Paths to Equality: Uncovering the Drivers of Income Inequality Reduction in Latin America

A Fuzzy-Set Qualitative Comparative Analysis of Political, Structural, and Economic Conditions

Master Thesis

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Abstract

This research examines the conditions that contributed to the decreasing income inequality levels in Latin America between 2000 and 2020. Latin America has long stood out as one of the most unequal regions in the world. However, the 2000s saw a region-wide decline in income inequality, but saw diverging national trends in the mid-2010s. While the overall decline is well-documented, there is less consensus about what factors drove it. Existing studies point to various political, structural, economic, and policy factors, but often analyze them acting in isolation. As a result, the interaction between these factors and how they contribute to decreasing income inequality remains insufficiently studied.

Due to the complex nature of income inequality reduction and the interaction between causal factors, a fuzzy set Qualitative Comparative Analysis (fsQCA) was employed to examine income inequality reductions across fifteen Latin American countries. Four conditions associated with income inequality decreases were identified from the literature: Labor market formality, the share of skilled workers in the labor force, trade openness, and the presence of left-leaning governments in the executive. The necessity and sufficiency of these conditions for producing income inequality reduction were systematically analyzed using fsQCA set-theoretic methods.

The results show that no condition was necessary for income inequality reduction to occur, while two configurations of conditions were found to be sufficient. The first configuration involved low labor market formality, a low share of skilled workers in the labor force, and a high share of left-leaning governments in the executive. The second involved high labor market formality, a high share of skilled workers in the labor force, low trade openness, and a high share of left-leaning governments in the executive. These findings challenge the view that favorable structural conditions are required for income inequality to decrease. Instead, they support arguments for the commitment of left-leaning governments to achieve more equal outcomes through redistributive policies.

While the results are limited in their generalizability due to context-specific variation and the presence of outliers, they underscore the need for future research to explore unobserved conditions or case-specific developments. All in all, the findings highlight the importance of configurational approaches to inequality and offer policymakers more nuanced insights into effective, context-aware strategies in the pursuit of achieving greater equality.

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1. Introduction

Latin America has long been one of the most unequal regions in the world. A turning point occurred around 2002-2003, when income inequality levels started to decline significantly across the region (Amarante, 2016; ECLAC, 2011). This decline coincided with significant political and economic transformations such as democratization, increased social spending, improved educational access, and trade liberalization reforms (Alvaredo et al., 2023; Cornia, 2014; Gasparini et al., 2016). Income inequality declined throughout the 2000s until around 2015, when individual countries began to show different trajectories (Alvaredo et al., 2024; Gasparini & Cruces, 2021; ECLAC, 2011). Despite making progress in reducing income inequality, improvements have varied widely across countries, and inequality levels in the region remain high. Understanding what drove the reductions in inequality, and under what conditions they occurred, remains an important question in the study of Latin American development.

1.1. Problem Statement

Many scholars have sought to explain the changes in inequality levels, both at the country and cross-country levels, but no consensus has been reached on the causes of the decline in income inequality (Amarante, 2016). While some studies highlight economic factors such as trade liberalization and labor market structures (Naanwaab, 2022; Rosenfeld et al., 2024; Amarante, 2016), others emphasize the role of political and institutional factors (Cornia, 2015; ILO, 2014; Sanchez-Ancochea, 2020; Gasparini et al., 2016). Many studies focus on single-variable explanations or average effects across countries, often assuming universal and linear causal mechanisms (Wageman & Schneider, 2010; Sanchez-Ancochea, 2020). However, changes in income distributions result from complex interactions between economic structures, institutional characteristics, policy decisions, and macroeconomic fluctuations, among other factors (Bentele, 2013).

Although existing studies have provided useful insights, they do not consider complex causality, resulting in a limited understanding of how different factors interact to produce inequality-reducing outcomes (Bentele, 2013; Sanchez-Ancochea, 2020). For example, an increase in the share of skilled workers might only reduce inequality if there is labor market demand for them, and the labor markets are sufficiently formalized to reward those skills fairly. Similarly, left-leaning governments might only be able to implement successful redistribution policies when operating within structurally favorable economic contexts. Previous studies also

provide limited explanations on why different countries experienced varying degrees of income inequality reduction. The mixed empirical findings highlight the need for a more comprehensive, multi-factor analysis of the factors that contributed to income inequality reduction in Latin America, leading to the central problem this research aims to address.

1.2. Research aim and question

This research aims to explain what factors contributed to decreasing income inequality levels across Latin America. By examining the conditions that contribute to income inequality reduction and their presence across different countries, this research sheds light on the complex causes underlying income inequality reduction in the region.

This study focuses on the period from 2000 to 2020, as the early 2000s marked a significant shift in inequality trends (Amarante, 2016; ECLAC, 2011). The endpoint of 2020 is chosen due to the disruptive impact of the COVID-19 pandemic and the limited availability of research after this year. This leads to the following research question:

"Under what conditions did income inequality decrease in Latin America between 2000 and 2020?"

This research applies a fuzzy set Qualitative Comparative Analysis (fsQCA) to answer the central question. This method allows for causal complexity, meaning that different combinations of factors can lead to the same outcome (equifinality), and that outcomes result from specific, context-dependent, combinations of conditions (Wagemann & Schneider, 2010; Marx et al, 2014). Latin America's status as one of the most unequal regions in the world, and its efforts to decrease inequality, make it a compelling setting to investigate configurations of conditions explaining the varying degrees of income inequality reduction.

1.3. Relevance

1.3.1. Academic relevance

This research contributes to academic debates on inequality and development by addressing the knowledge gap in how conditions interact to produce inequality outcomes. Through an fsQCA, this research identified multiple pathways to income inequality reduction, reflecting Latin America's political and economic heterogeneity. Furthermore, this research combines key insights from political economy, development studies, and social policy research. It builds on works that identify factors influencing income inequality, while contributing new insights into how these interact with each other. By demonstrating that multiple pathways can lead to similar outcomes, it provides a more nuanced and context-sensitive explanation compared to large-

scale statistical studies, which often employ linear explanatory models (Rihoux & Ragin, 2009).

To the best of the author's knowledge, Sanchez-Ancochea (2020) is the only scholar to have performed a Qualitative Comparative Analysis on income inequality in Latin America. The study identifies a low share of indigenous people and Afro descendants as a necessary condition for relatively low inequality, providing both social and political explanations for the finding. Sanchez-Ancochea (2020) emphasizes the need for further research on the interactions between institutional and progressive political forces and their effect on income distributions. This research answers Sanchez-Ancochea's (2020) call by providing a systematic, comparative, and empirically grounded account of income inequality reduction in Latin America.

1.3.2. Societal Relevance

The question of inequality not only provides academic insights but also has important societal implications. While some inequality naturally arises in market-based economies due to differences in talent, effort, and opportunity, excessive inequality can erode social cohesion, fuel political conflict, and limit long-term economic growth (Berg and Ostry, 2011; Rodrik, 1999) Inequality also hampers poverty reduction efforts and creates distrust in institutions (Bardhan, 2005; Dabla-Norris et al., 2015). Furthermore, inequality can negatively influence public policy by provoking backlash against reforms aimed at long-term inclusive growth (Claessens and Perotti, 2007).

This research highlights the role that political leadership can play in achieving more equal outcomes. It suggests that inequality reduction is a product of deliberate policy choices situated within a broader institutional and economic context (Lustig et al., 2009; Cornia, 2010; Robertson, 2015). The findings highlight the importance of aligning economic growth with inclusive policies and provide practical insights for Latin American policymakers, as well as international organizations and policymakers in other developing regions, for designing more effective and context-sensitive policies.

1.4. Research Outline

Following the introduction, chapter two presents a literature review. Chapter three posits a theoretical framework of the conditions that contribute to income inequality reduction. Chapter four presents the research design and is followed by chapter five, which details the results and discussion. Chapters six and seven conclude with an answer to the research question and address limitations. Finally, chapter 8 provides future research recommendations.

2. Literature Review

This chapter provides an overview of the literature on the development of income inequality in Latin America. First, the trends of income inequality levels in the region are outlined. This is followed by a review of the main factors that scholars have identified as contributing to changes in inequality. The chapter concludes by identifying the knowledge gap in the existing literature that this research aims to address.

2.1. Income Inequality in Latin America

2.1.1. Regional Inequality Trends

The history of income inequality in Latin America over the past decades can be described in three phases (Alvaredo et al., 2024). Inequality levels increased during the 1980s and 1990s, peaking around 2000. This period was characterized by debt crises, hyperinflation in some countries, and the widespread adoption of market-oriented reforms such as trade liberalization and privatization. Following this, the region saw significant reductions in inequality levels across almost all countries, albeit at different magnitudes and rates. This continued until around 2015, when inequality levels started diverging, with some countries seeing increases, some having roughly constant levels, and others seeing decreases but at a slower rate than before (Alvaredo et al., 2024; ECLAC, 2011). The income inequality trends from 2000 to 2020 for all countries analyzed in this research are presented in Appendix A.

Although the inequality trends are well-established, there is less agreement on the mechanisms underlying them. Scholars from diverse disciplines propose different explanations for the decline, which can be organized into four explanatory categories: Structural, policy, political & institutional, and macro-economic.

2.1.2. Structural Explanations

Structural explanations focus on the long-term developments of labor market composition and human capital development. Studies by Cornia (2015), Alvaredo et al. (2023), Lopez-Calva & Lustig (2010), Azevedo et al. (2013), and Gasparini et al. (2016) find that the expansion of secondary education to poorer segments of the population led to an increase in the supply of semi- and high-skilled workers. Based on a supply-and-demand model, these scholars argue that the rising supply of skilled workers outpaced demand, lowering the skill premium and reducing wage inequality. However, in some countries, the demand for skilled workers remained low, possibly because these countries moved from high-productivity jobs in

manufacturing to lower-productivity jobs in informal services and the production of primary commodities (McMillan & Rodrik, 2011; UNDP, 2015).

Changes in the labor market structure also affected inequality levels. Amarante (2016) and Keifman & Maurizio (2014) point to the formalization of the labor market, including the expansion of minimum wages, wage bargaining, and subsidies targeted to promote formal employment. Generally, informal wages have been found to decrease inequality, whereas formal wages contributed to increasing it (ILO, 2014). Informal wages are typically lower but more compressed, leading to lower income inequality. In contrast, formal wages often reflect skill-biased differences, which can increase inequality between low- and high-skilled workers, especially if not counterbalanced by redistributive mechanisms or extended to low-skilled sectors (Amarante, 2016; Keifman & Maurizio, 2014). Therefore, the effect of formalization depends on how widely it is implemented and its interaction with the skill composition of the labor market.

