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Trade Openness and Income Inequality: A Comparative Analysis
of High-, Middle-, and Low-Income Countries

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Abstract:

This Master's thesis investigates the relationship between international trade and income inequality, measuring trade openness as a share of GDP and inequality using the Gini coefficient. Using a fixed-effects panel data for 196 countries over 1990–2025, I estimate the effect of trade openness on inequality across high-, middle, and low-income countries, and further disaggregate the analysis by the income level of trading partners.

The results show that trade openness is consistently associated with a statistically significant rise in inequality at the global level, an effect strongest in middle-income economies, weaker in high-income countries, and largely insignificant in low-income countries. However, a counterfactual analysis reveals that this effect is economically small: trade has exerted only modest upward pressure on inequality even as the Gini coefficient has declined substantially across all income groups, meaning inequality has fallen despite, not because of, trade integration. The contribution of trade also follows a clear gradient—smallest in low-income countries, larger in middle-income countries, and largest, though still marginal, in high-income countries, where it is likely offset by stronger domestic institutions and human capital.

These findings suggest trade openness is not a central driver of inclusive growth, and that its distributional effects depend on domestic institutional, educational, and labor market conditions.

Kurzfassung

Diese Masterarbeit untersucht den Zusammenhang zwischen internationalem Handel und Einkommensungleichheit, wobei die Handelsöffnung als Anteil am BIP und die Ungleichheit anhand des Gini-Koeffizienten gemessen werden. Mithilfe eines Panel-Datenansatzes mit festen Effekten für 196 Länder im Zeitraum 1990–2025 schätze ich den Einfluss der Handelsöffnung auf die Ungleichheit in Ländern mit hohem, mittlerem und niedrigem Einkommen und disaggregiere die Analyse zusätzlich nach dem Einkommensniveau der Handelspartner, einschließlich des Süd-Süd-Handels.

Die Ergebnisse zeigen, dass Handelsöffnung weltweit durchweg mit einem statistisch signifikanten Anstieg der Ungleichheit verbunden ist; dieser Effekt ist in Ländern mit mittlerem Einkommen am stärksten, in Ländern mit hohem Einkommen schwächer und in Ländern mit niedrigem Einkommen weitgehend insignifikant. Eine kontrafaktische Analyse zeigt jedoch, dass dieser Effekt wirtschaftlich gesehen gering ist: Der Handel hat nur einen bescheidenen Aufwärtsdruck auf die Ungleichheit ausgeübt, obwohl der Gini-Koeffizient in allen Einkommensgruppen erheblich zurückgegangen ist, was bedeutet, dass die Ungleichheit trotz der Handelsintegration gesunken ist und nicht wegen ihr. Der Beitrag des Handels folgt zudem einem klaren Gradienten – am geringsten in Ländern mit niedrigem Einkommen, größer in Ländern mit mittlerem Einkommen und am größten, wenn auch immer noch marginal, in Ländern mit hohem Einkommen, wo er wahrscheinlich durch stärkere inländische Institutionen und Humankapital ausgeglichen wird.

Diese Ergebnisse deuten darauf hin, dass Handelsöffnung kein zentraler Motor für inklusives Wachstum ist und dass ihre Verteilungseffekte von den innerstaatlichen institutionellen Rahmenbedingungen, dem Bildungsniveau und den Arbeitsmarktbedingungen abhängen.

AI Declaration

During the development of this thesis, generative artificial intelligence tools, specifically ChatGPT (OpenAI), were used as complementary support in the research and academic writing process.

Consistent with the program's AI policy, AI tools were used as an aid rather than a substitute for independent academic work. Their use included support in finding relevant literature and clarifying theoretical and methodological concepts, assisting with coding tasks , and as a language-support tool (grammar and clarity).

All academic sources cited in this thesis were independently reviewed and verified by the author. The data collection, data cleaning, econometric modeling, empirical analysis, interpretation of results, and final conclusions were conducted independently. The author assumes full responsibility for the accuracy, validity, and integrity of all aspects of the work.

AI tools were not used to replace critical thinking, original analysis, or the author's understanding of the research design and results. All content presented reflects the author's own intellectual contribution.

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List of Acronyms

GDP: Gross Domestic Product

IMF: International Monetary Fund

OLS: Ordinary Least Squares

UN Comtrade: United Nations Commodity Trade Statistics Database

USD: United States Dollar

WDI: World Development Indicators

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Introduction:

Since the 1990s, rapid economic integration has been largely driven by the application of trade theories, with the expectation of increasing overall welfare through greater efficiency, specialization, and economic growth. However, despite the expansion of global trade, empirical evidence on its actual effects within countries remains mixed; both the benefits and limitations of international trade have been questioned from multiple perspectives. Nevertheless, the impact of economic integration on inequality is still not fully understood, particularly regarding how these effects vary across countries with different levels of development, degrees of internationalization, and structural integration.

Income inequality is influenced by many economic and social factors that have changed with globalization. For example, changes in labor markets, migration, and wage-setting rules can affect how income is distributed within a country. At the same time, globalization, new technologies, outsourcing, and financial integration have changed the types of jobs that are in demand and the wages people earn. In particular, international trade and global production have often increased the demand for skilled workers compared to less skilled workers, which can lead to higher wage differences within countries (Goldberg, 2007). Because of this, it is important to understand how globalization affects inequality in order to design policies that support more fair and inclusive economic growth.

A growing body of empirical literature suggests that trade openness may exacerbate pre-existing inequalities through several transmission channels. These include skill-biased technological change, shifts in the relative demand for skilled versus unskilled labor, capital-labor dynamics, and sectoral reallocation across industries (Goldberg, 2007). While trade can promote growth and efficiency, its distributional consequences are often uneven, affecting different groups, regions, and countries in distinct ways.

Despite scholarly attention, the relationship between international trade and income inequality remains fragmented and inconclusive. Much of the existing literature

focuses on aggregate effects (JAUMOTTE, 2013; Dorn, 2022 ; Meschi, 2009) or examines specific groups or regions in isolation (Autor D. H, 2013; Yameogo, 2021;Tomas Rosenfeld, 2024), However comparatively less attention has been paid to how these effects differ systematically across countries with different income levels. Moreover, while some studies suggest that the characteristics of trading partners can influence welfare outcomes (Acemoglu, 2003; Feenstra & Hanson, 1997;Muñoz, 2020) there is still limited empirical evidence on how inequality evolves depending on the interaction between countries at different stages of development.

