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FACULTY OF SOCIAL SCIENCES  
Institute of Political Studies  
Department of Political Science

**Bachelor's Thesis**

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**CHARLES UNIVERSITY**

**FACULTY OF SOCIAL SCIENCES**

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**The Impact of Trade Liberalization on Economic  
Growth in Latin America: A Comparative Analysis of  
Statistical Approaches**

Bachelor's Thesis

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3. I fully agree to my work being used for study and scientific purposes.
4. During the preparation of this thesis, the author used the integrated development environment Pycharm in order to run statistical calculations and create visuals. After using this tool/service, the author reviewed and edited the content as necessary and takes full responsibility for the content of the publication.

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## **Abstract**

In recent decades, Latin American countries have made significant reforms to liberalize trade. However, the existing literature does not reach a consensus on the significance of the relationship between trade and economic growth. This thesis examines 13 papers and 68 coefficients on the effect of trade liberalization on economic growth and establishes whether the methodology used could explain diverse results. The research finds no relationship between methodology and outcome of trade liberalization studies.

## **Abstrakt**

V posledních desetiletích provedly latinskoamerické země významné reformy s cílem liberalizovat obchod. Stávající literatura se však neshoduje na významu vztahu mezi obchodem a hospodářským růstem. Tato práce zkoumá 13 prací a 68 koeficientů vlivu liberalizace obchodu na hospodářský růst a zjišťuje, zda použitá metodika může vysvětlit rozdílné výsledky. Výzkum nezjistil žádný vztah mezi metodikou a výsledky studií o liberalizaci obchodu.

## **Keywords**

Trade liberalization, economic growth, Latin America, methodology, literature review, publication bias, developing economies

## **Klíčová slova**

Liberalizace obchodu, hospodářský růst, Latinská Amerika, metodologie, přehled literatury, publikační zkreslení, rozvojové ekonomiky

## **Název práce**

Dopad liberalizace trhu na ekonomický růst v Latinské Americe: Srovnávací analýza statistických přístupů.

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## **Introduction**

During the early 1990s, several Latin American countries, including Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Paraguay, Peru, Uruguay, and Venezuela, initiated significant trade liberalization reforms. This transition marked a substantial shift in their economic strategies and global interactions: elevating trade barriers, liberalizing customs regulations, increasing exports, etc. According to the classification by Wacziarg and Welch (2003), by 1999, all these nations had transitioned from being closed economies to embracing open economic policies.

Global organizations such as the World Bank, WTO, and the UN, all played a role in creating incentives for the countries to liberalize as a way to long-term economic growth and poverty reduction (UN, 2023; WTO, 2022). The neoclassical theory connects trade to economic growth by stating that trade allows economies to specialize in their respective predetermined comparative advantages, thus lowering the global opportunity cost and maximizing welfare. Yet, the connection between trade and economic growth remains more nuanced and less conclusively established in academic discourse than the widespread advocacy for the universal benefits of free trade suggests.

An alternative view has been emerging from the analysis of the data of Asian countries that pursued the strategy of export maximization and were often presented as positive role models for Latin America. Embracing natural comparative advantages through trade liberalization may inadvertently confine their economies to a reliance on resource-based exports. This scenario contrasts with the neoliberal scenario of reaping the short-term benefits of specialization. It implies that there are long-term tradeoffs to trade liberalization. Redding (1999) proposes an example of a Korean steel industry—Korea is not endowed with the resources involved in the production of steel, nor were there any conditions for the success of the government's decision to invest in this industry. Yet, today, it is the 7th largest steel producer in the world (WSA, 2022). Redding then concludes that economies with relatively high human capital, such as Latin American economies, can maximize welfare by implementing a temporary selective trade policy. In this view, the process of catching up, which is implied in neoclassical theory, happens through the ability to imitate the productions of the developed economies at a lower cost, as was done in the scenario of Asian

Tigers.

There is a reason to believe that the long-term positive relationship between trade and economic growth is less certain than was commonly accepted. In the short-term, an increase in exports is tautological in an increase in production; however, in the long-term, there are possible tradeoffs of liberalization policies.

The way economists read data is subject to change; trends appear and are forgotten, and constant revision uncovers deep-seated flaws in past studies. Establishing which factors influence economic growth is one of the most important questions in economic science and it is no surprise that in different periods, many different methods have been applied to the question of the results of trade liberalization in Latin America. The three most common econometric methods—panel data growth regression, time series analysis, and regression analysis—can lead to different results in studies due to their distinct methodologies, assumptions, and sensitivities. Each model relies on specific assumptions (e.g., panel data assumes individual effects are constant, time series assumes stationarity within one country data, and regression assumes a specific form of relationship). Violations of these assumptions can lead to different interpretations and conclusions. Additionally, researchers might be led to choose a methodology based on factors that influence the result they expect to achieve with their research. Researchers might choose methods that they believe will be more readily accepted and published, which can inadvertently align with the results they expect or wish to highlight.

In this study, I collected data from 13 papers published between 1985 and 2021, including 68 different factors or variables. I then analyzed whether variables such as methodology, end year or origin of the database have a robust effect on results. The goal was to see if the differences in the results from each paper could be explained by the different analytical methods used in each one. My findings find no relationship between methodology and results in the studies of trade liberalization and economic growth.

## **1. Trade policy in Latin America**

For the larger part of the XX century, Latin American policymakers were guided by a rejection of monetarist principles in favor of structuralist approaches that focused on supply-side solutions. Structuralism in Latin America emerged as a response to the perceived limitations of conventional economic theories to address the unique challenges faced by the region. Structuralists argued that underdevelopment was a condition maintained by structural factors both within and outside a country's economy. This belief made their policies aim to alter the economy's structure through industrial policy, agrarian reform, and protectionism to foster domestic industries. In this framework, opening up to trade would only solidify the country's structural barriers to growth (Laird, 1995).

Looking back, the application of structuralism in economic policy led to significant monetary policy mistakes, one of the most glaring being mishandled exchange rate regimes. To delve into more specific instances, perhaps the most infamous of these was the situation in Argentina, where the economy was caught in an unending cycle of overvaluation of the peso, which was subsequently followed by sudden and severe devaluations.

On the other hand, Brazil followed a different path, opting to pursue a strategy of import substitution industrialization (ISI). This was done with the aim to decrease the country's reliance on foreign imports and instead focus on the development of its own industrial sector. In order to make the cost of imported capital goods necessary for industrialization more affordable, the government maintained a relatively overvalued currency.

Similarly, Chile showed a certain level of hesitation in devaluing its currency despite the potential benefits. The country's economic policies during the 1960s and early 1970s, particularly under the leadership of President Salvador Allende, were largely centered around income redistribution, the nationalization of pivotal industries, and establishing economic independence from foreign influences. These policies were implemented with the intention of promoting self-sustainability and reducing external dependencies.

