complementary, since trade openness includes imports in the numerator while the other two measure only exports to the two different groups of countries. At this point, it is useful to recall that since the dependent variable is negative, negative coefficients increase the size of the variable and are therefore interpreted as increasing the loss suffered by periphery countries. In other words, negative coefficients increase the unrecorded value transferred from this group of countries to the club of core economies.

At first sight, trade openness appears to significantly increase the share of unrecorded value transfers (UVT) for periphery countries. As we can see in columns 1 to 3, the coefficient for trade openness enters negative and significant at 1% level. In the case of the preferred specification with country and year fixed effects - column 3 - a 1% increase in the trade to GDP ratio increases the unrecorded value loss by 4,6 percentage points, on average. This is, the dependent variable, UVT share, becomes 4.6 percentage points more negative with an increase in trade openness. The immediate conclusion from this result would be that openness to trade drives unequal exchange. However, once exports to core countries and within periphery countries are controlled for, in Columns 4 to 6, trade openness' coefficients become smaller, positive and keep their significance, indicating that trade openness might not be a driver of unequal exchange in itself. On the other hand, the coefficient of exports to core countries as a share of GDP are always negative, significant and of a big size. In Column 6, on average, a 1% increase in the share of exports to core countries increases UVT by 33 percentage points. This result gives evidence of extensive growth being, indeed, a driver of unequal exchange. On the other hand, the coefficient of the indicator of within-periphery trade, exports to other periphery countries as a share of GDP, enters always positive and significant, indicating that within-periphery trade significantly reduces the share UVT. Again in column 6, on average, a 1% increase in the share of exports to other periphery countries reduces the share of UVT by 7.5 percentage points. Therefore, the negative sign of the trade openness coefficient in columns 1 to 3 appears to be capturing the negative effect of exporting to the core under undervalued currencies.

Weighted ERDI, the main measure of exchange rate distortion, is negative and significant along all the specifications in Table 4, indicating that indeed price distortions significantly increase the share of UVT. A one unit increase in the price distortion ratio, this is, in the MER/PPP ratio, increases the dependent variable by 1.3 percentage point. This result gives evidence of intensive growth driving also unequal exchange, even though to a smaller extent than extensive growth.

Next, the border dummy was included to account for long run relationships between core and periphery, but can also proxy for current trade. Even though the sign and size is fairly maintained across the specifications, coefficients only show strong significance once share of exports to core and periphery are controlled for. Therefore, since the coefficient of exports to core measures the direct impact of current trade, the remaining positive sign of the border dummy coefficients can be interpreted in its proxy for long run relationships, indicating that those countries bordering a core economy benefit by reducing the share of unrecorded value transfers by 1.3 percentage point on average. As well, once current trade is controlled for, the positive impact of this variable's coefficient might also capture other positive spillovers from bordering a wealthy economy.

The coefficients for the variables attempting to measure presence in Global Value Chain (GVC) - the shares of agriculture, manufacturing and services value added (VA) - are all significant at the 1% level in the complete specification, including shares of exports to core and periphery (Columns 4-6). However, while the share production of agriculture VA and services VA are positive and therefore reduce the share of UVT, the share of manufacturing VA enters with a negative sign, increasing the share of the dependent variable.

Moving forward, income per capita does not show a clear correlation with the dependent variable. Neither the significance level nor the sign are consistent along the table. In the preferred specification, however, the coefficient enters positive and significant, somehow indicating that higher income reduces the share of UVT. Since the variable of GDP pc is constructed as a natural logarithm, it can be interpreted as a semi-elasticity, indicating that a 1% increase in GDP pc reduces the share of UVT by 0.6 percentage points. The mild positive sign found in column 6 relates to Figure 1, where a weak negative correlation was found between the same income per capita and the main indicator of unequal exchange, weighted ERDI. On the other hand, the fact that the share of UVT decreases with GDP pc could also help explain the mechanism of the long term gains from trade observed in the border dummy.