This thesis aims to address these gaps by providing both theoretical and empirical research to understand further, how does trade affect income inequality within countries and how does this effect differ between countries from different income levels. Specifically, it estimates an econometric model using fixed-effects panel data techniques for 196 countries over the period 1990–2025, a timeframe that captures the main expansion of global trade integration around the world. Additionally, countries are grouped according to their income level (high, middle, and low), and the analysis is extended to examine how inequality evolves depending on the income level of the trading partners. This approach allows for a more comprehensive understanding of how trade integration affects inequality, not only through its intensity but also through its structure.

Overall, the econometric results suggest that higher levels of trade integration are associated with a small but positive increase in income inequality across countries. This effect is particularly statistically significant in the case of trade relationships among middle-income countries. However, these marginal effects contrast with the observed global decline in income inequality over the same period, suggesting that other structural forces—such as institutional changes, human capital accumulation, and growth convergence in developing economies—have played a stronger role in shaping aggregate inequality trends.

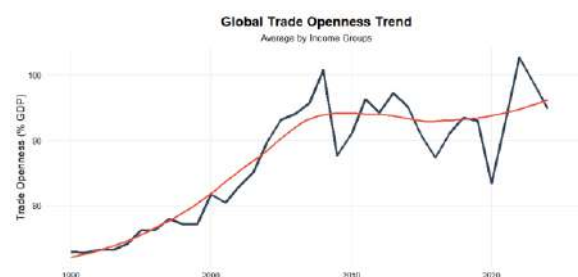
The remainder of the paper is structured as follows. I present the global background and recent trends in trade and inequality, followed by a review of the relevant literature. Next, the dataset and methodology are described, along with the main results and robustness checks. The paper then discusses the findings and concludes.

Background:

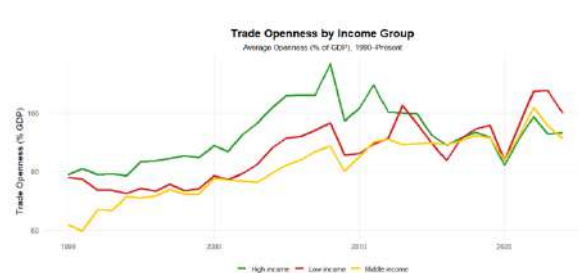
Over the past decades, trade openness has generally been promoted as a key driver of economic growth and many international institutions and economists argue that opening economies to global markets increases efficiency, productivity, and overall welfare; under this idea, the global economy has undergone a profound process of trade integration, characterized by reducing trade barriers, the expansion of international agreements, and a substantial increase in cross-border flows of goods and services. This process, commonly associated with globalization, has reshaped production structures and raised important questions regarding its implications for income distribution within countries from different development levels.

Figure 1

Panel A



Panel B



Own elaboration based on World Bank (World Development Indicators, 2026).

As illustrated in Figure 1, in panel A, global trade —measured as trade as a percentage of GDP— indices exhibit a clear upward trend from the late twentieth century, reflecting increasing economic interconnectedness. However, this trend is not uniform across

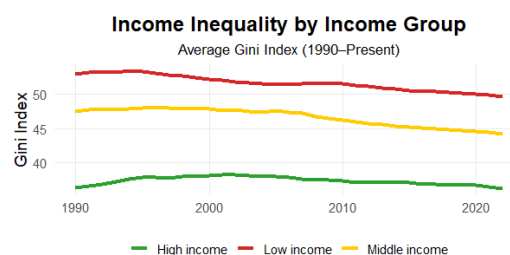
country groups, in panel B High-income countries display earlier integration consistently high and relatively stable levels of trade integration. In contrast, middle-income countries show the most pronounced increases over time, driven by trade liberalization policies, industrialization processes, and deeper participation in global value chains. Meanwhile, low-income countries remain less integrated into the global trading system, with more volatile integration levels.

Figure 2

Panel A



Panel B



Own elaboration based on World Bank (World Development Indicators, 2026).

As shown in Figure 2, income inequality, — measured by the Gini coefficient, where 0 denotes perfect equality and 100 indicates perfect inequality —has declined across all income groups over the 1990–2025 period, though at markedly different paces. Low-income countries display the steepest decline, falling from a Gini of approximately 58 to 50; middle-income countries show a more moderate decline, from approximately 48 to 44, including a plateau between 2000 and 2010; and high-income countries exhibit the lowest and most stable levels throughout, declining only slightly from approximately 39 to 37. This generalized decline in inequality is consistent with broader global trends in education expansion, urbanization, and redistributive policy over the period.

However, these trends should be interpreted with caution; While high-income countries exhibit both higher and more stable levels of trade integration and lower inequality, they also differ systematically from lower-income economies in terms of institutional quality, redistributive capacity, human capital, and technological adoption. These structural differences make it hard to separate how much inequality is caused by trade itself and how much is due to a country's level of development. In other words, the fact that richer and more open economies tend to have lower inequality may reflect their stage of development rather than a direct effect of trade on income distribution.

Moreover, trade integration is not a homogeneous process across countries. The nature of participation in global markets as shown in figure 1 differs substantially within countries from different income levels: high-income economies tend to engage in more complex, skill-intensive trade in services and high-technology goods, whereas middle- and low-income countries are more exposed to structural transformation processes, commodity specialization, and varying degrees of informality in labor markets. As a result, similar increases in trade openness may generate fundamentally different distributional effects across country income groups.

This heterogeneity raises a central empirical challenge: whether the observed decline in inequality over time can be attributed, at least in part, to increased trade integration, or whether it is primarily driven by other domestic factors such as education expansion, technological change, and redistributive policies, therefore, the key question that motivates this thesis is: How does trade affect income inequality within countries and how does this effect differ between countries from different income levels? To address this question, this paper analyzes the relationship between trade openness and income inequality across countries with different income levels. The objective is to better understand how the distributive effects of globalization vary depending on a country's stage of economic development and its structural characteristics.