During the 1980s, the debt crisis in Latin America resulted in a noticeable drop in the region's contribution to global trade and a significant reduction in the ratio of trade to GDP. Latin America's participation in global trade plummeted from roughly 5% to 3.5% (Loser & Guerguil 1999). This period also saw a dramatic decrease in the volume of imports and limited access to external financing. Many countries resorted to implementing trade and exchange controls as immediate measures to address the challenges of their balance of payments. The existing methods have proven unsuccessful, and the crisis has become one of the motivations behind the transition.

As can be seen from the graph, there are two structural breaks in the trends of export values of all Latin American countries. The first break is associated with the liberalization reforms of the 90s, and the second with another iteration of liberalization after 2002. The 2002 Latin American crisis led to various new economic and trade policies across the region as countries sought to stabilize their economies and restore growth. For example, In response to the crisis, Argentina and Brazil moved to a floating exchange rate and devalued their currencies. Mexico continued to expand its network of free trade agreements beyond NAFTA.

The 2008 Financial crisis had a significant impact on various nations worldwide, including those in Latin America. In response to this global economic downturn, several Latin American countries adopted protectionism as a strategy to safeguard their economies. This approach involved the implementation of policies designed to restrict or discourage international trade, primarily through the use of tariffs or quotas, and to favor domestic industries.

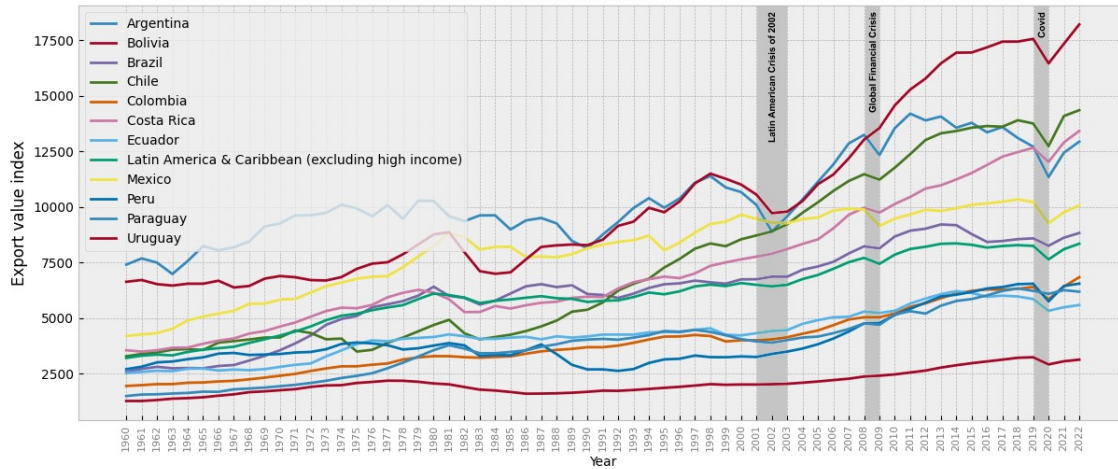
The countries that reverted to these protectionist measures reminiscent of those used before the 1990s, such as Bolivia, Ecuador, and Venezuela, are not included in this analysis. However, it is important to note that this trend was not confined to these countries but was evident across the Latin American region as a whole.

One country that adopted such measures was Argentina. The government responded to the crisis by imposing a 20% tax on the export revenues from agricultural products and hydrocarbons. This move was aimed at protecting local industries and stabilizing the economy. Moreover, they went a step further by introducing additional taxes on the export of minerals in an effort to increase state revenue and control over these lucrative sectors.

On a similar note, Brazil, another major Latin American economy, also resorted to protectionism. The Brazilian government increased tariffs on hundreds of imported products in a bid to protect domestic producers from foreign competition and promote local production. This move was seen as a tactic to stimulate economic growth and maintain employment levels during the challenging economic conditions brought about by the crisis.

**Fig 1.1 Export value index in Latin America (constant 2015 US USD)**

Data from World Bank



There is no research that would draw conclusions on what caused the drop in export value in 2015. The most probable reasons are global commodity price fluctuation or the Chinese economic downturn. Latin America's economy is heavily dependent on commodity exports such as oil, minerals, and agricultural products. A significant decline in global commodity prices in 2015, particularly oil prices, would have directly impacted the export revenues of the region.

Since then, exports are returning to the trend line. No significant trade reforms were conducted in the region. However, many Latin American countries expanded their network of trade agreements.

## 2. Literature review

For the purposes of this study, I first need to examine the established relationship between trade openness and economic growth in theory and empirical research and then look at the history of economic growth in Latin America to see what alternative factors exist besides trade liberalization.

### 2.1 Theoretical conceptualizations



This section provides an overview of various economic theories and models related to international trade and its impact on economic growth. It discusses theories such as the Theory of Comparative Advantages, the Heckscher-Ohlin model, and the Endogenous Growth Theory and offers empirical studies related to these theories. The section also addresses some alternative views and criticisms of trade liberalization.

### **2.1.1 Theory of Comparative Advantages**

Back in the XIX century, David Ricardo contributed to the theory of international trade and its impact on economic growth through his principle of comparative advantage.

According to Ricardo, the relationship between trade and economic growth is fundamentally positive, promoting efficiency, specialization, and, ultimately, the economic welfare of trading nations.

Ricardo's theory of comparative advantage suggests that even if a country can produce everything more efficiently than another country (that is, it has an absolute advantage in all goods), it still benefits from trade by specializing in the production of goods where it has a relative efficiency or the smallest absolute disadvantage. This specialization allows for more efficient allocation of resources, leading to an increase in overall production and economic growth.

### **2.1.2 Heckscher-Ohlin model**

In the 1940s, The Stolper-Samuelson Theorem addressed the relationship between trade and economic growth, focusing specifically on how trade affects the distribution of income within trading nations. It provides insights into the impact of international trade on the wages of workers in various sectors rather than directly focusing on economic growth as a whole.

According to the Stolper-Samuelson Theorem, when a country engages in free trade, it will increase the demand for the factor of production that it uses intensively in the production of its export goods. This increased demand leads to a rise in the real income or wages of the factor that is intensively used in the export sector. Essentially, trade liberalization benefits the abundant factor of production and harms the scarce factor within a country.

While the Stolper-Samuelson Theorem doesn't directly address economic growth, its implications suggest that trade can lead to changes in income distribution that might affect social welfare, political stability, and the capacity for sustained economic growth.

At its core, neoclassical economics assumes that markets are efficient, that there are diminishing returns to capital, and that economies can achieve growth through capital accumulation, technological progress, and labor expansion. In this context, trade openness is considered a pivotal factor for enhancing economic growth.

### **2.1.3 The Endogenous Growth Theory**

The Endogenous Growth Theory, as developed by economists like Robert Lucas (1988) and Paul Romer (1986), emphasizes knowledge, human capital, and innovation as engines of sustained economic growth, fundamentally integrating these factors into the growth process. In their models, trade not only allows for the exchange of goods and services but also facilitates the flow of ideas and innovations between countries. This transfer of knowledge can lead to spillover effects, where innovations in one country improve productivity in others, potentially leading to increasing returns to scale in the production of new knowledge and technology.