2.1.3. Policy Explanations

The expansion of social policies, especially the implementation of conditional cash transfer (CCT) programs, played a critical role in reducing inequality levels. Gasparini (2016) and Soares et al. (2007) argue that the impact of CCTs was higher than other types of social spending due to their targeted approach at increasing people's incomes. In Brazil, Chile, and Mexico, CCTs accounted for 15-21% of the decline in inequality between the mid-1990s and mid-2000s (Paes de Barro et al., 2009; Esquivel et al., 2009; Cruces & Gasparini, 2012).

These findings align with Lopez-Calva & Lustig (2010), who find that in Argentina, Brazil, Mexico, and Peru, increased government transfers to poorer populations, together with a lowered skill premium, were the two main factors explaining the downward trend in inequality during the 2000s.

2.1.4. Political and Institutional Explanations

Political and Institutional characteristics often determine policy choices and distributional outcomes. In a Qualitative Comparative Analysis (QCA), Sanchez-Ancochea (2020) attributes historic high inequality levels in Latin America to elite dominance and exclusionary social and economic institutions. However, over the last few decades, the region saw increased democratization of its political institutions, leading to governments adopting more redistributive labor and social policies (Martinez Franzoni & Sanchez-Ancochea, 2016; Lustig et al., 2009).

Cornia (2010) suggests that greater electoral participation and 'consolidation of democracy' weaken elite political influence and foster the adoption of more equalizing policies. Similarly, Robertson (2012) argues that the institutionalization of democratic competition, in a period of economic stability, motivated governments across the political spectrum to answer calls of social exclusion and inequality and adopt redistributive policies.

2.1.5. Macro-economic Explanations

In the economic literature, trade liberalization is a well-cited mechanism affecting inequality. Some studies find that trade liberalization increases inequality (Gourdon et al., 2008; Hanson & Harrison, 1999; Robertson, 2000; Rojas-Vallejos & Turnovsky, 2017), while others find it decreases inequality (Cicowiez et al., 2010; Reuveny & Li, 2003). Some studies find that trade liberalization has no significant effect on inequality levels (Dollar & Kraay, 2002; Edwards, 1997; Ravallion, 2001). Cornia (2014) provides evidence that the increase in commodity prices contributed to decreasing inequality in the region, especially in countries relying on commodity exports. Naanwaab (2022) argues that overall, trade liberalization is associated with decreasing income inequality, but the precise effects depend on the direction of trade flows. South-South trade contributes to reducing inequality levels, whereas North-South trade leads to increased inequality.

Sanchez-Ancochea (2020) proposes that the inequality effects of trade liberalization are shaped by the type of export. Countries exporting primarily from sectors with few domestic cross-sectoral linkages, such as mining, tend to experience higher inequality, as the gains are distributed among a narrow group of capital owners or high-skilled workers. In contrast, countries exporting mainly products with many cross-sector linkages, such as agriculture, tend to distribute the benefits of trade more evenly across the workforce.

Furthermore, economic complexity also influences the effect of trade openness on income inequality. Again, the literature presents mixed results. For example, Rosenfeld et al. et al. (2024) find that the "simplification" of economies led to reduced levels of income inequality. Conversely, Hartmann et al. (2017) argue that economic complexity reduces income inequality. In any case, it is well understood that the effects of trade on inequality depend largely on specific institutional and social characteristics within a country (UNDP, 2015).

2.2. Knowledge Gap

The above-mentioned studies identify several conditions that have been linked to income inequality. However, most studies isolate single explanatory variables and rely on fixed effects (Sanchez-Ancochea, 2020). As a result, there exists a knowledge gap in how these conditions

interact to produce inequality outcomes. Furthermore, existing research provides limited insight into regional variation, i.e., why countries with similar policies or institutions have experienced varying inequality outcomes. Rather than treating these factors as independent variables acting in isolation, a more holistic approach is needed to open the analysis up to multiple causal pathways (Mello, 2021). To date, Sanchez-Ancochea (2020) is the only scholar to have conducted a Qualitative Comparative Analysis (QCA) to examine the complex nature of inequality in Latin America. His study employs a broad historical timeframe, beginning in the early 1800s, and focuses on long-term economic, political, and social drivers to explain relative inequality levels within the region. In contrast, this research applies a Fuzzy-Set Qualitative Comparative Analysis (fsQCA) over a shorter and more recent period (2000-2020). It identifies a different set of conditions, presented in the theoretical framework, to explain income inequality reduction in Latin America. This approach enables the identification of additional pathways driving income inequality, complementing Sanchez-Ancochea's (2020) study, and contributes to a more comprehensive understanding of inequality dynamics across the region.

3. Theoretical Framework

This chapter conceptualizes income inequality and the previously identified explanatory factors into conditions influencing income inequality. It describes the mechanisms through which each condition is proposed to affect inequality. The chapter concludes with an explanation for the exclusion of certain factors from the analysis.

3.1. Conceptualizing Income Inequality

While related to poverty and income levels, income inequality is a distinct concept and refers to how evenly income is distributed across a population (OECD, 2021). Most studies focus on secondary household income distribution, which incorporates the distribution of household incomes after tax deductions and inclusions of transfer payments (UNDP, 2015). This measure reflects market outcomes and the redistributive effects of fiscal policy, making it suitable for cross-country and historical comparisons (Van der Hoeven, 2011). The Gini coefficient, which ranges from 0 (perfect equality) to 1 (perfect inequality), is the most widely used indicator of income inequality and is available for many countries and time periods (IMF, 2021; Alvaredo et al., 2024), making it the most suitable measure for this analysis.

3.2. Conceptualizing Conditions Driving Income Inequality

Following the literature review, four key conditions are identified and conceptualized below. These conditions are assumed to affect income inequality through complex and interactive causal processes. Some factors discussed in the literature review are excluded from the conceptual model. The reasoning for this is presented in paragraph 3.3.

3.2.1. Labor Market Formalization

Labor market formalization refers to the degree to which legal frameworks and formal contracts govern employment relationships (ILO, 2025). This is associated with strengthening labor market institutions such as minimum wage laws, labor protections, and wage bargaining mechanisms (ILO, 2014; Amarante, 2016). Formalization influences income inequality by increasing income security and reducing wage dispersion, particularly among lower-income workers. Instruments such as minimum wage policies and standardized contracts contribute to wage compression between high- and low-skilled workers, while also reducing wage dispersion within occupational groups. This limits the extent to which market forces alone determine income levels (Amarante, 2016; Keiffman & Maurizio, 2014).

Labor market formalization particularly benefits low-wage and low-skilled workers by raising their incomes closer to formal wages, thereby reducing income inequality across the

labor market (ILO, 2014). Within the formal sector, wage differentials can still be significant, reflecting differences in skills and occupation (Amarante, 2016). However, formal employment generally offers more stable wages compared to informal employment, which is associated with more volatile incomes, limited labor protections, and higher income inequality (Amarante, 2016; ILO, 2014). Furthermore, high informality allows for greater job mobility and flexibility, often at the cost of worker protections and stable incomes. If workers frequently change jobs for better opportunities or to maintain income, employers have little incentive to increase wages or invest in skill development. As a result, wage growth is limited within the informal sector and contributes to broader income stagnation in Latin America (Menezes-Filho and Narita, 2023).

3.2.2. Share of Skilled Workers in the Labor Force

This condition refers to the proportion of the labor force with at least secondary or tertiary education levels. Since the 1990s, educational attainment levels have increased across Latin America, especially among lower-income populations (Azevedo et al., 2013; Gasparini et al., 2012; UNDP, 2015). This shift affected the supply side of the labor market by increasing the number of skilled workers entering the workforce. As the supply of educated labor increased and began to outpace demand, the relative value of high-skilled labor declined. (Amarante, 2016; Lopez-Calva and Lustig, 2010). This lowered the skill premium, i.e., the wage differential between skilled and unskilled labor. As a result, the earnings gap between high-skilled and low-skilled workers narrowed, contributing to reductions in income inequality levels (Cornia, 2015).

However, the equalizing effect of a growing skilled labor force was not uniform across the region. In some countries, the skill premium remained constant or even increased, partly due to factors such as technological change and trade liberalization, which increased the demand for highly skilled workers and reinforced wage inequality (UNDP, 2015). This variation suggests that the share of skilled workers in the labor force can help explain cross-country differences in inequality outcomes. It also indicates that a high share of skilled workers does not automatically lead to lower inequality. Rather, its effect is contingent on how it interacts with market dynamics and policy decisions.

3.2.3. Trade Openness

Trade openness refers to the degree to which a country engages in international trade. In Latin America, trade openness expanded significantly in the 1990s through liberalization policies, including tariff reductions, deregulation, and participation in regional trade agreements (UNDP,

2015). According to the Heckscher-Ohlin-Stolper-Samuelson (HOSS) model, in labor-abundant economies, trade openness should reduce income inequality by increasing the demand for low-skilled labor-intensive exports (Naanwaab, 2022). However, the empirical literature on Latin America presents mixed results. Scholars have proposed different explanations for the findings, including trade direction (Naanwaab, 2022), the type of export sector (Sanchez-Ancochea, 2020), and economic complexity (Rosenfeld et al., 2024; Hartmann et al., 2017).

In this research, trade openness is treated as an isolated condition in order to capture its structural influence. This allows for a clear assessment of its interaction with other conditions, without confounding its influence with the moderating effects of trade direction, export type, and economic complexity.

3.2.4. Left-Leaning Government in the Executive

This condition refers to the extent to which left-leaning governments held executive power between 2000 and 2020. In Latin America, left-leaning governments, particularly those that came to power during the "Pink Tide" of the 2000s, typically prioritized income distribution and social inclusion more strongly than centrist or right-leaning governments (Sanchez-Ancochea, 2020; Cornia, 2015). These administrations implemented large-scale social spending programs such as conditional cash transfers (CCTs) aimed at poorer populations (Gasparini et al., 2016; Paes de Barros et al., 2009). Through these programs, the secondary household incomes of marginalized groups increased, contributing to the reduction in overall income inequality. Although governments across the political spectrum implemented redistributive policies, the scale of these programs was significantly larger under leftist governments (Cornia, 2015; Robertson, 2012).

Left-leaning government in the executive is thus conceptualized as a condition that increases the likelihood of large-scale, sustained, redistributive policies aimed at reducing income inequality, helping to explain variation in inequality reduction across countries.