Finally, while the coefficient for the share of official development assistance (ODA) is positive, its significance level disappears once shares of exports are accounted for, indicating that there is no significant correlation between foreign aid inflows and unrecorded value transfers. On the other hand, the coefficient for the share of foreign direct investment (FDI) enters negative and significant, and increases in size once share of exports are accounted for. In the preferred specification, a 1% increase in the share of FDI to GDP, increases the UVT as a share of GDP by 5.4 percentage points.

Table 5 further explores the relationship between the dependent variable, share of UVT and different trade partners. Given the importance of the share of exports to core countries to explain unrecorded value transfers, columns 1 to 3 in Table 5 further explores this relationship by splitting the variable in exports to a selection of core economies, namely the US, the European Union (EU), Japan and Australia. The selection of these countries attends to several reasons. In the case of the US, it has been shown in the literature that it has held aggressive trade strategies against periphery countries, for instance, through tied foreign aid and political interventions, that have served to increase their trade flows with these economies (Nunn, 2019). In the case of the EU, it has colonial ties with many countries around the globe that have also been shown to affect trade conditions and flows (Athow and Blanton, 2002). In the variable measuring share of exports to the EU, I have subtracted export flows with those European Union countries classified as periphery in my study. Finally, the four economies could be considered as the leading core economies in their respective trading regions. As columns 1 to 3 show in Table 5, the coefficients for the shares of exports to the US, EU and Japan all enter negative, significant and with similar size, somehow indicating a lack of great differences of trade with these countries. In the preferred specification, a 1% increase in the share of exports to any of the three economies increases the share of unrecorded value transfers by an average of between 32 and 37 percentage points. On the other hand, Australia's coefficient shows a slightly smaller size and a weaker level of significance, at only 10% level, but also with a negative

sign. Finally, notice that, for this set of regressions, trade openness shows up negative and significant as opposed to the sign shown by the coefficient when controlled for the share of exports to the entire set of core economies (such as Table 4, columns 4 to 6).

TABLE 5. TRADE PARTNERS
RANDOM EFFECTS REGRESSION, 1985 - 2017

Dependent variable: UVT/GDP	(1)	(2)	(3)	(4)	(5)	(6)
Trade Openness	-0.008** (0.003)	-0.009*** (0.003)	-0.011*** (0.004)	0.009*** (0.003)	0.005** (0.002)	0.005 (0.003)
Share of Exports to Core				-0.336*** (0.006)	-0.325*** (0.006)	-0.330*** (0.007)
Share of Exports to the US	-0.378*** (0.015)	-0.369*** (0.015)	-0.371*** (0.016)			
Share of Exports to the EU net	-0.333*** (0.013)	-0.311*** (0.013)	-0.324*** (0.014)			
Share of Exports to Japan	-0.377*** (0.047)	-0.404*** (0.046)	-0.366*** (0.049)			
Share of Exports to Australia	-0.242** (0.116)	-0.187 (0.116)	-0.203* (0.117)			
Share of Exports to Periphery	0.106*** (0.010)	0.087*** (0.009)	0.096*** (0.010)			
Share of Exports to Periphery without China				0.044*** (0.009)	0.033*** (0.009)	0.032*** (0.010)
Share of Exports to China				0.198*** (0.015)	0.192*** (0.014)	0.198*** (0.015)
Weighted ERDI	-0.017*** (0.001)	-0.017*** (0.001)	-0.017*** (0.001)	-0.015*** (0.001)	-0.015*** (0.001)	-0.015*** (0.001)
Border Dummy	0.007 (0.005)	0.013** (0.006)	0.006 (0.005)	0.011*** (0.004)	0.010*** (0.003)	0.009** (0.004)
Share of Agriculture VA	0.081*** (0.011)	0.078*** (0.012)	0.077*** (0.012)	0.051*** (0.009)	0.044*** (0.009)	0.045*** (0.010)
Share of Manufacturing VA	-0.036*** (0.014)	-0.027** (0.014)	-0.034** (0.014)	-0.052*** (0.012)	-0.041*** (0.011)	-0.051*** (0.012)
Share of Services VA	0.053*** (0.009)	0.053*** (0.009)	0.049*** (0.009)	0.017** (0.008)	0.018** (0.007)	0.014* (0.008)
Ln GDP pc	0.012*** (0.002)	-0.001 (0.002)	0.007** (0.003)	0.011*** (0.002)	0.001 (0.002)	0.007*** (0.002)
Share of ODA	0.036*** (0.014)	0.037*** (0.014)	0.039*** (0.014)	0.009 (0.010)	0.009 (0.010)	0.010 (0.010)
Share of FDI	-0.054***	-0.050***	-0.052***	-0.053***	-0.050***	-0.052***
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	No	Yes	Yes	No	Yes
Year Fixed Effects	No	Yes	Yes	No	Yes	Yes
Observations	1,868	1,868	1,868	1,966	1,966	1,966
Number of Countries	87	87	87	86	86	86