Trade can accelerate economic growth by promoting innovation through increased competition and by providing larger markets for new products, which in turn incentivizes R&D investment. The diffusion of technology and ideas across borders can enhance productivity and growth in both advanced and developing economies.

As economies open up to trade, they can shift resources toward more productive sectors, foster competition, and encourage the development of new industries, all of which can contribute to sustained economic growth. The resultant increase in production efficiency and competitiveness can spur economic growth. Romer (1992), Grossman et al. (1991), and Barro (1995) have also supported the view that trade facilitates the flow of technology across borders through the importation of capital goods, foreign direct investment, and the exchange of knowledge and innovation.

### **2.1.4 Empirical studies**

Another approach to the study of economic growth is a purely empirical one; it describes a group of studies that list coefficients they found and do not try to fit their findings into a larger picture.

Berg et al. (2012) differentiates between factors that initiate economic growth and those that maintain it over time, offering a valuable perspective. Poor-performing regions often experience short-lived growth spells. The study highlights several interconnected factors that influence economic growth in the context of trade liberalization. Trade liberalization often leads to increased competition and access to international markets, which can incentivize countries to enhance the sophistication of their export products. Sophisticated exports typically involve higher value-added goods and services, which can drive economic growth by increasing productivity, generating higher incomes, and fostering innovation. Countries with sophisticated export products are better positioned to compete globally, attract foreign investment, and achieve higher economic growth.

Liberalized trade policies can attract foreign capital by creating a favorable investment climate. However, it is crucial to maintain a balance between external capital inflows and internal investment to ensure sustainable growth. A healthy balance ensures that external capital complements rather than substitutes domestic investment. This balance supports the development of local industries, infrastructure, and human capital, which are vital for long-term growth.

While trade liberalization can spur economic growth, it can also lead to increased income inequality if the gains from trade are not evenly distributed. High-income inequality can arise if certain sectors or regions benefit more from trade than others. Income inequality can shorten the duration of growth spells by leading to social and economic instability and preventing the country from establishing institutions needed for long-term growth.

These additional factors that are entangled with trade liberalization suggest that the real effect on economic growth might be coming from variables associated with it, such as export sophistication, favorable investment climate, and income inequality.

### **2.1.5 Alternative views**

There are also skeptics of trade liberalization who point out possible trade-offs of this policy. As already mentioned, Redding (1999) warns of the locking in of developing economies to their labor-intensive comparative advantage at the expense of gaining more technologically intensive comparative advantages in the long term. Developing countries might find themselves locked into their current comparative advantages, which are often labor-intensive and low-tech industries. These industries typically have lower value-added and slower productivity growth compared to more technologically advanced sectors. By focusing on labor-intensive sectors, these countries might miss out on opportunities to develop and invest in more technologically-intensive industries. This could stifle their ability to move up the value chain and achieve sustained economic growth in the long run. Over-reliance on labor-intensive industries can lead to economic stagnation. As global competition increases and technology advances, countries that remain in low-tech sectors may struggle to keep up with more diversified and technologically advanced economies.

Krugman (1994) cites Young (1995) to illustrate that economic growth in East Asia, which has significantly influenced the development of economic theory, was not caused by increased productivity. This means that the miracles were a result of utilizing previously idle resources and not creating a base for sustained economic growth (except for Japan). East Asian countries experienced significant economic growth by bringing idle resources into productive use. This included labor, capital, and land that were not fully utilized previously. The rapid industrialization and urbanization in these countries led to substantial short-term economic gains. Krugman and Young argue that this type of growth is fundamentally different from growth driven by increases in productivity. While the mobilization of resources can generate impressive growth rates in the short term, it does not create a sustainable foundation for long-term economic development. Without underlying improvements in productivity, such as advancements in technology, education, and infrastructure, the growth achieved by merely utilizing idle resources is likely to plateau. This means that once the available resources are fully utilized, the growth rates will decline unless new sources of productivity gains are identified.

## **2.2 Empirical Studies of Trade and Growth**

Two recent major studies revising the impact of trade openness on economic growth (Jalil and Rauf (2021); Huchet-Bourdon et al. (2017)) highlight the empirical literature's inconclusiveness, emphasizing how outcomes depend heavily on the methodologies and definitions employed. Both studies undertake comprehensive reviews of numerous recent papers to reach their conclusions.

Jalil and Rauf (2021) looks at the geographical and temporal scope and methodology of 30 papers analyzing the relationship between trade openness and economic growth since the 80s. They also compare the definitions used for trade openness in the papers. Jalil and Rauf argue that the mixed results found in the literature are largely due to these differences. For instance, some studies may find positive effects of trade openness on economic growth, while others do not, simply because they use different definitions, cover different time periods, or apply different methodological approaches. Additionally, the relationship between trade openness and economic growth might not be straightforward.

The relationship between trade openness and economic growth may not be linear, as suggested by Kim et al. (2011) and Ramzan et al. (2019). They observe that the relationship between trade openness and economic growth is non-linear. This implies that the impact of trade openness varies depending on specific conditions within a country. Their findings indicate that countries experience economic growth as a result of opening up to trade, primarily if their exports are technologically intensive. This means that simply increasing trade is not sufficient; the nature of the trade matters significantly.

Most importantly, these two major studies are in disagreement about the conclusions and maintain a lack of consensus—Jalil finds a strong positive correlation, and Huchet-Bourdon finds a non-linear relationship where countries only experience economic growth as a consequence of opening up to trade if their exports are technologically intensive. This lack of agreement underscores the complexity of the relationship between trade openness and economic growth. The varying findings depend on methodological choices, definitions of trade openness, the time periods and countries studied, and the specific aspects of trade or growth analyzed.

The overall literature on the impact of trade openness on economic growth is largely dominated by studies that find positive results. This trend can be explained by the inherent relationship between trade volume and GDP growth. Essentially, when you regress the growth in trade volume against GDP growth, a strong relationship is observed because all other factors being equal, an increase in exports typically means an increase in production.

Many dynamic panel data models and OLS regressions fail to measure crucial variables such as the quality and diversification of exports. As proposed by Huchet-Bourdon et al. (2017), these aspects are essential for understanding the true impact of trade on economic growth. Quality exports are often associated with higher value-added and more sustainable economic benefits, while diversification can mitigate risks associated with dependency on a few commodities or markets. By not accounting for these qualitative factors, the models may provide an incomplete picture. A country might show strong GDP growth due to high trade volumes, but this growth might be less sustainable or robust if the exports are of low quality or poorly diversified.

Modern replications of the studies produced in that era only find what was already known: GDP is correlated with GDP in the past, investment, and whether the country is China (Koop, Osiewalski, Steel, 1999). Rodriguez (2006) argues that the value of findings using cross-country regressions diminishes when considering potential interactions between explanatory variables. He claims that such studies are largely arbitrary and are easy to manipulate.