3.3. Excluded Conditions

While several factors influencing income inequality in Latin America were identified in the literature review, not all are included in the analysis. Certain macroeconomic factors, such as commodity price booms (Cornia, 2014) and economic complexity (Hartmann et al., 2017; Rosenfeld et al. et al., 2024), are excluded due to empirical and conceptual limitations. While increasing commodity prices may affect inequality levels, they are typically short-term shocks and contingent on broader structural dynamics (Cornia, 2010). As Alvaredo et al. (2023)

highlight, long-term inequality shifts are often the result of structural changes within economies rather than cyclical shocks. Likewise, although economic complexity has been linked to inequality reduction, the evidence remains inconsistent across cases, and its broad nature complicates its operationalization within this research. Additionally, both factors are likely to exert their influence indirectly through mechanisms already captured by the conditions included in this study.

Though associated with reducing inequality, democratization and electoral participation (Cornia, 2010; Robertson, 2012) are also excluded. Their gradual and diffuse effects pose challenges for conceptualization and measurement within the timeframe of this research. Similarly, elite dominance and historical institutional inequality are excluded from this study. Although Sanchez-Ancochea (2020) establishes their relevance, this study conceptualizes them as background conditions rather than direct drivers of inequality, making them analytically different from the conditions prioritized in this study.

In his QCA, Sanchez-Ancochea (2020) identifies a low share of indigenous people and Afro-descendants as a necessary condition for relatively low income inequality levels within the region. However, this research aims to explain the reduction in income inequality, not relative inequality levels. Therefore, the condition is analytically different and is deliberately excluded from the analysis. This also allows for the possibility of identifying additional necessary conditions, consistent with the logic of fsQCA (Ragin, 2008; Schneider & Wagemann, 2006).

In the case of trade liberalization, while trade direction (e.g., North-South vs. South-South) and the type of export sector (e.g., mining vs. agriculture) are empirically relevant in affecting inequality, they are purposefully excluded from the analysis. Including these factors would risk conflating the structural influence of trade openness with the moderating effects of these factors. By only focusing on trade openness, the analysis isolates its effect more clearly and avoids overlapping or compounding conditions. While the inclusion of these factors may yield interesting results, in this analysis, they are treated as scope conditions.

By narrowing the scope to the four conditions conceptualized in the theoretical framework, this research ensures analytical focus while capturing the dynamic interaction of conditions most directly affecting income inequality outcomes in Latin America during the 2000s and 2010s.

4. Research Design and Method

This chapter outlines the research design and method used in this study. It begins by justifying the choice of the method, followed by a detailed explanation of Fuzzy Set Qualitative Comparative Analysis (fsQCA). Next, the case selection is presented, and the operationalization and calibration of the conditions are described. The validity and reliability of the analysis are addressed, and the chapter concludes with an overview of the methodological steps undertaken in the analysis.

4.1. Suitability of fsQCA

Several conditions have been identified that affect income inequality reduction. These conditions rarely act in isolation. Rather, their effects depend on how they interact with other conditions. To account for this complex causation behind the varying degrees of income inequality reduction across Latin America, an fsQCA approach was deemed the most suitable research design.

QCA is based on conjunctural causation (where causal conditions interact), equifinality (the possibility of multiple causal pathways to the same outcome), and asymmetric causality (the causes of an outcome's presence may differ from those explaining its absence) (Rihoux & Ragin, 2009; Schneider & Wagemann, 2012; Mello, 2021). In the analysis, set theory is used to determine the membership of cases in certain sets, which is then used to identify if conditions, or combinations of conditions, are necessary and/or sufficient to produce an outcome (Mello, 2021). Unlike conventional econometric approaches, which often assume variable independence and fixed effects within countries over time, QCA enables the systematic comparison of countries and assessment of causal complexity (Sanchez-Ancochea, 2020). QCA offers a configurational approach that rejects the assumptions of conventional econometric models. Instead, it emphasizes the interplay of conditions, identifying how combinations of factors, rather than single variables, are linked to reduced inequality (Bentele, 2013; Lewellyn, 2017).

Contrary to crisp-set QCA (csQCA), which employs a binary classification (fully in or fully out), fsQCA allows for fine-grained specification of set membership (Ragin, 2008). This makes it a powerful tool for analyzing social phenomena, such as income inequality, where combinations of conditions may not have uniform effects across contexts (Wagemann & Schneider, 2006). The use of fsQCA is also appropriate due to the limited number of cases available. Latin America consists of only 18 countries, which constrains large-N statistical methods. Furthermore, detailed, high-quality annual data on inequality and related conditions

are often unavailable or inconsistent across the region, posing challenges for panel-based regression models (Sanchez-Ancochea, 2020). In contrast, fsQCA does not require balanced panels or time-series data, allowing for a focus on cross-country comparison and causal configurations (Wagemann & Schneider, 2006; Sanchez-Ancochea, 2020).

Lastly, fsQCA has many of the virtues of quantitative analysis, while retaining set-theoretic inference capabilities (Ragin, 2008). It allows for structured cross-case comparisons while remaining sensitive to within-case complexity (Rihoux and Ragin, 2009), making it the theoretically and methodologically most appropriate method for this research.

4.2. Research Design

4.2.1. Research Process

In fsQCA, the concepts of independent and dependent variables are replaced by conditions and outcomes. In this study, the outcome is income inequality reduction. The conditions derived from the theoretical framework are: 1) labor market formalization, 2) share of skilled workers in the labor force, 3) trade openness, and 4) left-leaning governments in the executive.

A crucial step in QCA is calibration, which translates empirical data into fuzzy set scores. This involves concept operationalization and making theoretically informed decisions on set membership levels to establish empirical anchors (Schneider & Wagemann, 2012). In fsQCA, membership scores typically range from 0.05 (fully out of set) to 0.95 (fully in set), or 0.5 (neither in nor out) (Schneider & Wagemann, 2012). The 0.5 threshold, referred to as the point of maximum ambiguity, represents the qualitative threshold between inclusion and exclusion. There are two calibration methods. The manual method, which relies on the researchers' judgment, and the direct method, which uses a logistic function to transform numerical data into a fuzzy set score between the defined anchors (Mello, 2021).

QCA is based on Boolean algebra and its logical operations, such as AND (A*B), OR (A+B), and NOT (~A), to uncover patterns of necessity and sufficiency. Subset and superset relations are used to assess whether a condition or combination of conditions consistently leads to the outcome (Schneider & Wagemann, 2012). These relations are mapped using a truth table, which lists all logically possible combinations of the selected conditions (Mello, 2021). Logical minimization reduces these combinations into simplified expressions representing sufficient paths to the outcome (Ragin, 2008; Mello, 2021). This produces three solution types: complex, intermediate, and parsimonious. These solutions differ in the way that they treat counterfactual assumptions, or logical remainders (Mello, 2021). The complex solution avoids assumptions about unobserved configurations. The parsimonious solution simplifies the configurational

pathways by including all logical remainders, i.e., pathways that are theoretically possible but unobserved in the data, potentially increasing explanatory power at the expense of complexity. This trade-off addresses the limited diversity problem inherent in small-to-medium-N analyses, which occurs when the number of observed case combinations is much smaller than the number of logically possible combinations (Ragin, 1987; Schneider & Wagemann, 2012). The intermediate solution limits the use of logical remainder based on theoretically informed assumptions and is therefore generally the preferred solution.

QCA involves the analysis of necessary and sufficient conditions for the outcome (Marx, 2013). A condition is necessary if the outcome cannot occur without it, and sufficient if its presence reliably leads to the outcome (Marx, 2013; Ragin, 1987). In fsQCA, causal claims are evaluated using two parameters: Consistency and coverage. Consistency measures how reliably a condition or combination leads to the outcome, while coverage indicates how empirically relevant a configuration is in accounting for the outcome (Mello, 2021). A necessary condition should have a consistency above 0.90. Sufficient conditions require at least 0.80 consistency and 0.5 coverage to be considered empirically significant (Ragin, 2008; Sanchez-Ancochea, 2020). In the analysis of sufficiency for specific configurations, coverage is split into raw coverage and unique coverage (Ragin, 2017). Raw coverage indicates the total proportion of the outcome explained by each configuration or condition, while unique coverage reflects the proportion of the outcome that is explained exclusively by that configuration.

An important part of fsQCA is the analysis of non-occurrence. In fsQCA, the conditions that lead to the presence of an outcome are not necessarily the inverse of those that lead to its absence. The analysis of non-occurrence shows if the identified sufficient solutions are unique to the positive outcome or if they also occur when the outcome is absent. While this does not constitute the main purpose of the study, doing so adds robustness and a deeper understanding of the underlying causality of the positive outcomes (Wageman & Schneider, 2010).

4.2.2. Case Selection

Case selection in fsQCA is typically based on a defined population, often specified through scope conditions or purposeful sampling (Mello, 2021). A fundamental principle is to ensure case homogeneity while maximizing heterogeneity in the presence or absence of conditions and outcomes (Berg-Schlosser & De Meur, 2009). Another important consideration is the ratio of cases to the number of conditions. Generally, a ratio of at least four cases per condition is recommended. This enhances the robustness of the analysis and reduces the number of logical remainders (Mello, 2021). Additionally, fsQCA allows outcome-based case selection, a

practice often avoided in quantitative research due to concerns about selecting based on the dependent variable. However, in fsQCA, outcome-based selection is critical for ensuring analytical focus (Mello, 2021).

The period from 2000 to 2020 was selected to capture significant regional trends in inequality reduction as well as key social, economic, and political developments. In cases where data for the exact start or end year was unavailable due to differences in national reporting, the closest available year was used.

The initial population included all Latin American countries. However, due to limited data availability and reliability concerns, Venezuela, Guatemala, and Nicaragua were excluded from the analysis. This resulted in a final sample of fifteen countries, listed in Table 1**.** These cases reflect a broad range of outcomes in terms of inequality reduction and variation across conditions, while remaining comparable in terms of the regional and developmental context. This allows for a robust configurational comparison of both successful and less successful cases.

The analysis includes four conditions, resulting in a case-to-condition ratio of 15:4 (3,75:1), which falls slightly short of the recommended 4:1 ratio. This limitation was considered acceptable considering the trade-off between case diversity and data quality.