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable: UVT/GDP is constructed following the formula: $T = (X - ERDI \cdot X) / GDP$

This result indicates that the share of exports to the four core countries included into the regression do not account for all the negative effects of exports to core economies, and that part of it is still captured by the trade openness coefficient.

Finally, columns 3 to 6 in Table 5 explore the relationship between share of UVT and exports to emerging economies by splitting the variable between China and the rest of emerging economies. Being able to observe the impact of trade with China on unequal exchange gives the chance of observing the impact of a newly established global leader other than a core economy. As we can see, once China is removed from the set of emerging economies, the share of exports to them maintains its sign and significance level, but reduces the size almost by half with respect to Table 4, columns 4 - 6. As well, the share of exports to China enters positive and significant, with a higher coefficient. Therefore, even though within-periphery exports significantly reduces the share of UVT, it seems that trade with China is of great importance. One possibility is that it distorts/replaces trade with other core countries.

Finally, notice that in this set of regressions the share of exports to the whole set of core economies is held constant, and that trade openness maintains then the positive sign shown in Table 4, columns 4-6. This seems to confirm the hidden impact of trade with other core economies in the first three columns of the Table. On the other hand, in the preferred specification of Table 5, the trade openness coefficient loses its significance, somehow indicating that it was captured by the coefficient of trade with China. Finally, the rest of the coefficients in Table 5 show a strong consistency in sign, size and significance with Table 4.

Finally, the literature on unequal exchange sometimes divides periphery economies into semi-periphery and periphery, attending at closeness to the core of the global economy (Frank, 1966). Given the potential long term positive impact of bordering a core country found in Table 4, I exploit my sample by dividing it between countries bordering at least one core economy and countries not bordering any. Table 6, columns 1 to 3 restrict the sample to semi-periphery countries, namely, those countries with a value 1 in the border dummy, while columns 4 to 6 restrict the sample to periphery countries (with border dummy equal 0). Looking at results, the positive impact of trade openness appears to be significant only for countries bordering core economies but not to those further away from them, giving some intuition about the gains from trade driven by trading with core economies. On the other hand, the coefficient for the share of exports to periphery shows significance and a bigger size than in the previous specifications only for not-bordering periphery economies. Again, the rest of the coefficients show consistency in terms of size, sign and significance level.