Literature Review:

The theoretical foundation of international trade and integration has traditionally been built on the idea that countries can improve their welfare by specializing in the production of certain goods and services (Samuelson, 1939). This principle suggests that instead of trying to produce everything domestically, countries should focus on what they can produce relatively more efficiently and exchange goods with other countries (Smith, 1776)

Classical trade theories, particularly those developed by Adam Smith (1776), introduced the concept of absolute advantage, arguing that countries should specialize in the production of goods they can produce more efficiently than others. However, this idea cannot fully explain trade between developed and less developed countries, the latter may have a lower level of technological development and therefore may not hold an absolute advantage in the production of any good in relation with the developed country and still engage themselves in trade; This limitation was addressed by David Ricardo through the theory of comparative advantage, which demonstrated that even if a country is less efficient in producing all goods, it can still benefit from international trade by specializing in the production of goods for which it has the lowest opportunity cost. This insight provides a more robust and universally applicable explanation for trade patterns and supports the argument that all countries, regardless of their level of development, can gain from participating in international trade (Ricardo, 1817).

However, later developments in international trade theory, such as the idea introduced by Heckscher-Ohlin, also known as the Heckscher-Ohlin model, shifted the focus away from productivity differences towards the factor endowments, this economist argues that trade not only is influenced by opportunity cost but to the relative abundance of productions factors such as labor, capital and land. This model suggests then that countries will specialize in the production of goods that intensively use the factors they have in abundance with, while importing the goods that require factors that are relative scares domestically (Heckscher & Ohlin, 1933).

This approach not only explains why countries with different economic structures engage in trade but also highlights that the impact of trade openness on income inequality depends on a country's development level. Following the Stolper–Samuelson theorem, predicts that trade benefits the owners of a country's abundant factor while harming the owners of its scarce factor (Stolper & Samuelson, 1941). As a result, in developing countries where unskilled labor is relatively abundant, trade liberalization is expected to increase the demand for low-skilled workers, raise their wages, and reduce the gap in income inequality. Conversely, in developed countries where capital and skilled labor are relatively abundant, trade openness may increase income inequality by raising returns to these factors by increasing the existent gap.

Despite its significant contribution to explaining trade patterns between countries with different factor endowments, the Heckscher-Ohlin framework still assumes relatively simple market structures and does not fully capture the complexity of modern international trade. A significant share of global trade occurs between countries with similar levels of development and comparable factor endowments, particularly among advanced economies. Moreover, countries frequently engage in intra-industry trade, simultaneously exporting and importing similar types of goods, a phenomenon that cannot be fully explained within the traditional framework (Helpman, 1981)

This gap in the theory opened the door for a new approach in international trade economics that places greater emphasis on the current market structure, firm behavior, and economies of scale rather than only factor endowments. In this context, the so-called New Trade Theory developed by Paul Krugman introduced the idea that increasing returns to scale, imperfect competition, and product differentiation as key drivers of international trade. This framework shows that trade can arise even between identical countries, as firms benefit from economies of scale and consumers gain from greater product variety. (Krugman P. R., 1979)

However, the emergence of the New Trade Theory adds an additional layer to this relationship by introducing increasing returns to scale, imperfect competition, and

product differentiation, this framework suggests that trade does not only redistribute gains across factors of production but also across firms and industries. In this setting, the benefits of trade are often concentrated among large, highly productive firms and workers with skills that are complementary to advanced production technologies. As a result, trade may contribute to rising inequality in both developed and developing economies, regardless of their factor endowment structure.

Further advancements in the literature, particularly the Melitz model, incorporate firm-level heterogeneity and demonstrate that the gains from trade are unevenly distributed not only across factors of production but also across firms. In this context, only the most productive firms are able to enter export to international markets, and they would be the most benefited by international trade, while less productive firms are going to be concentrated in domestic markets until they exit the market, this, leading to a reallocation of resources toward more efficient producers (Melitz, 2003). As a result, trade liberalization can increase wage inequality by favoring high-skilled workers and employees in more productive firms, regardless of a country's factor endowment structure.

More recent empirical research emphasizes that the effects of trade depend not only on the overall level of openness but also on the characteristics of trading partners. In particular, the income level of partner countries plays a crucial role in shaping distributional outcomes- For example, Wood in North-South trade, employment and inequality: Changing fortunes in a skill-driven world (Wood A. , 1997) argues that trade between developed and developing countries alters the relative demand for skilled and unskilled labor across economies, while Feenstra and Hanson (1997) demonstrated that increased trade with low-income countries can contribute to rising wage inequality in developed economies by shifting low-skill production abroad. This is consistent with the “China syndrome” study (Autor D. H., 2013), the authors provide evidence that import competition from China had significant negative effects on employment and wages for low-skilled workers in the United States.

Furthermore, recent evidence from Latin American countries (Tomas Rosenfeld, 2024) suggests that the nature of trading partners matters more for inequality dynamics. When they disaggregate trade according to partners' relative income level, they found a decreasing-inequality effect of trade with higher-income countries, while if the trading partner is similar-or lower-income countries, inequality tends to worsen. All these findings suggest that trade is not a homogeneous process, but rather that its impact depends on who countries trade with, as different partners generate distinct labor market and distributional effects.

From a theoretical standpoint, the abundance theory suggests that relative factor abundance varies depending on the trading partner considered, implying that the relative abundance of production factors is not constant across trading relationships. On the other hand, heterogeneous firm theories and modern approaches suggest that trade openness enables technology upgrading in developing countries; either through the import channel (capital goods and intermediate input outsourcing) or the export channel (quality-upgrading mechanisms), a process that is highly conditional upon partners' income levels. Consequently, the ultimate effect of trade on income inequality varies depending on both the nature of the products traded and the characteristics of the trading partners (Muñoz, 2020)

Taken together, these theoretical and empirical contributions highlight that the relationship between international trade and income inequality is complex and driven by multiple mechanisms. While the Heckscher–Ohlin framework emphasizes the role of factor endowments and predicts different distributional outcomes depending on a country's level of development, the New Trade Theory and firm-level models suggest that trade can increase inequality more broadly through market structure and productivity dynamics. This thesis builds on these perspectives by explicitly incorporating the heterogeneity of trading partners into the analysis, rather than treating trade openness as a single aggregate measure, it examines how trade with countries at different income levels affects income inequality across economies from different income levels. By doing so, it aims to provide a more comprehensive

understanding of the income inequality within countries as a consequence of international trade and to assess whether these effects change significantly among countries from different income groups and trading partners.