Table 1

Selected Cases

No.	Country
1	Argentina
2	Bolivia
3	Brazil
4	Chile
5	Colombia
6	Costa Rica
7	Dominican Republic
8	Ecuador
9	El Salvador
10	Honduras
11	Mexico
12	Panama

13	Paraguay
14	Peru
15	Uruguay

4.3. Operationalisation and Calibration

In this section, an explanation for the calibration of the outcome and four conditions is presented. The data collection and operationalization in this research were conducted in accordance fsQCA best practices (Mello, 2021; Schneider & Wagemann, 2012). The raw data was collected through desk research methods, compiling data from relevant online databases. The raw data were downloaded as CSV files and subsequently transformed into usable data in Excel. The data matrices created served as the basis for calibration. The data for IIR was calibrated manually, while the four conditions were calibrated using the direct method through the fsQCA 4.1 software (Ragin & Davey, 2022). For a complete overview of the calibrated conditions and assigned fuzzy-set scores, see Appendix D.

The outcome was measured by the degree of change, while the first three conditions were measured using the average values over the 2000 to 2020 period. The fourth condition was measured as the percentage of years in which the condition was present. The use of averages reflects the assumption that income inequality reduction is more likely to occur under stable, long-term, favorable conditions, rather than due to short-term policy shifts. Using averages captures the typical environment in which inequality developed and reduces sensitivity to within-period fluctuations. While the outcome changes over time, the reasoning aligns with the fsQCA approach, which focuses on examining persistent conditions consistently associated with the outcome (Wagemann & Schneider, 2010)

The four conditions were calibrated using empirical anchor points based on the regional distribution of each condition over the relevant period, combined with substantive case knowledge. This method aligns with principles of fsQCA (Ragin, 1987) and follows the approach used by Sanchez-Ancochea (2020), who ranked countries based on the extent to which they exhibited the outcome and assigned fuzzy set scores accordingly. This approach was deemed suitable as there were no universally accepted thresholds for what constituted, for example, high labor market formality or a high share of skilled workers. Such thresholds typically depend on national contexts, making externally defined cut-off points difficult to apply consistently and meaningfully. Calibrating based on regional distribution therefore enhanced comparability across the region and reduced subjectivity in the process, making it the appropriate method for this analysis.

4.3.1. Outcome: Income Inequality Reduction (IIR)

This study defines the outcome as *Income Inequality Reduction (IIR).* In this research, the outcome is measured as the percentage change in the Gini coefficient between 2000 and 2020, which captures the degree to which income inequality was reduced. Using these two points ensured consistency across all cases and allowed for a standardized comparison over the period while avoiding the complexity and data-availability problems of tracking year-by-year fluctuations.

Data was sourced from the World Income Inequality Database (WIID), which aggregates data from regional producers, independent studies, and data harmonizers such as the Economic Commission for Latin America and the Caribbean (ECLAC), the World Bank Socio-Economic Database for Latin America Countries (SEDLAC), and the Luxembourg Income Study (LIS) (Alvaredo, 2024). Due to its breadth and harmonization, the WIID provides the most comprehensive and reliable data for cross-country comparisons of inequality.

Countries were assigned fuzzy scores based on the magnitude of the percentage change in Gini coefficients. Countries were ranked based on percentage change instead of absolute change because countries began the period with varying inequality levels. By measuring the relative (percentage) change in the standardized Gini coefficient, the analysis captured each county's progress more accurately and enabled a more accurate cross-country comparison.

The outcome was calibrated as a four-value fuzzy set, and the anchor points were set at 0.95 (substantial reduction), 0.67 (moderate reduction), 0.33 (limited reduction), and 0.0 (no reduction or increase in inequality). Bolivia achieved the highest degree of inequality reduction at 29% and was therefore assigned full set-membership (0.95). Colombia saw no meaningful reduction in inequality levels over the period (0% change) and was therefore assigned full non-membership (0.05). Notably, Costa Rica was the only country where inequality increased (2%). However, using Costa Rica as the anchor point for non-membership would have risked distorting the analysis, as the outcome being measured is the reduction of inequality, and would have resulted in Colombia receiving a positive score. The remaining anchor points were determined based on the regional distribution of scores. Mexico saw a relatively moderate reduction at 15% and was therefore considered more in than out (0.67). Brazil, showing less progress with a reduction of 10%, was considered more out than in (0.33). Based on these anchor points, fuzzy scores were assigned to each case. For a full overview of the regional distribution, country rankings, and corresponding fuzzy scores, see Appendix B.

Table 2

Calibration of IIR

Indicator	Empirical anchor	Gini reduction	Description
Full set-membership	0.95	≥21%	Substantial reduction
More in than out	0.67	Between 20% and 15%	Moderate reduction
More out than in	0.33	≤15%	Limited reduction
Full non-membership	0.05	<0%	No reduction or increase in inequality

4.3.2. Condition 1: Labor Market Formalization (LMF)

The condition *Labor Market Formalization (LMF)* was measured based on the average formal employment rate in a country from 2000 to 2020. To capture the long-term structural influence of labor market institutions on income distribution, the condition was scored based on the average informal employment rate over the 2000-2020 period. The available data practically only consisted of measures of informality. Since informality is the reverse indicator of formality, the collected values were inverted to determine the formality rate (i.e., 100 – average informality rate). By taking averages over the period, the typical labor market environment of countries was captured, rather than short-term fluctuations.

Data was primarily sourced from the International Labor Organization (ILO), which provides comprehensive and harmonized data on informal employment across countries. However, there were some gaps in the dataset. To address these gaps, supplementary data were drawn from Tornarolli et al. (2014), who calculated informality rates based on data from SEDLAC and the World Bank. These were used to ensure greater coverage and comparability across countries in the analysis.

For calibration, a three-value fuzzy set was assigned based on the empirical distribution in Latin America. Full set-membership (0.95) was set at 60%, representing countries with high formality rates and relatively strong labor institutions. The cross-over point (0.5) was set between Mexico and Argentina at 45% formalization. This point was used because it fell between the regional average (39%) and the point of maximum ambiguity between formal and informal labor structure dominance (50%). Countries with formalization scores lower than 30%, where informality remains institutionally entrenched and labor protections are minimal,

were assigned full non-membership (0.05). For the full calibration and regional distribution per country, see Appendix C.

Table 3

Calibration of LMF

Indicator	Empirical Anchor	Formality rate (%)	Description
Full set membership	0,95	≥ 60%	High formalization; Strong labor institutions and protections
Cross-over point	0,5	=45%	Threshold regional average and point of maximum ambiguity
Full non-membership	0,05	≤ 30%	Very low formalization, weak labor institutions and protections, high informality

4.3.3. Condition 2: Share of Skilled Workers in the Labor Force (SSW)

The condition *Share of Skilled Workers in the Labor Force (SSW)* was calibrated using the average share of skilled workers in the labor force between 2000 and 2020. Educational attainment rates were considered less suitable for the analysis as they do not accurately represent the labor force due to unemployment and the delayed effect on inequality. The use of average shares of skilled workers was deemed appropriate as it smooths out annual fluctuations and captures the long-term, structural influence of the skilled labor supply.

Data were sourced from the International Labor Organization (ILO). Since data on the share of the labor force with at least secondary education was not readily available, the author calculated these using statistics from the ILO. For a detailed methodology on this, see Appendix C. The average skilled labor share in Latin America ranged from 65% in Chile, to 21% in Honduras. Full set-membership (0.95) was set at 65%, reflecting a highly skilled labor force. Full non-membership (0.05) was set at 21%, indicating a predominantly low-skilled labor force. The crossover point (0.5) was set at 39%, corresponding to the regional average. Using

these anchor points, fuzzy-set scores were assigned for all countries. For a full overview of these scores, see Appendix D.

Table 4

Calibration of SSW

Indicator	Empirical Anchor	Share of Skilled Workers	Description
Full set membership	0,95	≥ 65%	High share of skilled workers in the labor force
Cross-over point	0,5	=39%	Regional average rate of skilled workers
Full non-membership	0,05	≤ 21%	Low share of skilled workers in the labor force

4.3.4. Condition 3: Trade Openness (TRO)

The condition *Trade Openness (TRO)* was measured as the ratio of total trade (imports plus exports) divided by the Gross Domestic Product (GDP). For the analysis, trade openness was averaged over the period from 2000 to 2020 to capture the structural effects of the trade liberalization reforms of the 1990s (UNDP, 2021). By averaging over the two decades, short-term fluctuations were reduced, ensuring the structural nature of the condition trade openness was captured in the analysis.

The calibration of this condition was based on the empirical distribution of trade openness levels across Latin American countries. Panama and Honduras were notable outliers, with trade openness levels of 118% and 114%, respectively. These high values reflect the countries' dependence on international trade for economic growth, participation in regional trade agreements, and strategic geographical locations (e.g., the Panama Canal), leading to large trade volumes relative to their GDPs (WTO, 2021; WTO, 2023). To avoid skewing the calibration, Panama and Honduras were considered outliers and assigned full membership (0.95). The calibration of thresholds was then based on the remaining cases. Full set-membership (0.95) was set at 75% (Paraguay), while full non-membership was set at 28% (Brazil). The crossover point (0.5) was set at 59% (Dominican Republic), which corresponded to the median of the distribution and presented neither relatively high nor low trade openness

levels, making it the point of maximum ambiguity. For a full overview of the trade openness levels, see Appendix C.

Table 5

Calibration of TRO

Indicator	Empirical Anchor	Degree of Trade Openness	Description
Full set membership	0,95	≥ 75%	High trade openness level
Cross-over point	0,5	=59%	Regional average level of trade openness
Full non-membership	0,05	≤ 28%	Low trade openness

4.3.5. Condition 4: Left-Leaning Government in the Executive (LLG)

The condition *Left Leaning Government in the Executive (LLG)* was operationalized using the Global Leader Ideology dataset (Herre, 2021), which compiles the political ideologies of Latin American governments. This dataset provided a comprehensive cross-country overview of the political ideologies held by chief executives across years. The dataset classifies governments as leftist, centrist, or rightist based on their beliefs about the role of government in economic intervention. Leftist executives are defined as those who support state intervention to promote social equality, while rightists advocate for limited government involvement to increase individual freedom (Herre, 2021).

Although this study focuses on the period from 2000 to 2020, the years 1999 to 2019 were used for this condition. This was done to account for delayed policy effects, i.e., the effects of policies implemented in a given year are reported in data in the subsequent year(s). For each country, the number of years under leftist governments was divided by the total of 21 years to calculate a percentage.

Four countries had leftist governments in 71% of years and were determined fully in (0.95). Two countries had zero years of leftist governments (0%) and were therefore considered fully out (0.05). The crossover point (0.5) was set at 48%, corresponding to the two countries that had leftist governments for roughly half the period (10 out of 21 years). A full overview of the calibration of the condition is shown in Appendix C.