### **2.3 Economic Growth and Trade Policy in Latin America**

The history of economic growth in Latin America is characterized by difficult recoveries from a crisis of one decade only to be engulfed by one of the next. Overall, it can be divided into a period of relatively high growth that could suggest convergence with the developed world in 1960-80 and a drop toward slow and volatile growth after 1980. In the first period, the 12 countries (added Venezuela and Costa Rica) observed experienced an average per capita GDP growth rate of 3.0 percent, which markedly exceeded the 0.5 percent rate observed from 1981 to 2002 (Soliman & Soto 2005). The only exception to this rule is Chile. Additionally, the variability in growth rates, as measured by the standard deviation, increased from 3.7 in 1960-1980 to 4.7 in 1981-2002. This indicates a notable shift post-1980, where economic expansion slowed and exhibited greater instability than the preceding twenty years. Solimano suggests that this drop has coincided with the increased lagging behind in TFP in Latin American countries, with the exception of Chile.

Looking at the literature analyzing the determinants of Latin American economic growth, most studies present a picture that, in one way or another, contradicts the optimistic neoclassical models of growth. Brazil is the only country that is decreasing the gap between its GDP per capita and that of the US. De Gregorio (2006) mirrors the points raised by Young (1995) in the context of East Asia: growth is less about improvement in TFP, which is not recorded, and more about attracting the capital needed to utilize the labor resource. In his view, it is trivial to say that trade openness is a determinant of growth for small countries (there are 33 countries in Latin America, 26 of which are small). There has not been a growing small country that has not been integrated into the global economy. De Gregorio states that what is more important to explain is the lower growth rates of Latin America compared to the global average or East Asia. His (De Gregorio & Lee, 2004) analysis does not show that openness to trade significantly impacts the gap between global and Latin American growth. His study then confirms that same finding when comparing Latin America to East Asia.

More studies subscribe to this conceptualization of growth in Latin America. Astorga (2010) looks at the data of the six biggest Latin American countries over the whole XX century and finds that growth is most strongly correlated with investment. More interestingly, they find that trade is correlated with growth negatively; however, at the same time, trade openness is correlated with foreign investment. This means that it is likely that the liberalization of trade in Latin America either occurred or collided with the increase in the attractiveness of investment.

When considering the type of growth trade openness is expected to foster, an additional layer is added to the discussion. Literature on the effects of trade-induced growth (Dorn, Fuest, Potrafke 2022) suggests that it is significantly correlated with higher income inequality. This creates a somewhat paradoxical situation: growing as a result of trade openness leads to lower rates of growth in the future because of increasing income inequality.

### **3. Methodology**

I conducted an analysis of 13 papers investigating the relationship between trade and economic growth, encompassing studies both exclusive to Latin America and those including it in the analysis. These papers contained 68 regression coefficients between trade, defined in various terms, and economic growth (GDP and GDP per capita). The minimal criteria for inclusion in the dataset required papers to undergo peer review and be published in English.

Another criterion was the paper using econometric methodology with the output in the form of regression coefficient. For example, two insightful and otherwise relevant papers (Gries, Kraft, & Meierrieks, 2011; Vedia-Jerez & Chasco, 2016) examining the relationship between trade and growth using Granger causality were excluded because this methodology cannot be quantitatively compared to the rest of the dataset.

To better explain the motivation behind the variables that I include in my analysis, I will first explain the reasons other researchers have come to view the literature on trade and growth as highly influenced by the choice of methodology.

#### **3.1 Forming the dataset**



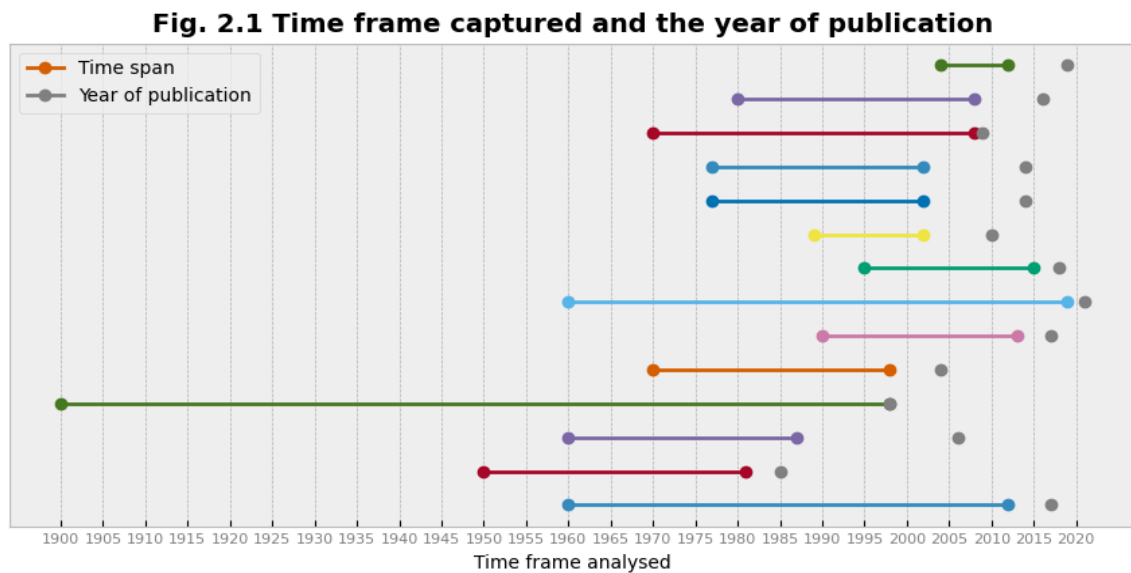
This section explains the variables that were included in the analysis and how the studies were limited to be included in the dataset. It highlights the evolution of empirical studies, starting from the 1970s, when protectionism was widely debated, to more recent analyses up to 2021. The chapter addresses the methodological advancements and criticisms, particularly the challenges of endogeneity in early research. By focusing on studies from 1985 onwards, it aims to provide a contemporary understanding while excluding outdated findings. Key topics include the data sources used, potential biases based on the country of origin, and the diverse methodologies employed in the analysis. The chapter ultimately seeks to elucidate the nuanced and complex correlation between trade openness and economic growth.

### **3.1.1 Year published and time frame analyzed**

Even after limiting the papers to the region of Latin America, the list of publications examining the relationship between trade and economic growth is extensive. However, while the subject matter presumes a timeless nature of the relationship, in reality, most papers did not age well for no fault of their authors. Papers written in the 70s look at trade openness as an unchanging quality, using terms like “outward or inward-oriented countries” (Edwards, 1993). In the 1970s and 1980s, a growing body of empirical research challenged the merits of protectionism, which was the dominant policy of the XX century. Initial studies on trade and growth often relied on qualitative assessments of protectionist policies and their impact on domestic industries, with a particular focus on the rationale behind ISI strategies. Scholars in the 70s introduced cross-country regression analyses to assess the relationship between trade policies and economic growth quantitatively. Economic processes in the 70s were overshadowed by the oil crisis, as the oil embargo of the Yom Kippur war disturbed the global economy. Later years fascinated researchers with the role of trade in the Latin American debt crisis.