Data:

This thesis uses a panel dataset that combines macroeconomic data and social indicators covering the period from 1990 to 2025. The data is obtained from internationally recognized sources such as the World Bank and Our World in data, which provide and comprehensive information for a large number of countries worldwide.

Since the main objective of this thesis is to analyze how income inequality within a country evolves as it becomes more integrated into international trade, my mean dependent variable is income inequality, which is measured using the Gini coefficient. This indicator is widely accepted in academic research as a standard measure of inequality. It ranges from 0 to 100, where 0 represents perfect equality and 100 indicates perfect inequality.

The main independent variable of interest is trade liberalization. This is proxied by the trade openness indicator, defined as the ratio of the sum of exports and imports to GDP for each country. This measure captures the degree to which an economy is integrated into global markets according to its GDP.

In addition to the main variables of interest, this analysis also includes a set of control variables that are commonly used in the academic literature on inequality and economic development. These variables help to isolate the effect of trade openness on inequality by accounting for other relevant factors.

The first control variable is the GDP per capita to correct for any distributional effects driven by income levels, which is included in the model as the logarithm of GDP and is calculated in constant values of USD 2015. This transformation allows the model to capture percentage changes over time and serves as a proxy for the level of economic

development of each country. Economic development plays a crucial role in shaping income distribution as more developed economies tend to exhibit different inequality dynamics compared to less developed ones, and the GDP per capita allows me to account for this

The second control variable that is used in the model is education; according to human capital theory, differences in educational attainment are a key driver of wage inequality, as higher levels of education increase productivity and earnings (Autor D. H., 2014) In this thesis, the model captures education as the percentage of secondary school enrollment; Including this variable allows the model to account for cross-country differences in skill distribution, which may mediate the effect of trade on inequality.

The third control variable included in the model is the age dependency ratio, which reflects the proportion of dependents, such a children and elderly individuals, relative to the working-age population (younger than 15 or older than 64) . This variable serves as well as an indicator of demographic structure indicator; it is relevant for inequality as only the working-age population generates income while the dependents rely on transfers, which means that a high dependency ratio reflects a higher pressure on households because the income must be distributed among more individuals, potentially affecting income distributions and increasing inequality.

The fourth and final control variable included in the model is the urban population, as a percentage of the total population; this variable captures the degree of structural transformation within an economy. More urbanized countries are typically associated with higher average wages and greater economic opportunities; however, their benefits are often unevenly distributed across regions and populations, contributing to both regional and income disparities (Castells-Quintana, 2017)

This thesis incorporates a dimension that captures the structure of countries' trade relationships, namely the income level of their trading partners. While traditional measures of trade openness focus on the volume of trade, recent developments in the

international economics literature emphasize that which countries trade with is equally important in shaping domestic economic outcomes, including income inequality.

To account for this, bilateral trade data was incorporated from international trade databases such as UN Comtrade, which provide detailed information on trade flows between country pairs over time. Using this data, each country's trade flows were decomposed according to the income classification of its trading partners, following the current World Bank's categorization. Specifically, trading partners were grouped into high-income, middle-income, and low-income countries.

Based on this classification, new variables were constructed to measure the share of a country's total trade (exports plus imports as a percentage of GDP) that takes place with partners in each income group. This allows the analysis to go beyond aggregate trade openness and instead capture the composition of trade exposure. This distinction is particularly relevant from a theoretical perspective as the adoption of advanced technologies, typically originating in high-income countries, tends to be skill-biased, thereby increasing the relative wages of skilled workers in developing economies (Acemoglu, 2003). In contrast, trade with lower-income countries can reinforce comparative advantages in labor-intensive sectors, increasing the demand for low-skilled labor and potentially reducing wage inequality. (Wood A. , 1997)

Incorporating the income level of trading partners is consistent with a growing body of empirical literature in international economics that emphasizes the role of trade structure and global value chains in shaping distributional outcomes. Trade with different types of partner countries has distinct distributional effects, implying that inequality outcomes vary depending on whether trade occurs with high- or low-income economies (Goldberg, 2007) By explicitly accounting for these dimensions, this thesis provides a more comprehensive understanding of how trade integration affects inequality, not only through its overall intensity but also through the composition of trading partners.

Unemployment is not included as a control variable because it is likely to be endogenous to trade exposure. Including it could absorb part of the causal effect of trade on inequality, leading to an underestimation of the total impact of trade liberalization.

A comprehensive database was constructed with all the variables described above, using all available information from 1990 to 2025. Additionally, countries were classified according to the World Bank classification system. While the World Bank distinguishes between four categories—high income, upper-middle income, lower-middle income, and low income—this thesis groups upper-middle and lower-middle income countries into a single “middle-income” category

One limitation encountered during the data collection process was the lack of consistent and reliable information for many low-income countries. In many cases, limited institutional capacity and data availability made it difficult to obtain complete time series for all variables. To avoid inconsistencies and extreme outliers that could bias the results, low-income countries with less than 5 years of data were excluded from the analysis.

In that order, the final dataset used in the econometric model consists of 196 countries, of which 69 are classified as high-income countries, 102 as middle-income countries, and 25 as low-income countries.

Methodology:

To analyze the relationship between trade openness and income inequality, this thesis employs an econometric approach based on panel data, which allows the observation of multiple countries over time, providing a richer basis for inference and interpretation of results across high-income countries, middle-income countries and low-income countries.

The core of the empirical analysis is based on a linear fixed-effects models that control for unobserved heterogeneity across countries and common global shocks.