Table 6

Calibration of LLG

Indicator	Empirical Anchor	Years under Leftist Governments (%)	Description
Full set membership	0,95	≥ 71%	Significant number of years with a leftist executive
Cross-over point	0,5	=48%	Roughly half of the period with a leftist executive
Full non-membership	0,05	=0%	No years with a leftist executive

4.4. Validity and Reliability

A core principle of QCA is its recognition of causal complexity (Ragin, 1987). Because of this, QCA achieves internal validity through the combination of in-depth case knowledge and systematic empirical comparisons to ensure grounded causal explanations. A common challenge to the internal validity of QCA is that of limited diversity (Ragin, 1987). This was addressed by restricting the number of conditions to four, which decreased the number of logical remainders. Additionally, the cases had a high degree of heterogeneity across the conditions and outcomes, which reduced the risk of skewed data. In fsQCA, construct validity is ensured by justifying calibration decisions and performing robustness tests (Skaaning, 2011; Thomann & Magetti, 2020). In this research, several robustness tests were conducted to assess the sensitivity of calibration and consistency threshold choices. This increased the validity of solution results by identifying possible measurement errors. For a full overview of the robustness tests, see Appendix G.

Although the generalizability of fsQCA findings is less than large-scale statistical inferences, modest generalization is possible (Ragin, 1987; Rihoux & Ragin, 2009). The sample size in this research appears small, yet it captures nearly the entire target population. This enhances generalizability, which was further increased through adherence to best practices and use of reliable data (Schneider & Wagemann, 2012).

Two strengths of QCA as a method are its replicability and transparency (Rihoux & Ragin, 2009). In the process of calibration, all decisions were explained, justified, and

documented to enhance transparency. Furthermore, replicability is ensured through the set-theoretic analysis, which is based on unambiguous Boolean algebra, employed in the fsQCA software. Any limitations of the analysis were acknowledged and reported, further contributing to transparency, and from which follow future research possibilities.

4.5. Methodology

First, the analysis of necessity was conducted, with a minimum consistency score of 0.9 being required for a condition to be necessary. Next, the analysis of sufficiency was conducted by creating a truth table, which matched cases with possible causal pathways. The truth table was constructed based on the calibrated data and analyzed using fsQCA 4.1. Following this, the frequency and consistency thresholds were established to determine relevant pathways. As this research was conducted with a small number of cases, the frequency threshold was set to one case per pathway (Ragin, 2017). The consistency threshold was set at 0.8 to ensure robustness of the findings (Ragin, 2017). Based on these thresholds, a treatment of logical remainders was conducted, resulting in simplified expressions of sufficient pathways to the outcome. Following this, the logical minimization of the truth table was done by removing all rows containing logical remainders, resulting in nine rows being included in the analysis. The final step involved an analysis of non-occurrence to determine pathways that explain the absence of income inequality reduction. To strengthen the findings of the analysis, several robustness tests were performed, which involved changing calibration and consistency thresholds.

5. Results and Discussion

In this chapter, the findings from the fsQCA are presented. The analysis examined four conditions: Labor Market Formalization (LMF), Share of Skilled Workers in the Labor Force (SSW), Trade Openness (TRO), and Left-leaning Governments in the Executive (LLG). The outcome was Income Inequality Reduction (IIR). The results consist of an analysis of necessity, of sufficiency, and of non-occurrence. Following this, the results are interpreted, and their implications are discussed.

5.1. Analysis of necessity

The analysis of necessity assessed whether any single condition was consistently present in cases where the outcome occurred (Ragin, 2017). A condition was considered necessary when it had a consistency of at least 0.9. The results of the analysis of necessity are presented in Table 7.

Table 7

Results for the analysis of necessity for outcome IIR

Condition	Consistency	Coverage
LMF	0.34	0.45
LLG	0.63	0.57
SSW	0.51	0.57
TRO	0.74	0.61

The analysis showed that none of the examined conditions were necessary for the outcome to occur. Trade openness (TRO) had the highest score for consistency at 0.74 but still fell short of the 0.90 consistency threshold. This suggests that while trade openness is frequently present in cases where income inequality decreased, several cases saw inequality decrease without high levels of trade openness, meaning the condition is not a prerequisite for the outcome. The other conditions similarly did not meet the thresholds for consistency. These results imply that none of the individual conditions were necessary for the outcome to occur. In other words, inequality reduction was not dependent on the presence of any single condition assessed in the analysis. This highlighted the configurational nature of inequality reduction as it was not the presence of a single factor, but the combination of multiple factors, that determined the outcome.

5.2. Analysis of Sufficiency

5.2.1 Truth Table Construction

A truth table was constructed for the analysis of sufficiency. Before utilizing the truth table, several analytical steps were undertaken following the guidelines set out by Ragin (2017). The frequency threshold was set to 1 to retain all the empirically observed configurations. A consistency threshold of 0.80 was used to ensure that only configurations that show significant association with the outcome were analyzed. After these thresholds had been applied, rows 1 through 9 remained, while the other 7 rows, which consisted of logical remainders, were deleted. The resulting truth table used for the analysis is shown in Table 8.

Table 8

Truth table

Path	LMF	SSW	LLG	TRO	IIR	number	Cases	Consistency
1	0	0	1	1	1	1	Bolivia	0.96
2	0	0	1	0	1	1	Ecuador	0.94
3	1	1	1	0	1	2	Argentina, Brazil	0.83
4	0	0	0	1	0	3	Honduras, Mexico, Paraguay	0.80
5	1	0	1	0	0	1	Uruguay	0.67
6	1	1	0	1	0	1	Panama	0.64
7	1	0	1	1	0	1	Costa Rica	0.59
8	0	1	0	0	0	1	Colombia	0.58
9	1	1	1	1	0	1	Chile	0.57

Notably, the Dominican Republic, El Salvador, and Peru were not included in the truth table. While all three experienced inequality reduction, they scored low across all four conditions. Because of this, they had very weak or negligible degrees of membership (<0.50) in the sets of conditions, which disqualified them from being included in any of the observed configurations in the truth table (Ragin, 2017). The exclusion of these cases reflects the problem of limited diversity, a common issue in small-n QCA studies. The exclusion of the three countries may point to unique pathways that were not captured by the data or conditions used in the analysis. Common solutions for the problem of limited diversity include adding cases or expanding the conditions (Mello, 2021). However, neither of these solutions was manageable for this analysis.

5.2.2 Configurational Pathways

Following the construction of the truth table, an analysis was conducted to determine the conditions that were sufficient to explain the outcome. This resulted in the complex,

intermediate, and parsimonious solutions, which identified the causal configurations associated with inequality reduction in Latin America. The interpretation of these solutions is presented in the following paragraphs. The solutions provide a measure of consistency and coverage. Solution consistency indicates how much of the outcome can be explained by the pathways, while solution coverage presents the proportion of cases explained by the solution (Ragin, 2017; Kent, 2008). In a pathway, (*) indicates a conjunction (logical AND), while (~) indicates negation (logical NOT), i.e., a low degree of membership in that condition (Ragin, 2017). A solution should have a consistency of at least 0.8 and coverage of 0.5 to be considered sufficient. For a full overview of the fsQCA software output, see Appendix E.

Complex and Intermediate Solutions

The complex and intermediate solutions provided identical results, as shown in Table 9. The complex and intermediate solutions had a consistency of 0.91 and coverage of 0.57. These values are high and indicate that the configurational pathways reliably explain a significant share of the observed cases of inequality reduction.

Table 9

Intermediate and complex solutions for outcome IIR

Configuration	Pathway	Consistency	Raw Coverage	Unique Coverage	Cases Covered
1	~LMF*LLG*~SSW	0.94	0.44	0.34	Bolivia & Ecuador
2	LMF*LLG*SSW*~TRO	0.83	0.22	0.13	Argentina & Brazil
	Solution	**Consistency**	**Coverage**		
		0.91	**0.57**		

The first configuration, exemplified by Bolivia and Ecuador, shows that significant inequality reduction occurred in countries with low labor market formalization, a low share of skilled workers, and a high share of left-leaning governments in the executive.

The second configuration indicates a pathway where inequality was reduced in countries with high labor market formality rates, a high share of left-leaning governments in executive, high shares of skilled workers, and low trade openness levels. This pathway was most clearly presented in Argentina, which achieved moderate income inequality reduction (fuzzy score 0.67) between 2000-2020. Brazil, however, achieved limited inequality reduction (fuzzy score 0.33). Its inclusion in the configuration was justified due to its high degree of set-

membership in the conditions and thus constituted a deviant case for consistency (Ragin, 2008). This meant that it met the causal preconditions but did not display the expected outcome. fsQCA allows for this inconsistency as long as the overall solution consistency meets the 0.80 threshold. Brazil's different outcome may result from contextual restrictions or conditions not included in this analysis, highlighting the importance of complementary case-specific research in QCA.

While both configurations provide plausible explanations for inequality reduction, the first pathway offered a more consistent and empirically sound result, illustrated by its higher consistency and coverage scores. The second configuration, while also relevant, had lower consistency and coverage scores, making it a less robust pathway.

The Parsimonious Solution

The parsimonious solution, shown in Table 10, aligned with intermediate and complex solutions by highlighting the presence of left-leaning governments, low trade openness, and a high share of skilled labor. However, with a score of 0.82, the parsimonious solution had a lower consistency than the intermediate and complex solutions. Additionally, the solution included the overlapping of configurations 2 and 3, with very low unique coverage scores. These factors limit its interpretive power and leave the intermediate solution as the preferred solution.

Table 10

Parsimonious Solution for Outcome IIR

Configuration	Pathway	Consistency	Raw Coverage	Unique Coverage	Cases Covered
1	~LMF*LLG	0.87	0.49	0.26	Bolivia & Ecuador
2	LMF*SSW*~TRO	0.82	0.24	0.02	Argentina & Brazil
3	LLG*SSW*~TRO	0.79	0.33	0.003	Argentina & Brazil
	Overall Solution	**Consistency**	**Coverage**		
		0.82	**0.61**		

5.2.3 Analysis of non-occurrence

Following the analysis of sufficient conditions, an analysis of the non-occurrence was conducted to identify configurations that led to the absence of the outcome (denoted as ~IIR). The method for this analysis was the same as for the main analysis, except that in this case, the

outcome was the negation of income inequality reduction (~IIR). A full overview of the analysis of non-occurrence is found in Appendix F.

The analysis of necessity for ~IIR did not result in any single condition meeting the consistency threshold of 0.9. LLG, SSW, and TRO all had a consistency score of 0.66, while LMF scored 0.58. LMF and SSW had relatively high coverage scores at 0.79 and 0.78, respectively, suggesting they were often present in cases where inequality reduction was absent, but are not prerequisites.