TABLE 6. PERIPHERY AND SEMI-PERIPHERY
RANDOM EFFECTS REGRESSION. 1985 - 2017

Dependent variable: UVT/GDP	Semi-periphery (border = 1)			Periphery (no border = 0)		
	(1)	(2)	(3)	(4)	(5)	(6)
Trade Openness	0.045*** (0.006)	0.028*** (0.006)	0.047*** (0.007)	0.000 (0.003)	0.001 (0.003)	0.002 (0.003)
Share of Exports to Core	-0.436*** (0.016)	-0.367*** (0.013)	-0.452*** (0.018)	-0.308*** (0.007)	-0.304*** (0.007)	-0.310*** (0.007)
Share of Exports to Periphery	0.012 (0.016)	0.008 (0.016)	0.000 (0.017)	0.112*** (0.009)	0.103*** (0.008)	0.114*** (0.009)
Weighted ERDI	-0.012*** (0.001)	-0.012*** (0.001)	-0.014*** (0.001)	-0.019*** (0.001)	-0.018*** (0.001)	-0.018*** (0.001)
Share of Agriculture VA	0.193*** (0.025)	0.147*** (0.020)	0.197*** (0.027)	0.032*** (0.009)	0.029*** (0.009)	0.028*** (0.009)
Share of Manufacturing VA	-0.068** (0.027)	-0.029 (0.022)	-0.055** (0.027)	-0.049*** (0.013)	-0.060*** (0.013)	-0.056*** (0.014)
Share of Services VA	-0.023 (0.023)	0.017 (0.017)	-0.085*** (0.023)	0.026*** (0.007)	0.027*** (0.007)	0.027*** (0.007)
Ln GDP pc	0.028*** (0.004)	0.009*** (0.002)	-0.001 (0.006)	0.005** (0.002)	-0.001 (0.002)	0.007*** (0.002)
Share of ODA	-0.159*** (0.045)	-0.112*** (0.042)	-0.124*** (0.045)	0.010 (0.008)	0.011 (0.008)	0.013 (0.008)
Share of FDI	-0.096*** (0.027)	-0.058* (0.031)	-0.117*** (0.029)	-0.048*** (0.009)	-0.044*** (0.009)	-0.046*** (0.009)
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	No	Yes	Yes	No	Yes
Year Fixed Effects	No	Yes	Yes	No	Yes	Yes
Observations	610	610	610	1,567	1,567	1,567
Number of Countries	26	26	26	61	61	61

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable: UVT/GDP is constructed following the formula: $T = (X - ERDI \cdot X) / GDP$

7. Discussion

After the overview of the main results and given the consistency the sizes of the coefficients, signs and significance are very consistent along the table, which allows us to extract some meaningful conclusions.

First, openness to trade itself cannot be considered as a driver of unequal exchange and unrecorded value transfers between core and periphery, since it either reduces or relates insignificantly to the dependent variable, Unrecorded Value Transfer (UVT) shares. On the contrary, presence in

international trade appears to reduce unequal exchange between countries. This finding is consistent with the literature studying international trade that finds that trade openness is a positive driver of economic growth (Acemoglu et al., 2005). This common finding in the literature is confirmed as well by my sample, as a simple regression of GDP growth on trade openness yields a positive and significant correlation⁶. In fact, this result might shed light over the channel through which openness to trade reduces the share of UVT. The positive correlation between trade openness and economic growth indicates that trade liberalization might reduce the share UVT by increasing the denominator of the dependent variable, i.e. the GDP, faster than the numerator, in this case, the volume of value loss due to unequal exchange. On the other hand, Table 6 showed that while openness to trade significantly reduces unrecorded value transfers for the semi-periphery, i.e., countries bordering at least one core country, it does not impact countries located further away from the core of the global economy. Two main reasons might explain this finding. On the one hand, semi-periphery countries have, on average, a higher degree of openness to trade in this sample and during the time frame of this study: 81% versus the 63% of pure periphery countries. This might already reduce the impact of the coefficient. On the other hand, the positive and significant result only for semi-periphery economies indicates that more contact with core economies might be indeed a driver of the reduction of unequal exchange in the long run. This finding adds relevance to this study, since it confirms the importance of trade with core economies for development and thus the importance of making international trade relations between the core and the periphery of the global economic system as equitable as possible. In fact, the consistent negative impact of exports to core economies in unequal exchange by significantly increasing the share of unrecorded value transfers confirms the inequality of international trade relationships between the two groups and the great room for improvement. This inequality is further confirmed by the negative impact of the four core trade partners explored in Table 5 and the consistent negative impact of the price distortion index, the weighted ERDI.