Specifically, country fixed effects account for time-invariant characteristics such as geography, institutions, and historical factors, while year fixed effects capture global trends and shocks affecting all countries simultaneously. To address potential endogeneity and the dynamic nature of economic processes, all explanatory variables are included with lag 1 ($t - 1$). This approach ensures that changes in inequality are preceded by changes in the explanatory variables, capturing the delayed effects of trade and economic conditions. That is, an increase in trade openness in year t is assumed to affect inequality only from $t+1$ onward

The baseline empirical model is specified as follows:

$$Gini_{i,t} = \alpha_i + \lambda_t + \beta Trade_{i,t-1} + \gamma_1 \ln(GDPpc_{i,t-1}) + \gamma_2 Urban_{i,t-1} + \gamma_3 School_{i,t-1} + \gamma_4 AgeDep_{i,t-1} + \varepsilon_{i,t}$$

Where:

- ***Gini***: represents the Gini coefficient for country i at time t
- **α** : represents country-fixed effects, which control for time-invariant, country-specific characteristics (such as institutional quality, historical background, or geographic location) that may influence inequality.
- **λ** : represents time-fixed effects, which account for global shocks or trends that affect all countries simultaneously (e.g., global economic crises or technological shifts).
- **$\beta Trade$** : is the primary independent variable (trade as percentage of GDP).
- The remaining terms represent the set of control variables (GDP per capita, Education, Age Dependency, and Urbanization).
- **ε** : Error term.

As the main objective of this thesis is to investigate how trade openness affects income inequality and to compare how these effects differ across high-, middle-, and low-

income countries, the dataset was divided according to income classification groups. I then estimate separate fixed-effects regressions for each group; by running independent country- and year-fixed effects models within each income category, like this, I am able to isolate and compare the coefficients of trade openness and other socio-economic determinants across different economic contexts, allowing for a deeper analysis of heterogeneity in the relationship between trade and inequality.

To investigate heterogeneity in the effects of trade based on its structure, the analysis extends the baseline specification by decomposing the trade openness variable according to the income level of trading partners; meaning the trade relationship:

- **High-income countries:** trade with High-income countries, middle-income countries and low-income countries (H-H, H-M, and H-L respectively)
- **Middle-income countries:** trade with High-income countries, middle-income countries and low-income countries (M-H, M-M, and M-L respectively)
- **Low-income countries:** trade with High-income countries, middle-income countries and low-income countries (L-H, L-M, and L-L respectively)

$$Gini_{i,t} = \beta_1 TradeH_{i,t-1} + \beta_2 TradeM_{i,t-1} + \beta_3 TradeL_{i,t-1} + \delta X_{i,t-1} + \alpha_i + \lambda_t + \varepsilon_{i,t}$$

where i indexes countries and t denotes time. The dependent variable is the Gini coefficient. The main explanatory variables capture trade exposure with partner countries at different income levels: high-income ($TradeH$), middle-income ($TradeM$), and low-income ($TradeL$), all expressed as a share of GDP and included with a one-period lag to mitigate potential endogeneity concerns. The vector $\mathbf{X}_{i,t-1}$ includes the set of control variables and the country (α_i) and time (λ_t) fixed effects used in the baseline regression, and the error term $\varepsilon_{i,t}$. This model is estimated separately for different country income groups (high-, middle-, and low-income) to explore potential heterogeneity in the relationship between trade and inequality.

To ensure the robustness of the empirical results, several additional specifications are implemented. First, the analysis accounts for potential dynamic effects of trade on inequality by introducing lagged values of the main independent and control variables. Specifically, the regressions are re-estimated using progressively longer lag structures to assess how the effect of trade openness on inequality unfolds over time. This approach allows the model to capture the delayed effects of trade openness and trade composition on income inequality, recognizing that adjustments in labor markets, sectoral reallocation, and income distribution may occur gradually rather than contemporaneously.

In addition, a second robustness check is performed by re-estimating the model using a reduced-frequency dataset constructed at five-year intervals. Instead of relying on annual observations, the data is calculated every five years, thereby focusing on medium- to long-term structural changes rather than short-term fluctuations. This strategy helps mitigate the influence of business cycle volatility, measurement error, and temporary shocks that may bias the results in high-frequency data. By comparing changes across five-year periods, the analysis is better able to capture persistent trends in inequality and their relationship with trade integration.

Overall, this empirical strategy allows for a comprehensive assessment of both the level and composition of trade openness, while accounting for heterogeneity across countries and over time.

Results:

This section presents the main empirical findings regarding the relationship between trade integration and income inequality, measured by the Gini coefficient. The analysis first considers aggregated trade openness by income groups and subsequently disaggregates trade flows by the income level of trading partners.

Table 1 presents the baseline results for the full sample of countries using a one-period lag specification. The results suggest a statistically significant relationship between

trade openness and income inequality in the full sample, challenging the predictions of the Stolper–Samuelson theorem. My regression with 3,427 observations from 196 countries indicates that on average, an increment in 1% in trade openness, the overall Gini coefficient increments by approximately 0.021 points. This result aligns with studies such as *The China Syndrome: Local Labor Market Effects of Import Competition in the United States* (Autor D. H., 2013) and *Distributional Effects of Globalization in Developing Countries* (Goldberg, 2007) which document that increased exposure to international trade can lead to rising wage inequality, especially when labor markets are imperfect, and adjustment mechanisms are slow.

Table 1: OLS Fixed Effects

	Estimate	Std. Error	t-value	p-value
Trade openness (t-1)	0.0210**	0.0080	2.6412	0.0089
Education (t-1)	0.0119	0.0125	0.9512	0.3427
Urbanization (t-1)	-0.0524	0.0465	-1.1273	0.2610
Age dependency ratio	0.0450	0.0315	1.4257	0.1555
GDP per capita (log, t-1)	0.1944	0.7893	0.2462	0.8058
Observations		3,427		
Adj. R ²		0.9543		
Within R ²		0.0153		
RMSE		2.0794		
Country-level (iso3) clustered. Significance Levels: *** p<0.01, ** p<0.05, * p<0.1				

The effect of trade openness on income inequality is expected to differ depending on the development level of countries. The Stolper–Samuelson theorem (Stolper & Samuelson, 1941) predicts that trade openness increases inequality in developed countries and decreases inequality in developing countries; I examine 3 subsamples depending on the development level of countries (High, middle and low).