The truth table analysis and logical minimization for ~IIR resulted in two sufficient configurations in the intermediate solution. These were LMF*SSW*TRO with 0.90 consistency and ~LMF*~LLG*SSW*~TRO with 0.85 consistency. The intermediate solution had an overall solution consistency of 0.80 and coverage of 0.71, and thus provided a reasonably strong explanation for the absence of inequality reduction. Notably, the two sufficient configurations shared several conditions with the positive-outcome analysis. For example, LMF and SSW, which were part of the configuration for Argentina and Brazil, also appeared in the ~IIR configuration for Chile, Costa Rica, and Uruguay. However, these conditions appeared in combination with different conditions. In the main analysis, they combined with LLG and ~TRO, while in this analysis, they combined with TRO and without LLG to lead to the non-occurrence of IIR. This showed that while the same conditions appeared across the positive and negative outcomes, their effects depended significantly on the specific configuration of conditions, highlighting the causal complexity of income inequality reduction.

5.3 Discussion

The findings of this research affirm the context-dependent configurational nature of income inequality reduction. None of the individual conditions was found to be necessary for inequality reduction to occur. Trade openness had the highest score for consistency but fell short of the necessity threshold. This indicated that no single factor analyzed in this research was a prerequisite for inequality reduction. Instead, multiple factors, and their interactions with each other, are key to understanding inequality trends across Latin America.

The analysis of sufficiency identified two consistent pathways to income inequality reduction. The first configuration, represented by Bolivia and Ecuador, included low labor market formality, a low share of skilled workers, and a high share of leftist governments in the executive. This pathway challenges the economic assumptions that formal labor markets and high-skilled labor are essential for reducing income inequality (Gasparini et al., 2011). Instead,

it illustrates the function of labor market dynamics and the role of left-leaning governments in compensating for structural shortcomings (Huber & Stephens, 2012; Barrientos, 2010).

In Bolivia, the main source of income was through informal labor and self-employment, particularly in the mining and natural resources sectors, and in the 2000s experienced rapid economic growth with the export of these products (Vargas, 2016). This generated a large demand for low-skilled labor, which lowered the skill premium and increased informal wages (Amarante, 2016). Most of the gains accrued in the informal sector among low-skilled workers, while average labor income decreased in the formal sector (Vargas, 2016). Additionally, left-leaning governments aimed to address inequality by implementing redistributive policies, such as the *Bono Juancito Pinto* program. However, scholars argue that these played a more limited role in reducing income inequality compared to labor market dynamics (Amarante, 2016; Lopez Calva & Lustig, 2010; Vargas, 2016).

Ecuador also had low labor market formality and a low share of skilled workers, but in this case, redistributive policies played a more central role (Amarante, 2016; UNU-WIDER, 2014). Starting in 2007, Rafael Correa's government substantially expanded the *Bono de Desarrollo Humano* cash transfer program, which mainly benefited poorer households (UNU-WIDER, 2014). Additionally, the labor market experienced increased demand for unskilled labor, especially in urban informal sectors and agriculture. This demand outpaced that for skilled workers and, as in Bolivia, contributed to a decline in the skill premium, thereby reducing income inequality (Amarante, 2016; UNU-WIDER, 2014).

The second configuration, represented by Argentina and Brazil, shows a different pathway, where high labor market formality, a high share of skilled workers, low trade openness, and left-leaning governments led to a reduction in income inequality. Both countries had leftist governments implementing large-scale redistributive policies and experienced a lowering of the skill premium, resulting in the narrowing of the earnings gap between high-skilled and low-skilled workers (Lopez Calva & Lustig, 2010).

In Argentina, the governments under Néstor and Cristina Kirchner implemented the *Asignación Universal por Hijo (AUH)* program, which complemented the incomes of low-income households and increased their social protections (Judzik et al., 2017). In Brazil, the *Bolsa Família* program played a significant role in reducing income inequality (Góes, 2019). Labor market formality, combined with a high share of skilled workers, provided governments with high tax revenues. These were used to implement larger and more effective redistribution programs compared to other countries in the region (Lustig et al., 2023; Gasparini et al., 2016; Paes de Barros et al., 2009). Contrary to expectations of the HOSS-model, the two countries'

low trade openness levels preserved the demand for low-skilled labor in commodity production. This moderated the skill premium and reduced labor market polarization (McMillan & Rodrik, 2011; UNDP, 2015). As a result, governments were able to operate within relatively stable and favorable environments to implement their redistributive policies.

Both configurations included a high share of leftist governments, highlighting the importance of government orientation in influencing inequality outcomes. However, the role that governments fulfilled was divergent between these pathways. In Bolivia, labor market dynamics drove income inequality reduction more than government policies, while in Ecuador, labor market demands and redistributive policies complemented each other. In Argentina and Brazil, governments were able to use structural strengths to their advantage to reduce income inequality. It should be noted, however, that inequality reduction in Latin America did not only occur under left-leaning governments. However, the results support the literature highlighting the greater commitment of left-leaning governments in prioritizing inclusive, large-scale redistributive policies that successfully reduce income inequality (Sanchez-Ancochea, 2020; Cornia, 2015).

The analysis of non-occurrence further reinforced these findings. In the analysis of the absence of income inequality reduction, the absence of left-leaning governments was consistent with the outcome. Additionally, high trade openness, combined with high levels of labor market formality and skilled labor, led to the absence of inequality reduction. This supports arguments that trade liberalization increases inequality by raising returns to skilled labor and disaffecting low-skilled workers (Gourdon et al., 2008; Rojas-Vallejos & Turnovsky, 2017). Furthermore, the findings of the non-occurrence analysis reaffirm QCA's principle of causal asymmetry, where the conditions that produce inequality reduction are not simply the inverse of those that lead to sustained or increased inequality.

Several robustness tests were conducted to test the findings of the analysis. These involved changes in the consistency threshold and calibration of anchor points. Overall, the robustness tests support the results of the main analysis. For a detailed description of these tests, see Appendix G. Interestingly, the robustness test using stricter calibration thresholds and a lower consistency cutoff (0.75) brought the previously excluded El Salvador, the Dominican Republic, and Peru back into the analysis, although with low consistency scores. This highlights the sensitivity of the analysis to calibration choices and illustrates the importance of conducting robustness tests.

All in all, the findings show that income inequality reduction in Latin America cannot be attributed to a single causal factor. Instead, income inequality reduction is the result of

several factors interacting and can be achieved through various pathways and mechanisms. These results have important policy implications. While labor market protections and high-skill development are important, political leadership plays a crucial role in determining if these conditions lead to more equal outcomes. Policy makers aiming to reduce income inequality must therefore be very aware of the context in which they work, recognizing that it is not only the technical soundness of policies, but also political, economic, and structural factors that shape their implementation and effectiveness.

6. Conclusion

This research set out to answer the question: *"Under what conditions did income inequality decrease in Latin America between 2000 and 2020?".* Through an extensive literature review, four key conditions driving income inequality reduction were identified: Labor Market Formalization, the Share of Skilled Workers, Trade Openness, and the Presence of Left-leaning Governments in the Executive. Although in general the Latin American region saw inequality decrease throughout the 2000s and 2010s, some combinations of conditions were found to be more likely associated with income inequality reduction. Using a fuzzy-set Qualitative Comparative Analysis, this research uncovered multiple distinct pathways leading to income inequality reduction, reflecting the principles of complex causation and equifinality (Ragin, 2008; Wagemann & Schneider, 2010).

The analysis found that no single condition was necessary for income inequality reduction to occur. Instead, two sufficient pathways for income inequality reduction were identified. The first, present in Bolivia and Ecuador, was characterized by left-leaning governments, weak labor market protections, and a low-skilled workforce. In these countries, inequality declined primarily through increased informal labor incomes (Vargas, 2016; Amarante, 2016), with redistributive policies playing a greater role in Ecuador (Lopez-Calva & Lustig, 2010). The second pathway, present in Argentina and Brazil, identified a path marked by favorable structural conditions, characterized by labor market formality, a highly skilled workforce, and low levels of trade openness. This enabled left-leaning governments to amplify existing advantages and effectively reduce income inequality (Lopez-Calva & Lustig, 2010; Sanchez-Ancochea, 2020; Lustig et al., 2009).

While both pathways involved left-leaning governments, the mechanisms through which income inequality decreased were different. The first pathway highlights the role of labor market dynamics and governments' ability to compensate for structural weaknesses. The second pathway illustrates how governments were able to leverage structural advantages to achieve greater decreases in income inequality levels.

The analysis of non-occurrence adds strength to these findings by highlighting that in Latin American countries with favorable structural conditions, but without left-leaning governments, and often combined with high trade openness, income inequality was less likely to decrease. This supports the argument that structural improvements alone are insufficient to reduce income inequality, unless they are combined with a strong political commitment to redistribution (Martinez Franzoni & Sanchez-Ancochea, 2016).

The findings of this study challenge the conventional assumption that formalization and a high-skilled workforce are necessary to decrease income inequality. Instead, it demonstrates that within specific contexts, political will combined with labor market dynamics can produce more equal outcomes, even in structurally disadvantaged environments. These findings contribute to a more nuanced understanding of income inequality reduction in Latin America and highlight the importance of context-sensitive policy solutions in the pursuit of achieving greater equality.

7. Limitations

While this research offers valuable insights into the conditions under which income inequality decreased in Latin America, several limitations that affect the interpretation and generalizability of the findings should be acknowledged.

The first limitation relates to the calibration of conditions, which presents a concern for construct validity and interpretation. In determining the anchor points, the average levels over the period 2000 to 2020 were used, which masks any within-period fluctuations that countries experienced. For example, on average, there was a 0% change in income inequality levels in Colombia between 2000 and 2020. As such, the country was used to calibrate the anchor point for full non-membership. However, within the period, Colombia did experience both increases and decreases in income inequality levels. While the problem of masked within-period fluctuations applies to all countries, Colombia is somewhat of an outlier, as nearly all countries experienced declining trends in inequality levels, with only slight within-period fluctuations. Furthermore, the use of single-year values at the start and end of the period to calculate the percentage change in Gini coefficient increased sensitivity to outliers such as Colombia and Peru, which had sharp increases in inequality towards the end of the period.