As summarized by Edwards (1993) in his survey of literature on trade and growth, the development of new econometric tools did not protect the studies from criticism. Edwards argues that the studies are plagued with endogeneity to the extent that no adequate conclusion can be made about the relationship. The trade theories have not significantly advanced in these decades, but it is the empirical evidence that lost relevancy.

For these reasons, the list of literature was limited to papers written after 1985, with the most recent paper being published in 2021. This gives a fair representation of the studies while excluding outdated papers.

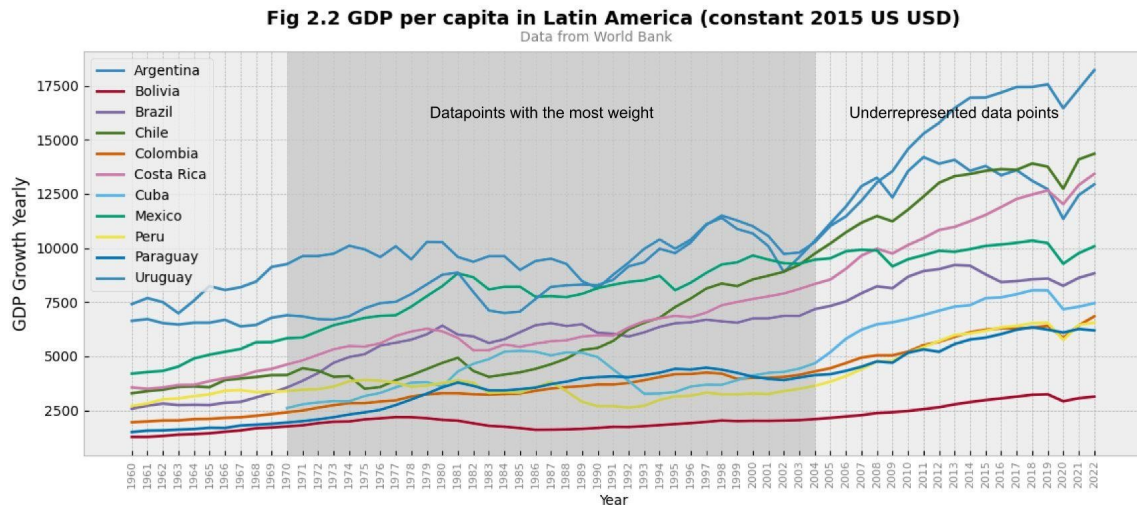


The analysis takes into account the timeframe covered by the studies, averaging from 1970 to 2004. This timeframe is critical as it encompasses a significant period during which the studies' subject matter, such as GDP per capita growth, could have undergone notable changes influenced by various economic policies, global economic conditions, and local events. The figure (Fig 2.1) included in your analysis illustrates the overlapping timeframes of all the articles in the database, enabling readers to visually identify which periods have been studied most and least extensively.

The visualization provided by Fig 2.1 is particularly useful for understanding how different time periods have been covered by the research. From this graph, one can discern that the most and least studied periods can be distinctly seen, highlighting the focus areas of existing literature and potential gaps in research coverage.

The emphasis on the period between 1970 and 2004 is justified by observing GDP per capita growth trends. Notably, the 2000s showed a marked increase in GDP growth rates compared to previous decades. If this period were excluded from the analysis, the resultant understanding of GDP growth trends could be misleading or incomplete, potentially overlooking significant economic developments.

Including the end year of each study in the analysis ensures that the temporal dimension of economic growth is adequately considered.



### 3.1.2 Database used and country of origin

A potential for bias arises from another two variables that were not included in the analysis due to the limited sample size.

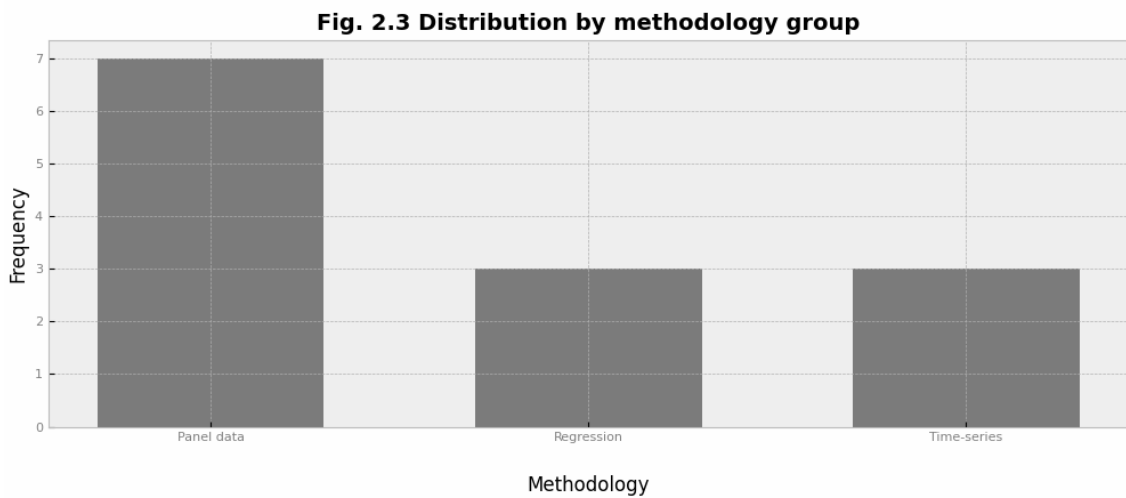
Publicly available data sets are provided by institutions that advocate for free trade. The most popular databases are those provided by the IMF; five papers use either IFS or WEO databases. Among these, the most used seems to be the World Bank database, as it's mentioned multiple times. The second most used appears to be IFS by IMF, which was also mentioned multiple times. A notable source of data is the Penn World Table, which was compiled by independent researchers and is unlike the IMF and WB databases.

Unfortunately, despite the standards of transparent research practices, four out of 13 papers do not disclose the origin of their data. Two more use a combination of IFS, WEO, and WB for different parts of their research.

Another concern about bias is addressed by including the country of origin in the analysis. The majority of the papers were published in Western countries, with only three papers coming from Singapore and China. This is not surprising, as the English language of publication was one of the filters for inclusion in the data set.

### 3.1.3 Grouping methodologies

The main independent variable in the analysis is the methodology. To be precise, papers in the dataset use diverse methodologies that were grouped into three main methodology categories: panel data, regression, and time series. There are seven papers using panel data, three using regression, and three using a time-series approach. As noted above, the distribution of the qualities of papers in the dataset does not correspond to the distribution of the observations in the analysis. The distribution of methodologies in the total observations is 31 panel data, 30 time series, and five regression analyses.



Panel Data is a technique that analyzes data collected from multiple subjects over multiple time points, allowing for the simultaneous examination of individual differences and time effects.