When running the same baseline regression but divided into high-, middle-, and low-income countries, as shown in Table 2 the results indicate a more specific story, the changes in inequality found in table 1, is mostly driven by middle income countries,

where according with the regression within this income level group, in average, an increment in openness is associated an increase in 0.027 points in the Gini coefficient for middle income countries, being statistically significant at the 10% level. For high-income countries, the coefficient on trade openness is not statistically significant. This result is consistent with the presence of stronger redistribution mechanisms, more developed labor markets, and institutional frameworks that may mitigate distributional effects of trade.

For low-income countries, the estimated association between trade openness and inequality is not statistically significant. Although some coefficients are economically large, they are imprecisely estimated, likely reflecting the small sample size, higher volatility, and greater measurement uncertainty in this group. Accordingly, the results for this subset should be interpreted with caution and do not support strong inference.

Table 2: OLS Fixed Effects by Income Group

	High Income	Middle Income	Low Income
Trade openness (t-1)	0.0296 (0.2393)	0.0275* (0.0123)	0.5781 (0.7513)
Education (t-1)	-0.0172 (0.0125)	0.0380 (0.0203)	0.0010 (0.0603)
Urbanization (t-1)	0.0467 (0.1023)	-0.0716 (0.0470)	-0.0515 (0.2294)
Age dependency ratio (t-1)	0.1329 (0.0727)	0.0185 (0.0399)	-0.1219 (0.1097)
GDP per capita (log)	-2.7695 (1.6090)	1.7227 (1.1169)	0.8130 (2.6394)
Observations	1,255	1,817	355
Adj. R ²	0.948	0.943	0.836
Within R ²	0.097	0.034	0.039
RMSE	1.669	2.067	2.646

Country-level (iso3) clustered. *** p<0.01, ** p<0.05, * p<0.1 Standard Error in parenthesis

Overall, control variables in regression by subsamples show weaker and less consistent effects, although education, according to human capital theory, is a key driver of wage inequality, occasionally enters with a positive coefficient, suggesting a

potential skill-biased mechanism, there are no statistically significant results. Urbanization and demographic structure do not exhibit robust patterns across specifications.

To further investigate the heterogeneous effects of trade on income inequality, the analysis decomposes total trade openness according to the income level of trading partners. This allows for a more granular understanding of whether the distributional effects of globalization depend not only on the intensity of trade, but also on its direction across distinct income level groups of countries.

Table 3 shows that the effects of trade on income inequality depend significantly on the income level of trading partners.

In the full sample, trade with middle-income countries emerges as the only statistically significant component. The estimated coefficient is positive (0.138) and significant at the 5% level, indicating that an increase in trade with middle-income partners is associated with higher income inequality across countries.

Table 3: Impact of Trade Exposure on Inequality

	All Countries
Trade with High Income (t-1)	-0.011 (0.016)
Trade with Middle Income (t-1)	0.138* (0.057)
Trade with Low Income (t-1)	-5.712 (8.983)
Education (t-1)	0.013 (0.013)
Urban population (t-1)	-0.053 (0.046)
Age dependency (t-1)	0.046 (0.031)
Log GDP per capita (t-1)	0.149 (0.779)
Observations	3,427
Fixed Effects	Country, Year
R² (within)	0.016

Country-level (iso3) clustered Significance levels: *** p < 0.001, ** p < 0.01, * p < 0.05, · p < 0.1.

In contrast, trade with high-income countries does not exhibit a statistically significant effect on inequality. The coefficient is negative but insignificant, suggesting no systematic distributional impact of trade with advanced economies in the global sample.

Similarly, trade with low-income countries is not statistically significant. Although the estimated coefficient is large in magnitude, it is imprecisely estimated, reflecting substantial variability in this trade category and limited statistical power.

Overall, Table 3 indicates that the aggregate relationship between trade and inequality is not uniform across trading partners, but is instead driven mainly by trade flows between middle-income economies.

Table 4 further explores whether the impact of trade with different partner groups varies depending on the income level of the importing country.

For high-income countries, none of the trade variables are statistically significant at conventional levels. However, trade with middle-income countries shows a negative coefficient that is marginally significant at 10% level. This suggests that increased integration with middle-income economies may be associated with a reduction in inequality in advanced economies, potentially reflecting consumption gains from lower-cost imports or changes in production structure. Trade with high-income and low-income partners does not display any statistically meaningful effects, indicating that trade composition is not a major driver of inequality dynamics in high-income economies.

Table 4: Impact of Trade Exposure on Inequality by Income Group.

	High Income	Middle Income	Low Income
Trade with High Income (t-1)	0.334 (0.368)	-0.023 (0.025)	-0.977 (2.313)
Trade with Middle Income (t-1)	-0.246 [·] (0.134)	0.209** (0.062)	2.990 (3.663)
Trade with Low Income (t-1)	0.751 (14.749)	6.475 (12.939)	-23.220 (18.708)
Education (t-1)	-0.017 (0.013)	0.038 [·] (0.020)	0.015 (0.065)
Urban population (t-1)	0.046 (0.101)	-0.072 (0.047)	-0.101 (0.261)
Age dependency (t-1)	0.132 [·] (0.073)	0.018 (0.040)	-0.117 (0.110)
Log GDP per capita (t-1)	-2.768 [·] (1.536)	1.725 (1.119)	0.435 (2.542)
Observations	1,255	1,817	355
Fixed Effects	Country, Year	Country, Year	Country, Year
R² (within)	0.099	0.037	0.054

Notes: Standard errors are reported in parentheses. clustered at the country level . Significance levels: *** p<0.001, ** p<0.01, * p<0.05, [·] p<0.1.

In middle-income countries, the results reveal a strong and statistically significant relationship between trade with middle-income partners and income inequality. The coefficient is positive (0.209) and highly significant at the 1% level, indicating that increased trade among middle-income economies is associated with higher inequality within this group. This result is particularly important, as it suggests that the distributional consequences of trade are most pronounced in peer-level interactions among economies with similar levels of development. In contrast, trade with high-income and low-income countries does not show statistically significant effects, reinforcing the idea that the inequality impact of trade is concentrated in South–South trade among middle-income countries.