At first, this dual finding might seem puzzling. How can contact with core countries be negative and positive at the same time? How can countries benefit from contact with core economies at the same time that increasing their share of unrecorded value transfers to them? The answer lies behind the basic understanding of unequal exchange and its relationship with international trade. In section 5.1, I acknowledged the fact that international trade is necessary for periphery countries' development, generates gains, and therefore countries have to and choose to engage in it. However, the international trade arena is designed to be structurally more beneficial for core economies than for the periphery when both groups trade together. In 1998, Köhler illustrated this duality between engaging trade despite its inequality with simple example: "The situation is comparable to that of a worker vis-a-vis an exploitative employer (...) if the choice is between 'no job' and a 'bad job', the worker gains from by taking a bad job. Similarly, if a country has a choice between 'no trade' and 'unfair trade', the country gains by engaging in unfair trade. (...) In this case, it is possible to 'gain from trade' and be 'exploited through trade' at the same time." (Köhler, 1998, p. 180).

⁶ Coefficient 0.66***, p-value = 0.003 < 0.01

The result found in my analysis of a dual impact of contact with core economies seems to exactly confirm the previous understanding. On the one hand, the consistent negative impact of the coefficient of exports to core means that when periphery countries export to core countries, they significantly transfer unrecorded value to them, confirming the existence of unequal exchange in international markets. The existence of unequal exchange is further corroborated by the consistent negative impact of the price distortion index, the weighted ERDI, indicating that countries experiencing undervaluation indeed lose value in favor of those receiving their exports.

At the same time, semi-periphery countries, arguably having more contact with core economies, benefit from trade openness by enhancing their economic growth faster than the loss of unrecorded value transfers due to unequal exchange. This can also be confirmed by the positive and significant impact displayed by the bordering dummy, indicating positive long term effects of bordering the core of the global economic system. This finding of dual impact of trade with core economies offers great hope, as it opens the possibility of constructing a fair international playing field that accelerates development.

A final mention is due to the results shown by the proxies for Global Value Chains presence (GVC), even though results might be taken cautiously. Given its importance in international trade, and the consistent significant results, it is relevant to understand how they relate to unequal exchange. Across all the specifications, the general finding is that higher shares of production of agricultural and services value added (VA) significantly reduces the share of unrecorded value transferred to core economies, while manufacturing VA production significantly increases it.

First, it is plausible that the positive correlation of agriculture VA production and unrecorded value transfers reduction is driven by a reduction in the numerator of the dependent variable for two main reasons. First, as wealthier countries are more specialized on higher stages of the production chain, specialization in agriculture might reduce trading relations with high income countries while increasing trade contact with other emerging economies. Once the primary products are processed, these products might be exported to other lower and middle income countries to continue the production process. On the other hand, it is fairly established in the literature that core economies protect their primary markets by imposing high tariffs on periphery countries' primary commodities, to avoid competition (Chang, 2008). This might also reduce exports from agricultural producers in the periphery to core economies, and thus reduce the extensive growth in unrecorded value transfers. On the other hand, the negative effects of manufacturing VA production might be driven by the higher trade with core economies. Given the finding in the literature that middle and low income countries integrated in middle stages of production operate at very low margins and compensate with higher volumes of exports (Ravenhill, 2014), this finding seems a plausible explanation. In addition, this result combines with the fact that high income countries specialize in the upper parts of the production chains, importing value added from lower income countries to complete the production process. Given also that the main goal of GVC, or production outsourcing is the profit maximization by multinational corporations, the negative impact of manufacturing seems to correlate with it. Finally, the consistent negative impact of shares of foreign direct investment (FDI) somehow supports this possibility.

8. Conclusion

In this thesis, I have studied an alternative view of international development: the unequal exchange theory. Basically, unequal exchange theory contrasts with the traditional view of economic development in its international perspective. For unequal exchange theory, countries' development is explained by their position in the international economic system and by unequal interactions happening in international trade. The current international economic system has its roots in the understanding of trade during the mercantilist era and in the expansion of the imperialist understanding of the world during the colonial period. It is in fact during this period that high income countries structured the global economy to locate themselves in the center and integrate the rest in unequal terms. Within this context, I have sought to understand unequal exchange both from the theoretical and the empirical perspectives.