Time series analysis is a methodological approach that involves observing a dataset composed of sequentially measured points spaced at uniform time intervals. This methodology is particularly powerful for analyzing data that shows significant dependence over time. Time series allows researchers to explore trends, cycles, and other temporal dynamics within a single entity or variable over a period. It is particularly useful for forecasting and modeling data where time-dependent changes are crucial, such as analyzing the GDP growth of a country year by year. However, time series analysis might not be as effective when it comes to understanding the impact of variables across different entities or groups since it focuses on temporal variation within a single subject or group.

On the other hand, panel data combines features of both time series data and cross-sectional data, where multiple subjects or entities are observed at multiple time points. This method allows researchers to analyze the differences between subjects as well as the changes within them over time. For instance, economists can use panel data to study how trade policy changes affected various countries' economic growth over several years. Panel data is particularly useful for controlling for variables that differ across individuals but are constant over time, thus reducing omitted variable bias. However, complex modeling techniques are required to appropriately handle the interdependence of observations within and between groups over time. Unlike time series, panel data can compare multiple entities under similar circumstances, but it may require more sophisticated statistical methods to differentiate between time effects and entity-specific effects.

Regression refers to the studies that use all other economic methodologies that output a correlation coefficient. Such as Chow or even a simple iterated OLS.

### **3.1.4 The dependent variable**

The main focus of this analysis is the correlation coefficient between trade openness and economic growth. There is great diversity in the values of this variable, ranging from -5.4 to 8.2.

### **3.2 Are these publications comparable?**

An additional comment has been made about how comparable the papers are. One potential challenge to the comparability of the publications is the diversity of the definition of trade openness, the dependent variable. Inconsistent definitions can lead to heterogeneity in data, making it difficult to compare and synthesize findings.

However, I believe that the inclusion of multiple definitions of trade openness in a meta-analysis could be seen as a feature rather than a flaw. By encompassing a broad range of definitions, the analysis captures a more comprehensive picture of how different aspects of trade openness (e.g., tariff rates, non-tariff barriers, economic system characteristics) individually and collectively impact economic growth. This approach can enhance the robustness of the findings, allowing the analysis to account for varied economic contexts and policy frameworks. It may also provide a richer understanding of the mechanisms through which trade openness influences growth, supporting more nuanced and broadly applicable policy recommendations.

The outliers are not correlated with the definition used in the studies. As this is a soft concept, it is difficult to estimate this relationship precisely. This relationship can be evaluated qualitatively. Firstly, the discrepancy is almost completely eliminated when single-country observations are excluded. With the exclusion of one data point from the Parikh and Stirbu (2004) paper. It finds an 8.23 coefficient between trade balance and GDP growth between 1970 and 1979. Other than this point, the highest and lowest values are 1.9 and -2.5. There is nothing special about that outlier observation, as other observations from the same paper are also included: 1.11 and 0.28. The other paper that accounts for all bottom outliers is Pacheco-López and Thirlwall (2007). This paper also uses trade balance as an indicator of openness to trade. These two papers both use the balance of trade as their definition, but their results end up on the opposing sides of the spread. This suggests that choosing this definition does not skew the results.

### **3.3 Overview of the Regression Model**

The purpose of this analysis is to examine the relationship between trade openness and economic growth across different empirical methodologies. I am using a regression model where the dependent variable is the correlation coefficient between growth and trade openness. The model is estimated using OLS regression. The methodology groups are encoded into dummy variables to represent the methodological approaches: panel data, time series, and regression analysis; time series is taken as the basic value.

$$Y = \beta_0 + \beta_1 D_{\text{panel data}} + \beta_2 D_{\text{regression}} + \epsilon$$

In this particular case, many of the statistical tests that are normally considered necessary do not apply. For instance, there is no multicollinearity between the explanatory variables. This is due to the fact that these variables are mutually exclusive, meaning that they do not overlap or correlate with each other. Additionally, the end year does not exhibit any significant relationship with the methodological categories, as evidenced by a p-value of 0.2, which is above the commonly used threshold of 0.05 for statistical significance. Nevertheless, it is worth noting that, on average, time-series studies tend to end approximately 5 years earlier than other types of studies. Specifically, the mean end year for time-series studies is 1995.9, compared to 2001 for other types of studies. This suggests that time-series methodology may have been more prevalent or popular in earlier years.

The residuals of this model are not normally distributed. However, this is irrelevant in this case, as there are only two binary explanatory variables, meaning that the regression coefficients are simply the mean value of the groups. The residuals cannot be normally distributed as there are only differences between the observation and the mean of the group. This does not invalidate the regression model or the estimates of effects, particularly if the sample size is large. However, this might limit the types of inferences you can reliably make, especially concerning predictions or the construction of confidence intervals using standard OLS assumptions. In this analysis, I use robust standard errors to address issues with the error terms in our regression model, which are not assumed to be normally distributed. This deviation from normality can often arise from heteroscedasticity—where the variance of the error terms is not constant across observations—or from other violations of the classical linear regression assumptions. Robust standard errors, unlike conventional standard errors, do not rely on the assumption of normally distributed error terms. They are designed to provide consistent standard error estimates even when the error terms are heteroscedastic or otherwise non-ideal. This approach enhances the reliability of hypothesis tests and confidence intervals by compensating for potential biases and inefficiencies in the estimation process caused by non-standard error distributions. HC1 type of standard error computing adjusts the standard errors for degrees of freedom, which can be beneficial in smaller samples. Since none of the results are significant at this point, no further robustness checks were conducted.

The next step in our study will be to conduct a second regression, this time including the end-year of the study variable. As I have previously highlighted, studies that are older might be constrained by their temporal scope. They may not take into account the recent developments in GDP growth that could potentially influence the results of the study. It might be the case that while the changes in trade openness during the 90s did not yield significant results, the changes that occurred in the 2000s did indeed coincide with a noticeable growth in GDP. Another possible scenario might be that significant time lags occur in policy implementation, causing these effects to fall outside of the scope of the study and, therefore, never influence the analysis. To tackle this potential issue of truncation, I will include the end-year of the dataset used in the study in our second regression.

Considering the statistical nature of our data, it is crucial to mention that neither the end-year variable nor the regression coefficients followed a normal distribution. This observation led us to the conclusion that it was appropriate to use a non-parametric approach for the analysis. Therefore, I decided to use Spearman's Rank Correlation Coefficient, a non-parametric measure of statistical dependence between the rankings of two variables, to assess the significance of this relationship. This technique will allow us to determine whether there is a statistically significant association between trade openness and GDP growth.

Another regression is run for averaged data points only. Some of the studies, specifically time-series studies, include exclusively single-country observations. Observations from atypical countries can introduce bias if the country in question has unique characteristics or if there are outliers. For example, some countries in Latin America have oil, which puts them in a particularly beneficial position in terms of trade benefits. At the same time, some countries are so small that any barriers to trade would be devastating to their economy as they depend on imports in more areas. The backside of this is countries like Brazil, which are much more potentially capable of establishing autarky. I averaged the coefficients for these studies to create a new data point that is not country-specific.