This pattern is consistent with the framework developed by Melitz (2003), which emphasizes firm heterogeneity in international trade. In this context, trade between similar economies is often characterized by intra-industry exchanges rather than traditional comparative advantage. As a result, trade liberalization leads to a reallocation of resources toward more productive firms that are able to compete in export markets, while less productive firms contract or exit. This process increases average productivity but also amplifies differences across firms and workers within the same sector. Since more productive firms tend to employ higher-skilled labor and pay

higher wages, the gains from trade become unevenly distributed, leading to greater wage dispersion and higher overall income inequality. (Melitz, 2003)

For low-income countries, none of the trade coefficients are statistically significant. Although some estimates are large in magnitude, particularly for trade with low-income partners, they are estimated with high uncertainty and do not allow for robust inference. This likely reflects the small sample size, higher economic volatility, and limited integration into global trade networks characteristic of this group.

Robustness Check:

To evaluate whether the baseline findings are driven by short-term macroeconomic volatility or represent persistent structural trends, this section implements two complementary robustness specifications.

Table 5: Robustness Check: Dynamic Effects of Trade Openness on Inequality

Dependent Variable: <i>Gini</i>	(1) Full Sample	(2) High Income	(3) Middle Income	(4) Low Income
Trade Dynamics				
Trade/GDP ($t - 1$)	-0.0215 (0.0193)	0.2735 (0.3314)	-0.0357 (0.0336)	0.4131 (0.4250)
Trade/GDP ($t - 2$)	0.0292 (0.0209)	-0.1595 (0.0919)	0.0551 (0.0360)	0.0213 (0.6259)
Trade/GDP ($t - 3$)	0.0330** (0.0111)	-0.3671 (0.2769)	0.0334** (0.0104)	-0.0877 (1.1602)
Long-Run Cumulative Effect				
$\sum$ Trade/GDP	0.0407	-0.2532	0.0527	0.3467
Country Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes
Observations	3,284	1,229	1,721	334
Within R ²	0.0226	0.1071	0.0416	0.0607

Notes: Country-level (iso3) clustered. standard errors are reported in parentheses. · $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

The first robustness check , in Table 5, is performed by re-estimating the baseline regression using progressively longer lag structures to assess how the effect of trade openness on inequality unfolds over time. The results are consistent with the baseline specification and show that the inequality-increasing effect of trade is not contemporaneous: when adding more lags to the regression, I found that the effect is absorbed after 3 years and this effect remaining concentrated in middle-income countries. Specifically, a one-percentage-point increase in trade openness is associated with an increase of approximately 0.04 points in the global Gini coefficient at its peak lag, rising to 0.05 points when the sample is restricted to middle-income countries. Economically, this delayed response is consistent with the adjustment mechanisms described by firm-heterogeneity models such as Melitz (2003): reallocating resources toward more productive, export-oriented firms takes time, as it requires hiring and training skilled workers, reorganizing production processes, and allowing less productive firms to contract or exit the market. The fact that the effect peaks rather than emerges immediately therefore reinforces the structural, rather than purely short-run, nature of the relationship between trade and inequality in middle-income economies.

Table 6: Robustness Check: Effects of Trade Openness on Inequality (5-years Interval)

	All	High Income	Middle Income	Low Income
Trade openness (t-1)	0.0194** (0.0062)	-0.3834 (0.4316)	0.0279*** (0.0068)	3.9247 (5.8739)
Education (t-1)	0.0147 (0.0210)	0.0379 (0.0276)	0.0079 (0.0201)	-0.0763 (0.1148)
Urbanization (t-1)	-0.0704 (0.0468)	0.1107 (0.1363)	-0.0853* (0.0479)	0.0181 (0.3368)
Age dependency ratio (t-1)	0.0393 (0.0338)	0.1305* (0.0729)	0.0206 (0.0403)	-0.0558 (0.1123)
GDP per capita (log)	0.5078 (1.0041)	-3.1305* (1.6979)	1.2463 (1.3484)	3.0238 (3.8461)
Observations	615	204	338	73
Standard errors in parentheses, clustered by country				
***P<0.01, ** p< 0.05, * p < 0.1				

As a second robustness check, the baseline model is re-estimated using a reduced-frequency dataset constructed at five-year intervals, reported in Table 6. This lower-frequency strategy filters out business-cycle noise and short-term shocks, isolating the medium- to long-run relationship between trade and inequality. The results confirm the patterns found in the annual specification: trade openness remains positively associated with the Gini coefficient, and this relationship continues to be driven primarily by middle-income countries, where the coefficient remains statistically significant, at 0.02. The persistence of this effect at a lower frequency reinforces the view that the link between trade integration and inequality in middle-income economies is structural rather than a transitory, business-cycle phenomenon

Applying the same five-year-interval strategy to the trade-structure model produces results broadly consistent with the baseline specification, with one notable difference: over this longer horizon, trade between high-income and middle-income countries becomes statistically significant, with a sign indicating an equalizing rather than a disequalizing effect for high-income countries. This pattern is economically intuitive: in the long run, high-income countries benefit from importing lower-cost intermediate and final goods from middle-income trading partners, which raises real purchasing power, particularly for lower-income households that spend a larger share of their budget on tradable goods. At the same time, the stronger redistributive institutions and more developed labor markets characteristic of high-income economies allow them to better manage and redistribute these gains, an equalizing effect that only becomes visible once short-term adjustment costs have dissipated. None of the other trade-structure coefficients, for middle and low income groups, are statistically significant at this lower frequency.