From the theoretical perspective, I reviewed the most prominent schools of thought on unequal exchange, which mostly surged during the mid 20th Century, and found that they still connect to today's economic relationships between core and periphery countries. From the empirical perspective, I conducted the first regression analysis on the drivers of unequal exchange in international trade. Specifically, I focused my analysis on unequal exchange driven by distortions on the exchange rate system, which consistently undervalues peripheral countries' currencies. I found that, while international trade has indeed positive effects on periphery economies' economic growth, exporting to core economies directly entails a loss of value for peripheral countries. This result is encouraging, since by addressing the unequal side of international trade, its positive impact on long term international development could be even greater. As well, this result confirms the importance of not biasing economic research on development by focusing only on the positive aspects of international interactions between developed and developing countries. Finally, after my analysis, some conclusion arise:

The first conclusion is that both the economic history reviewed and empirical quantifications confirm that indeed periphery countries transfer value to core countries. Looking at this result, further research on international development should focus on understanding through which mechanisms this loss of value affects periphery countries' development. The second conclusion derives from the first one and tells that the same history that has shaped countries' current domestic conditions has as well shaped their international interactions, and the economic performance of countries is indeed closely linked to their international environment. These interactions are and have historically been extremely beneficial for today's high income countries while unequivocally detrimental for poorer ones (Frank, 1966). For all the above reasons, economic interrelations between countries are crucial to understand today's economic differences. As Gunder Frank (1966) explained, we cannot see each country's current situation as isolated from the rest and from its history, as it is international economic dynamics, flowing resources around the globe, that enrich some while impoverishing others. For this reason, if we are to formulate real solutions that make the world a more equitable place, restraining the accumulation of the 'some' while lifting the 'others' out of poverty, we need to look at the global economic structure as an interrelated reality.

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South Asia		South East Asia	
Country Name	Nr. Obs.	Country Name	Nr. Obs.
Bangladesh	33	Cambodia	25
Bhutan	16	Indonesia	33
India	33	Lao People's Dem. Rep.	28
Nepal	33	Malaysia	31
Pakistan	33	Myanmar	8
Sri Lanka	33	Philippines	18
Total	181	Thailand	25
		Viet Nam	32
		Total	200
China			
Country Name	Nr. Obs.		
China	14		
Total	14		
East Europe Periphery		South Europe Periphery	
Country Name	Nr. Obs.	Country Name	Nr. Obs.
Belarus	24	Albania	22
Hungary	10	Bosnia and Herzegovina	20
Rep. of Moldova	23	Croatia	17
Poland	10	Montenegro	11
Romania	14	North Macedonia	24
Russian Federation	3	Serbia	11
Ukraine	26	Total	105
Total	110		

2. Table A2: List of Core Economies.

List of Core Economies		
Australia	Germany	New Zealand
Austria	Greece	Norway
Belgium	Iceland	Portugal
Bermuda	Ireland	Republic of Korea
Canada	Israel	Singapore
Cayman Islands	Italy	Slovakia
Curaçao	Japan	Slovenia
Cyprus	Latvia	Spain
Czechia	Lithuania	Sweden
Denmark	Luxembourg	Switzerland
Estonia	Malta	United Kingdom
Finland	Netherlands	United States of America
France	New Caledonia	