## **4. Results**

In my research, I discovered that, intriguingly, there is no statistically significant relationship between the methodologies employed in the various studies and the



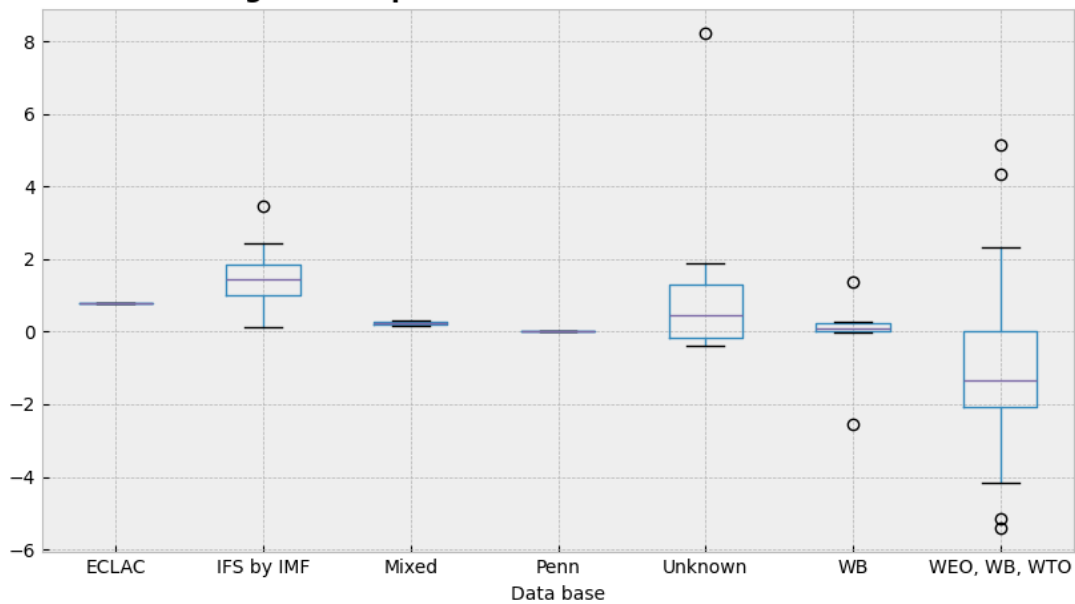
coefficients reported for economic growth and trade openness in Latin America, as evidenced by a p-value greater than 0.05. This intriguing finding suggests that, within the constraints of the dataset I have worked with, the selection of a specific estimation method may not have a critical influence on the estimated effects of trade openness on economic growth.

While the effect of trade openness on economic growth might still exist, it could potentially be obscured by several factors. These include the inevitable noise that accompanies any research, limitations in the sample size available for study, or the possible presence of other variables that could confound the results.

My analysis, however, does not boast a sample size large enough to definitively confirm the robustness of the effect of the database on the coefficient. Despite this, the distribution of the data suggests a certain pattern. The studies that utilized databases provided by the IMF are more likely to report a positive correlation. On the other hand, studies that relied on databases provided by the World Bank seem to be more inclined to find negative results.

Interestingly, the studies that utilized data from the World Bank also demonstrated a much larger spread than other groups, suggesting a greater variability in the results. However, it is important to note that these findings, while fascinating, are inconclusive. Therefore, in order to provide a more comprehensive analysis, it is crucial that more studies be included in future research endeavors.

**Fig. 4.1 Boxplot for values and data base used**



It is pivotal to underline that my findings should not be misinterpreted to suggest that the chosen methodology has no measurable impact on the results of the study. Rather, the findings indicate that while there is an observable relationship between the methodology chosen and the results obtained, this relationship does not hold a level of statistical significance that would warrant further examination.

When I delve deeper into the average coefficient for the three distinct groups, I uncover a revealing pattern. The averages of these groups differ notably, with values of 0, 0.47, and -0.06, respectively. This suggests a potential pattern that warrants consideration.

This pattern suggests that when panel data methods are employed, they typically yield a positive relationship. This is in stark contrast to methodologies that are grounded in time-series and regression, which do not produce consistent results. However, it is essential to remember that these averages are historical and not indicative or predictive of the potential outcomes of future studies.

The time-series approach was selected as the point of reference for this study. This choice was made primarily to avoid the well-known dummy trap of collinearity, a pitfall that researchers must be aware of and navigate around. The time-series approach was deemed appropriate because its mean coefficient hovers around the neutral value of 0, simplifying the evaluation and comparison process.

**Table 1. OLS Regression Results, Methodology groups**

<b>Dep. Variable:</b>	coefficient	<b>R-squared:</b>	0.014
<b>Model:</b>	OLS	<b>Adj. R-squared:</b>	-0.017
<b>Method:</b>	Least Squares	<b>F-statistic:</b>	1.212
<b>No. Observations:</b>	68	<b>Prob (F-statistic):</b>	0.304
<b>Df Residuals:</b>	65	<b>Log-Likelihood:</b>	-145.27
<b>Df Model:</b>	2	<b>AIC:</b>	296.5
<b>Covariance Type:</b>	HC1	<b>BIC:</b>	303.2

	<b>coef</b>	<b>std err</b>	<b>t</b>	<b>P&gt;  t </b>	<b>[0.025</b>	<b>0.975]</b>
<b>const</b>	0.0030	0.448	0.007	0.995	-0.893	0.899
<b>panel-data</b>	0.4722	0.545	-0.866	0.389	-0.616	1.560
<b>regression</b>	-0.0670	0.475	-1.554	0.888	-1.016	0.882

Notes: [1] Standard Errors are heteroscedasticity robust (HC1)

**Table 2. OLS Regression Results, Cumulative observations only**

<b>Dep. Variable:</b>	coefficient	<b>R-squared:</b>	0.037
<b>Model:</b>	OLS	<b>Adj. R-squared:</b>	-0.008
<b>Method:</b>	Least Squares	<b>F-statistic:</b>	1.371
<b>No. Observations:</b>	45	<b>Prob (F-statistic):</b>	0.265
<b>Df Residuals:</b>	42	<b>Log-Likelihood:</b>	-80.788
<b>Df Model:</b>	2	<b>AIC:</b>	167.6
<b>Covariance Type:</b>	HC1	<b>BIC:</b>	173

	<b>coef</b>	<b>std err</b>	<b>t</b>	<b>P&gt;  t </b>	<b>[0.025</b>	<b>0.975]</b>
<b>const</b>	-0.1815	0.272	-0.667	0.508	-0.730	0.367
<b>panel-data</b>	0.657	0.415	1.583	0.121	-0.181	1.494
<b>regression</b>	0.144	0.335	0.43	0.670	-0.532	0.82

Notes: [1] Standard Errors are heteroscedasticity robust (HC1)

While the findings from this study do not provide a definitive answer regarding the influence of methodology on the results of a study, they do offer valuable insights. These insights shed light on the intricate interplay between the methodology chosen and the outcomes of research, highlighting the complexity of the research process and the careful considerations that must be taken into account.