Table 7: Robustness Check 5 years Interval by Trading Partner

	All	High Income	Middle Income	Low Income
Trade with High Income (t-1)	0.1062 (0.2194)	0.2136 (0.5059)	-0.2361 (0.4582)	2.4097 (7.1362)
Trade with Middle Income (t-1)	-0.2256 (0.5315)	-0.8806*** (0.2348)	0.6237 (1.1094)	5.1149 (5.4894)
Trade with Low Income (t-1)	30.5547* (17.4993)	26.3730 (17.5808)	30.7312 (27.4624)	14.3725 (53.3363)
Education (t-1).l1	0.0122 (0.0189)	0.0388 (0.0287)	0.0081 (0.0199)	-0.0642 (0.1160)
Urbanization (t-1)	-0.0754* (0.0455)	0.0734 (0.1339)	-0.0870* (0.0469)	-0.0193 (0.3838)
Age dependency ratio (t-1)	0.0359 (0.0329)	0.1281* (0.0711)	0.0175 (0.0393)	-0.0460 (0.1003)
GDP per capita (Log)	0.6655 (1.0083)	-2.8301* (1.6440)	1.3861 (1.3461)	3.5650 (4.4423)
Observations	615	204	338	73
Standard errors in parentheses, clustered by country				
*** p<0.01, ** p<0.05, * p<0.1				

To assess the real-world economic magnitude implied by the regression coefficients, beyond their statistical significance, a counterfactual decomposition exercise was conducted comparing the change in the Gini coefficient that can be directly attributed to the observed change in trade openness against the total observed change in the Gini coefficient over the same period, separately for each income group. This attributable change is computed as the product of the estimated coefficient (β) and the actual change in trade openness over the period ($\Delta TradeOpen$), relative to the actual change in the Gini coefficient ($\Delta Gini$):

$$\Delta \widehat{Gini} = \beta \cdot \Delta Trade$$

Across all three income groups, the Gini coefficient declined substantially over the sample period, yet in every group, the change attributable to trade openness moves in

the opposite direction to this decline, and represents only a small fraction of it: -0.83% for high-income countries, -0.57% for middle-income countries, and -0.06% for low-income countries (-0.53% at the aggregate level). This consistency across groups is itself a meaningful finding: it shows that, regardless of a country's level of development, trade openness has never been the primary force behind the observed evolution of inequality — its disequalizing pressure is real and statistically detectable, but quantitatively dominated by other forces specific to each income group.

Discussion:

Even though the results are statistically significant, the actual economic impact in the relationship between trade openness and income inequality is very small, while also revealing important heterogeneity across income groups. Although the regression estimates consistently indicate that trade openness is associated with higher inequality, the counterfactual analysis shows that its quantitative contribution is small relative to the observed decline in the Gini coefficient. In fact, inequality falls substantially over the period despite the fact that trade exerts a slight upward pressure. The comparison across groups, however, reveals an important nuance that reinforces the central argument of this thesis. The fraction of inequality change explained by trade is smallest in low-income countries (-0.06%), suggesting that in these economies the decline in inequality has been driven almost entirely by factors unrelated to trade, plausibly reflecting their limited integration into global markets. In middle-income countries, where the baseline regressions identify the strongest and most robust disequalizing effects of trade, the fraction explained is larger (-0.57%), indicating that trade plays a more active—though still secondary—role in shaping distributional outcomes. In high-income countries, the fraction explained is largest in absolute terms (-0.83%), even though it remains economically insignificant, suggesting that while trade may generate stronger disequalizing pressures, these are more than offset by well-developed redistributive institutions and labor market structures. Taken together, this

gradient across income groups suggests that trade openness exerts a modest but systematic upward pressure on inequality, but that this effect is consistently dominated by stronger equalizing forces. Overall, these findings support the central claim that the relationship between trade and inequality is fundamentally heterogeneous across levels of development, even if its aggregate economic magnitude remains small in all cases.

Conclusion:

The relationship between international trade and income inequality has long been a central question in economics, often framed around whether trade openness promotes inclusive growth or exacerbates disparities. This thesis contributes to this debate by providing a comprehensive and disaggregated analysis of this relationship across 196 countries over the period 1990–2025. By distinguishing not only between countries at different income levels but also between the income levels of their trading partners, this thesis moves beyond aggregate measures of trade to uncover the specific structures through which globalization affects income distribution.

The empirical results point to three main findings. First, at the global level, trade openness is consistently associated with a statistically significant rise in income inequality. However, this effect is not uniform across countries. It is strongest and most robust in middle-income economies, particularly in the context of South–South trade, where integration into global markets tends to generate uneven gains across firms and workers. In contrast, the effects are weaker and less consistent in high-income countries, and largely insignificant in low-income countries, which likely reflects their more limited integration into global value chains and limited data.

Second, and most importantly, the counterfactual analysis shows that the actual economic impact of this relationship is very small. While trade openness is associated with a slight increase in inequality, its contribution to the overall changes in the Gini

coefficient over time is minimal. In fact, even though inequality has declined significantly across all income groups, trade has exerted a small upward pressure in the opposite direction. This means that inequality has fallen despite, not because of, trade integration. In other words, although the effect of trade is statistically significant, its real-world impact is limited, suggesting that other factors play a much more important role in shaping inequality.

Third, the comparison across income groups reveals a clear and systematic gradient. The contribution of trade to inequality is smallest in low-income countries, slightly larger in middle-income countries, and largest—though still economically marginal—in high-income countries. This pattern suggests that while trade may generate modest disequalizing pressures across all stages of development, its impact is consistently dominated by stronger domestic forces. In high-income countries, these forces likely include well-developed redistributive institutions, advanced labor markets, and high levels of human capital. In middle-income countries, trade plays a more visible role, but remains secondary to broader structural transformations, and In low-income countries, changes in inequality appear to be largely disconnected from trade dynamics.

Taken together, these findings challenge the idea that trade openness is a central driver of inclusive growth. Instead, they suggest that the distributional outcomes trade openness depend fundamentally on domestic conditions, including institutional quality, education systems, and the capacity for redistribution. Trade is not a homogeneous force as it has a different effect on the level of development, nor does it operate in isolation. Its effects on inequality are heterogeneous and context dependent.

In conclusion, this thesis shows that understanding the relationship between trade and inequality requires moving beyond aggregate correlations and focusing on the interaction between global integration and domestic structures. For policymakers, the implication is clear: promoting trade alone is not sufficient to achieve more equitable

outcomes. Instead, complementary policies that strengthen institutions, expand access to education, and support inclusive labor markets are essential to ensure that the gains from globalization are broadly shared.

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