APPENDIX B

Table B1: Results in Table 4 including baseline specification, not including

TABLE 4. DETERMINANTS OF UNEQUAL EXCHANGE. FULL SAMPLE
RANDOM EFFECTS REGRESSION. 1985 - 2017

Dependent variable: UVT/GDP	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trade Openness	-0.031*** (0.003)	-0.033*** (0.003)	-0.042*** (0.003)	-0.046*** (0.003)	0.009*** (0.002)	0.012*** (0.003)	0.006*** (0.002)	0.010*** (0.003)
Share of Exports to Core					-0.331*** (0.006)	-0.337*** (0.007)	-0.322*** (0.006)	-0.330*** (0.007)
Share of Exports to Periphery					0.087*** (0.007)	0.085*** (0.008)	0.073*** (0.008)	0.075*** (0.008)
Weighted ERDI	-0.010*** (0.001)	-0.010*** (0.001)	-0.009*** (0.001)	-0.010*** (0.001)	-0.014*** (0.001)	-0.014*** (0.001)	-0.013*** (0.001)	-0.013*** (0.001)
Border Dummy	0.014 (0.010)	-0.015 (0.011)	0.018** (0.009)	0.005 (0.011)	0.010** (0.004)	0.013*** (0.004)	0.010*** (0.004)	0.013*** (0.004)
Share of Agriculture VA	0.024* (0.013)	0.024* (0.013)	0.029** (0.013)	0.025* (0.014)	0.055*** (0.008)	0.059*** (0.009)	0.053*** (0.009)	0.056*** (0.009)
Share of Manufacturing VA	-0.075*** (0.018)	-0.071*** (0.018)	-0.023 (0.018)	-0.028 (0.018)	-0.055*** (0.011)	-0.045*** (0.012)	-0.042*** (0.011)	-0.041*** (0.012)
Share of Services VA	0.064*** (0.011)	0.059*** (0.011)	0.056*** (0.010)	0.045*** (0.011)	0.022*** (0.007)	0.022*** (0.007)	0.020*** (0.007)	0.020*** (0.007)
Ln GDP pc	0.000 (0.003)	0.004 (0.003)	-0.018*** (0.003)	-0.022*** (0.003)	0.006*** (0.002)	0.010*** (0.002)	0.002 (0.002)	0.006** (0.002)
Share of ODA	0.011 (0.013)	0.014 (0.013)	0.029** (0.013)	0.029** (0.013)	0.006 (0.008)	0.008 (0.008)	0.013 (0.008)	0.012 (0.009)
Share of FDI	0.035*** (0.013)	0.035*** (0.014)	0.024* (0.013)	0.026** (0.013)	-0.049*** (0.009)	-0.055*** (0.009)	-0.049*** (0.009)	-0.054*** (0.009)
southasia	0.021 (0.031)	0.046*** (0.015)	0.006 (0.027)	0.002 (0.014)	0.003 (0.013)	-0.079*** (0.016)	0.001 (0.012)	0.005 (0.007)
southeastasia	-0.033 (0.030)	-0.023*** (0.008)	-0.040 (0.027)	-0.010 (0.008)	-0.015 (0.013)	-0.097*** (0.018)	-0.016 (0.012)	-0.006 (0.005)
easterneu	-0.005 (0.031)	0.067*** (0.015)	0.008 (0.027)	0.043*** (0.014)	-0.016 (0.013)	-0.097*** (0.016)	-0.011 (0.012)	-0.007 (0.007)
southeu	0.012 (0.031)	0.043*** (0.015)	0.027 (0.027)	0.027* (0.014)	-0.005 (0.013)	-0.092*** (0.017)	-0.000 (0.012)	-0.003 (0.007)
latamc	0.016 (0.028)	0.028*** (0.008)	0.032 (0.025)	0.062*** (0.008)	-0.002 (0.012)	-0.095*** (0.019)	0.003 (0.011)	0.000 (0.005)
mena	0.022 (0.029)	0.059*** (0.013)	0.031 (0.025)	0.037*** (0.012)	-0.001 (0.012)	-0.082*** (0.016)	0.003 (0.011)	0.006 (0.005)
ssa	0.026 (0.028)	0.012 (0.010)	0.013 (0.025)	-0.013 (0.010)	0.007 (0.012)	-0.075*** (0.015)	0.006 (0.011)	0.009 (0.007)
Year Fixed Effects	No	No	Yes	Yes	No	No	Yes	Yes
Country Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	2,200	2,200	2,200	2,200	2,177	2,177	2,177	2,177
Number of Countries	89	89	89	89	87	87	87	87

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable: UVT/GDP is