Second, for the calibration of conditions, there were no established theoretical or empirical models available to determine the anchor points. As a result, calibration was done in the same manner as Sanchez-Ancochea (2020), based on the regional distribution of values, rather than normative benchmarks. While this is a common strategy for fsQCA, the absence of external ideal points for calibration limits the comparability with other studies. Using benchmarks set by international organizations could, in principle, lead to more meaningful calibration. However, because this study focused on averages over 20 years, external benchmarks, which change over time, would have been difficult to apply accurately and consistently. Their time-bound nature would have resulted in discrepancies when comparing them with long-term averages, leading to distorted calibration thresholds. Furthermore, calibrating based on the regional distribution reflected relative, rather than absolute rankings. This meant that a country could have full set-membership (e.g., high formality) compared to other Latin American countries, even if the value would be considered modest (e.g., low formality) when compared to, for example, European countries.

A limitation related to this was the difficulty in determining what constituted “significant” inequality reduction to assign anchor points. Because inequality levels and the degree of inequality decreases varied across countries depending on their initial levels, there

was no benchmark for establishing significance. As such, the calibration of the outcome relied on the authors' judgement, guided by the regional distribution of changes in the Gini coefficient. While this is methodologically defensible in QCA, it did introduce a degree of subjectivity into the analysis.

Additionally, limited diversity proved to be an issue, as it restricted the scope of the configurational analysis. Due to the limited number of cases (15), not all logically possible combinations of conditions were observed. This not only reduced the number of empirically meaningful pathways but also led to the exclusion of the Dominican Republic, El Salvador, and Peru from the truth table due to their very low set-membership across conditions. Having fifteen cases also limited the number of conditions that could be used in the analysis. While adding conditions may have provided valuable insights, their inclusion would have further reduced the number of observable combinations. Linked to this is the fact that, while the conditions were derived from existing literature, they do not capture all possible conditions that may contribute to inequality reduction.

Finally, while fsQCA is well-suited to analyze complex causality, it cannot fully account for all contextual and historical factors affecting income inequality levels. Factors such as economic complexity, external shocks, democratization, etc., which were deliberately excluded from the analysis, may have played important roles in shaping inequality outcomes. Therefore, while much effort was put into identifying relevant causal factors and proper calibration, the results should not be treated as exhaustive explanations, but rather as foundations for future research.

8. Recommendations

Following the limitations identified in this study, several possibilities for future research are recommended to enhance the understanding of income inequality reduction in Latin America, as well as other regions.

First, future research could improve on the calibration of conditions by using dynamic or less time-sensitive benchmarks. While this study focused on average values over 20 years, future research could explore shorter timeframes or use justified within-case periods to capture more nuanced trends of inequality reduction. One approach that can be employed is Trajectory-Based Qualitative Comparative Analysis (TJ-QCA). This approach conceptualizes configurations as part of evolving development stages within cases. Multiple configurations can then represent case development, each corresponding to a specific stage in a country's trajectory (Pagliarin & Gerrits, 2020). This would enable researchers to trace within-case changes over time and analyze the reductions of income inequality as a dynamic process rather than a fixed outcome.

Second, future research could include different conditions in the analysis. While this study was constrained in the number of conditions that could be used, future studies could include conditions such as technological advancement, trade direction, economic complexity, and tax policies to gain a more comprehensive understanding of the underlying drivers of inequality. Furthermore, the issue of limited diversity can be addressed by expanding the number of cases included in the analysis. Instead of treating each country as a single case, future studies could divide countries into multiple cases based on their configurational trajectories within a TJ-QCA (Pagliarin & Gerrits, 2020). Another possibility would be to expand the sample to include other developing regions or countries, which would allow for greater cross-case comparability. A cross-regional fsQCA could help determine if the causal pathways identified in Latin America are also sufficient in other contexts, such as Southeast Asia or Sub-Saharan Africa.

Third, future studies could employ a mixed-method design, combining fsQCA with in-depth case studies. This would allow for a deeper understanding of how specific policy decisions were made and implemented in countries that followed the identified pathways. Case studies could also shed light on deviant or contradictory cases, such as the case of Brazil in this analysis, to account for the contextual dependencies of configurations.

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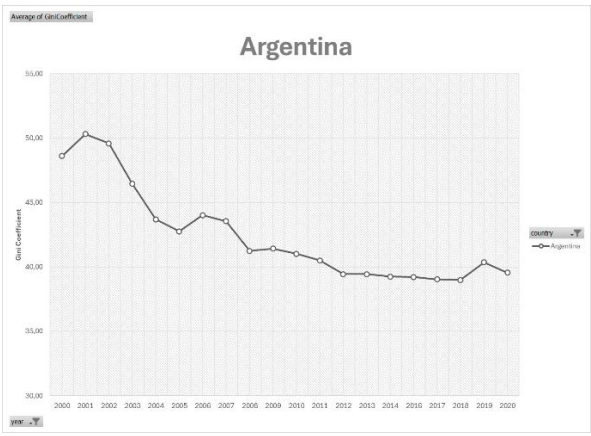
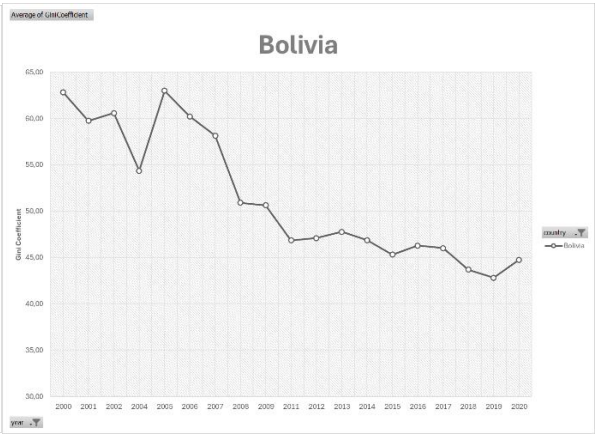
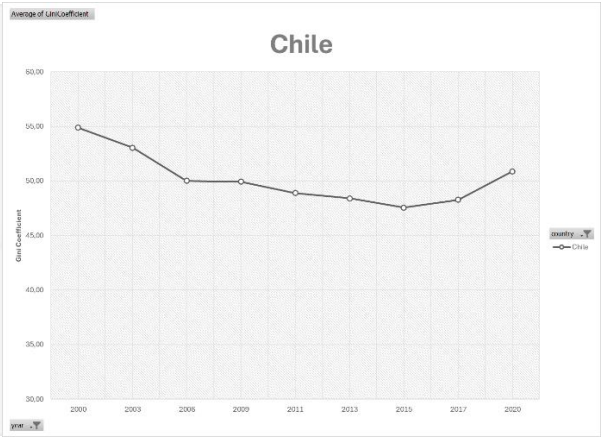
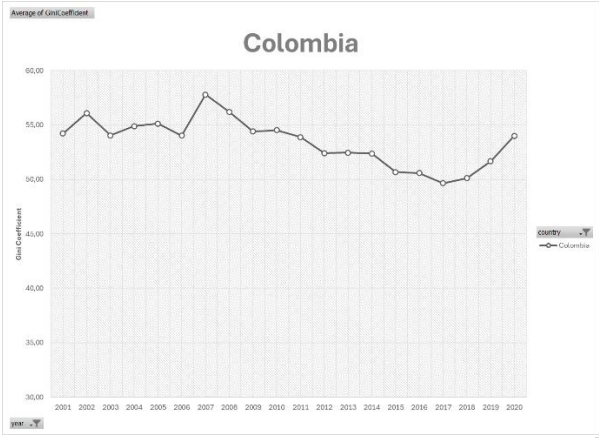
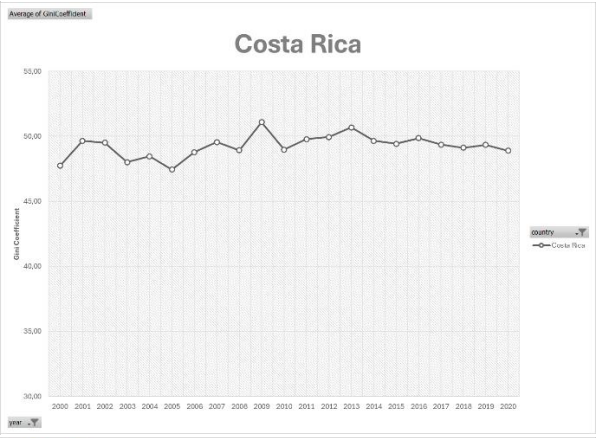
Appendix A: Income Inequality Trends per Country

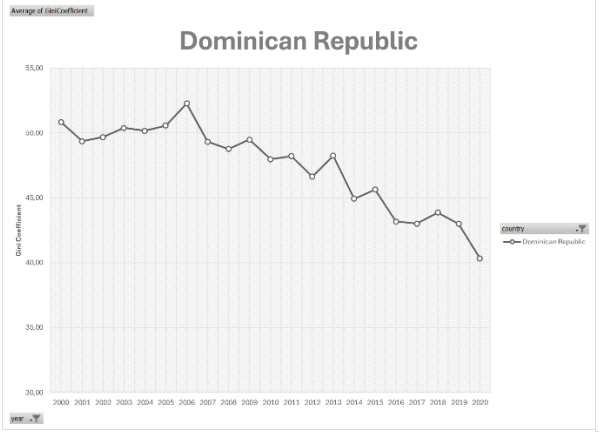


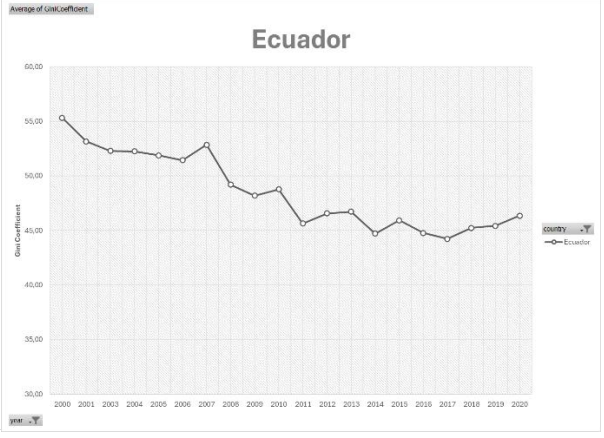


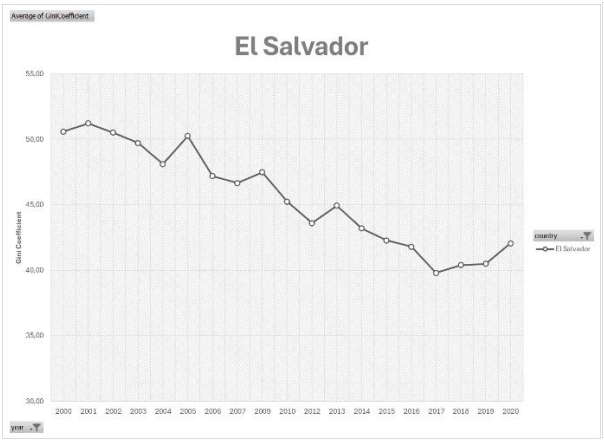











Average of GiniCoefficient
El Salvador
Gini Coefficient
55,00
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45,00
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35,00
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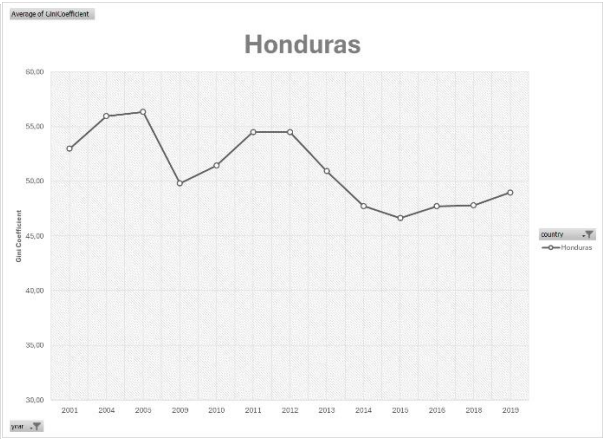
2000 2001 2002 2003 2004 2005 2006 2007 2009 2010 2012 2013 2014 2015 2016 2017 2018 2019 2020
year
country
El Salvador