This might be influenced by the small sample size (68). This number might still be insufficient to capture the full variability and ensure adequate power for detecting small but meaningful differences in coefficients driven by methodological choices. Another problem that is connected to a small sample size is the grouping of the methodologies. The real picture is much more detailed than just three categories; however, grouping the papers based on the specific model they employ would prove impossible, considering the sample size. Increasing the number of studies included or using meta-analytic techniques to aggregate findings could potentially alter the significance levels in future analyses.

The consideration of including only the averaged observations does not change the results of the analysis. The mean value for time-series analysis goes down to -0.18 and regression to -0.03. Again, these results are not statistically significant and cannot be extrapolated to future studies choosing one or the other methodology. However, it is notable that the average coefficient is in the negative range despite the seeming consensus on the relationship between trade openness and economic growth.

It may be beneficial to consider additional variables that could influence the relationship between study methodology and outcomes, such as the economic context and the size of the economies involved. However, this approach is yet again limited by the availability of the studies.

Perhaps future studies of the impact of methodology on findings can take a more experimental approach and run the analyses using different methodologies on the same data. This would allow to isolate the effect of the methodology itself on the findings, providing clearer insights into how methodological choices influence outcomes. This approach minimizes the biases that might arise from disparate data sources, ensuring that any differences in outcomes can be more confidently attributed to the methodologies employed rather than underlying data differences.

Further, I analyzed the effects of the end-year of the dataset used on the correlation coefficient. Neither the end-year nor the coefficient follows a normal distribution; therefore, I used Spearman's Rank Correlation Coefficient to estimate the significance of this relationship. This lead was not successful either; the p-value of this correlation is over the 0.05 mark at 0.08. This is more significant than the methodology used, but it still does not explain the variance in findings.

Considering the fact that the end-year of the dataset used is not a significant variable, future research may increase the small sample size by including older papers. More papers can be included if the language requirement is seized.

## **Conclusion**

This thesis evaluates the correlation between trade liberalization and economic growth in Latin America using a comparative analysis of various statistical methodologies. The study scrutinizes data from 13 papers, comprising 68 different correlation coefficients, to ascertain if methodological differences account for the varied results in the current literature.

During the early 1990s, several Latin American countries initiated significant trade liberalization reforms, transitioning from closed to open economic policies. Global organizations like the World Bank and WTO supported these reforms as a path to economic growth and poverty reduction. Despite the theoretical connection between trade and economic growth, empirical evidence remains mixed, and different methodologies might influence the observed outcomes. Despite a seemingly unified consensus portrayed by global organizations, empirical studies on trade and growth show mixed results. While some studies find positive effects of trade liberalization on economic growth, others do not. Methodological differences, definitions of trade openness, and the time periods and countries studied are some of the variables that could explain these varied outcomes.

The thesis concludes that there is no statistically significant link between the methodology used and the outcomes of studies on trade liberalization and economic growth in Latin America. This conclusion suggests that the specific methodology selected does not have a significant influence on the estimated effects of trade liberalization. This implies that regardless of the approach taken to assess the impact of trade liberalization, similar results might be expected. Nevertheless, it's important to note that inconsistencies in the findings could be ascribed to a variety of other factors. These might include noise in the data, limitations related to the sample size, or variables that have been overlooked in the analysis. The presence of such inconsistencies highlights the complex nature of trying to establish a definitive link between trade liberalization and economic growth. It showcases the challenges faced when attempting to draw concrete conclusions from such complex socio-economic phenomena. The analysis also emphasizes the necessity for further research in this area. Additional studies should ideally involve larger sample sizes and more rigorous methodologies. This will enable researchers to delve deeper into the intricacies of the relationship between trade liberalization and economic growth and potentially yield more definitive and reliable results.

Further studies should consider larger sample sizes, more robust methodologies, and potentially experimental approaches to better isolate the effects of trade liberalization on economic growth. Additionally, including more recent data and considering other variables, such as economic context and size, could provide deeper insights.

## **Závěr**

Tato práce hodnotí korelaci mezi liberalizací obchodu a hospodářským růstem v Latinské Americe pomocí srovnávací analýzy různých statistických metodik. Studie zkoumá údaje ze 13 prací, které obsahují 68 různých korelačních koeficientů, aby zjistila, zda metodologické rozdíly vysvětlují rozdílné výsledky v současné literatuře.

Na počátku 90. let 20. století zahájilo několik latinskoamerických zemí významné reformy v oblasti liberalizace obchodu a přešlo od uzavřené k otevřené hospodářské politice.

Světové organizace jako Světová banka a WTO tyto reformy podporovaly jako cestu k hospodářskému růstu a snížení chudoby. Navzdory teoretické souvislosti mezi obchodem a hospodářským růstem zůstávají empirické důkazy smíšené a pozorované výsledky mohou být ovlivněny různými metodikami. Navzdory zdánlivě jednotnému konsensu, který prezentují globální organizace, empirické studie o obchodu a růstu vykazují smíšené výsledky. Zatímco některé studie konstatují pozitivní vliv liberalizace obchodu na hospodářský růst, jiné nikoli. Metodologické rozdíly, definice obchodní otevřenosti a zkoumaná časová období a země jsou některé z proměnných, které by mohly vysvětlit tyto rozdílné výsledky.

Práce dochází k závěru, že neexistuje statisticky významná souvislost mezi použitou metodikou a výsledky studií o liberalizaci obchodu a hospodářském růstu v Latinské Americe. Tento závěr naznačuje, že konkrétní zvolená metodika nemá významný vliv na odhadované účinky liberalizace obchodu. Z toho vyplývá, že bez ohledu na zvolený přístup k hodnocení dopadu liberalizace obchodu lze očekávat podobné výsledky. Nicméně je důležité poznamenat, že nesrovnalosti ve zjištěních lze přičíst řadě dalších faktorů. Mezi ně může patřit šum v datech, omezení související s velikostí vzorku nebo proměnné, které byly při analýze přehlédnuty. Přítomnost těchto rozporů poukazuje na složitou povahu snahy o stanovení definitivní vazby mezi liberalizací obchodu a hospodářským růstem.



Ukazuje na problémy, kterým čelíme při pokusech vyvodit konkrétní závěry z tak složitých socioekonomických jevů. Analýza rovněž zdůrazňuje nutnost dalšího výzkumu v této oblasti. Další studie by v ideálním případě měly zahrnovat větší výběrové soubory a přísnější metodiky. To umožní výzkumníkům proniknout hlouběji do složitostí vztahu mezi liberalizací obchodu a hospodářským růstem a potenciálně přinést jednoznačnější a spolehlivější výsledky.

Další studie by měly zohlednit větší velikost vzorků, robustnější metodiky a případně experimentální přístupy, aby bylo možné lépe izolovat účinky liberalizace obchodu na hospodářský růst. Hlubší pohled by navíc mohlo přinést zahrnutí novějších údajů a zohlednění dalších proměnných, jako je ekonomický kontext a velikost.

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