Average of GiniCoefficient
Honduras
Gini Coefficient
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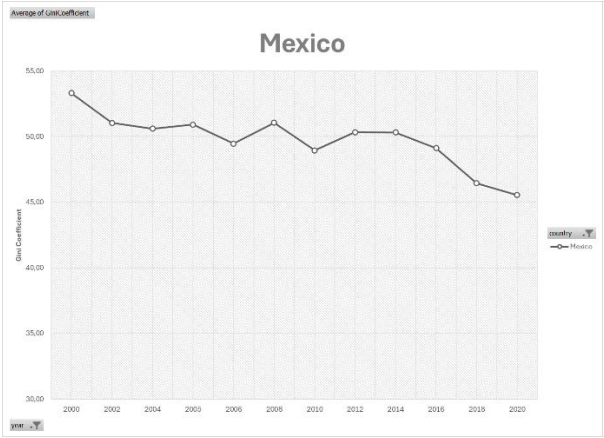
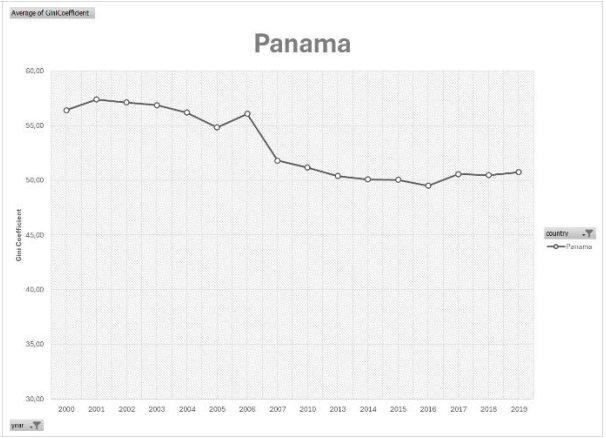
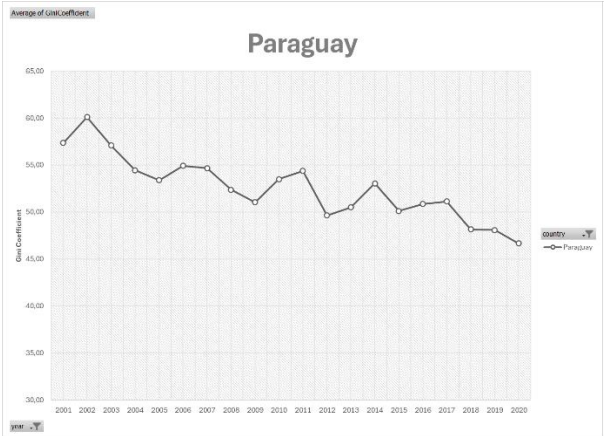
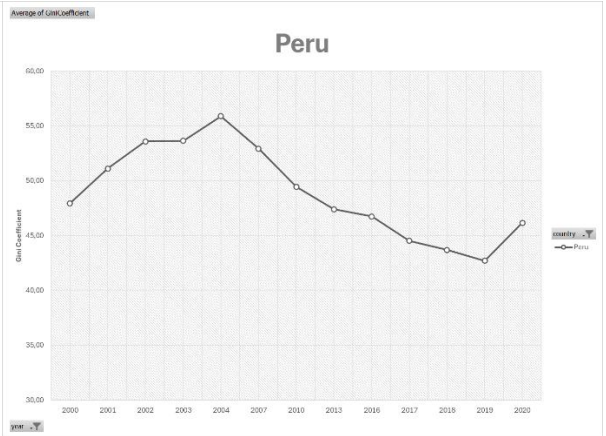
Honduras


Average of GiniCoefficient
Mexico
Gini Coefficient
55,00
50,00
45,00
40,00
35,00
30,00
2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020
year
country
Mexico


Average of GiniCoefficient
Panama
Gini Coefficient
60,00
55,00
50,00
45,00
40,00
35,00
30,00
2000 2001 2002 2003 2004 2005 2006 2007 2010 2013 2014 2015 2016 2017 2018 2019
year
country
Panama


Average of GiniCoefficient
Paraguay
Gini Coefficient
65,00
60,00
55,00
50,00
45,00
40,00
35,00
30,00
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
year
country
Paraguay


Average of GiniCoefficient
Peru
Gini Coefficient
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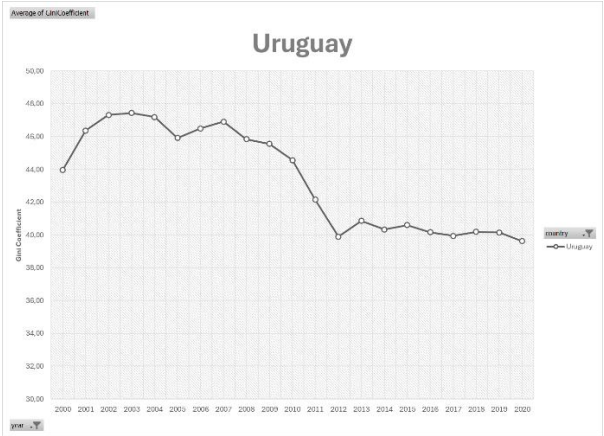
55,00
50,00
45,00
40,00
35,00
30,00
2000 2001 2002 2003 2004 2007 2010 2013 2016 2017 2018 2019 2020
year
country
Peru


Average of GiniCoefficient
Uruguay
Gini Coefficient
50,00
48,00
46,00
44,00
42,00
40,00
38,00
36,00
34,00
32,00
30,00
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
year
country
Uruguay

Appendix B: Calibration of Outcome

Income Inequality Reduction

Data was sourced from the World Income Inequality Database (WIID), downloaded as a CSV file, containing global income inequality statistics. The data was imported into Excel and transformed to capture only the data relevant for this research. The table below presents the Gini coefficient for each country per year, spanning the period from 2000 to 2020.

Table 11

Gini Coefficients per country

Years	Argentina	Bolivia	Brazil	Chile	Colombia	Costa Rica	Dominican Republic	Ecuador	El Salvador	Honduras	Mexico	Panama	Paraguay	Peru	Uruguay
2000	48,60	62,81		54,88		47,74	50,85	55,31	50,58		53,31	56,40		47,94	43,97
2001	50,31	59,75	53,37		54,23	49,65	49,37	53,16	51,21	52,99		57,38	57,34	51,11	46,36
2002	49,58	60,58	52,72		56,09	49,51	49,68		50,51		51,03	57,13	60,12	53,58	47,32
2003	46,46		51,96	53,03	54,05	48,01	50,39	52,29	49,71			56,88	57,07	53,64	47,43
2004	43,69	54,35	51,17		54,90	48,46	50,17	52,24	48,10	55,97	50,59	56,19	54,45	55,88	47,20
2005	42,75	62,99	51,07		55,14	47,45	50,57	51,87	50,24	56,34	50,91	54,84	53,39		45,91
2006	44,01	60,21	52,29	50,00	54,03	48,78	52,27	51,43	47,18		49,45	56,07	54,92		46,49
2007	43,54	58,13			57,80	49,56	49,32	52,85	46,66			51,81	54,66	52,93	46,91
2008	41,24	50,89			56,20	48,92	48,76	49,20			51,06		52,36		45,84
2009	41,42	50,64	50,28	49,92	54,41	51,09	49,50	48,18	47,48	49,81			51,04		45,55
2010	41,02				54,53	48,97	47,97	48,77	45,23	51,44	48,94	51,16	53,51	49,44	44,56
2011	40,49	46,85	49,18	48,88	53,88	49,77	48,21	45,64		54,51			54,37		42,15
2012	39,44	47,09			52,41	49,94	46,64	46,56	43,59	54,50	50,33		49,64		39,90
2013	39,43	47,76	48,21	48,40	52,45	50,68	48,24	46,72	44,94	50,92		50,39	50,49	47,40	40,86
2014	39,24	46,85			52,38	49,66	44,93	44,70	43,18	47,75	50,30	50,07	53,04		40,33
2015		45,30		47,54	50,67	49,42	45,63	45,93	42,26	46,64		50,05	50,12		40,60
2016	39,20	46,28	49,11		50,57	49,86	43,18	44,76	41,78	47,72	49,12	49,50	50,85	46,73	40,17
2017	39,03	46,01	50,40	48,27	49,65	49,36	43,00	44,21	39,79			50,56	51,13	44,51	39,95
2018	38,98	43,68	50,24		50,11	49,12	43,87	45,22	40,38	47,79	46,44	50,47	48,16	43,67	40,19
2019	40,35	42,80	50,39		51,67	49,35	43,00	45,42	40,48	48,98		50,73	48,07	42,68	40,15
2020	39,54	44,75	47,80	50,88	54,01	48,89	40,33	46,35	42,04		45,54		46,66	46,15	39,62
Grand Total	**42,42**	**51,46**	**50,58**	**50,20**	**53,46**	**49,25**	**47,42**	**48,54**	**45,54**	**51,18**	**49,75**	**53,10**	**52,57**	**48,90**	**43,40**

Table 12 shows the average reduction in Gini coefficients per country from 2000 to 2020. It also shows the fuzzy scores that were manually assigned based on a four-value fuzzy set with corresponding label, as well as the absolute change in Gini coefficient over the period.

Table 12

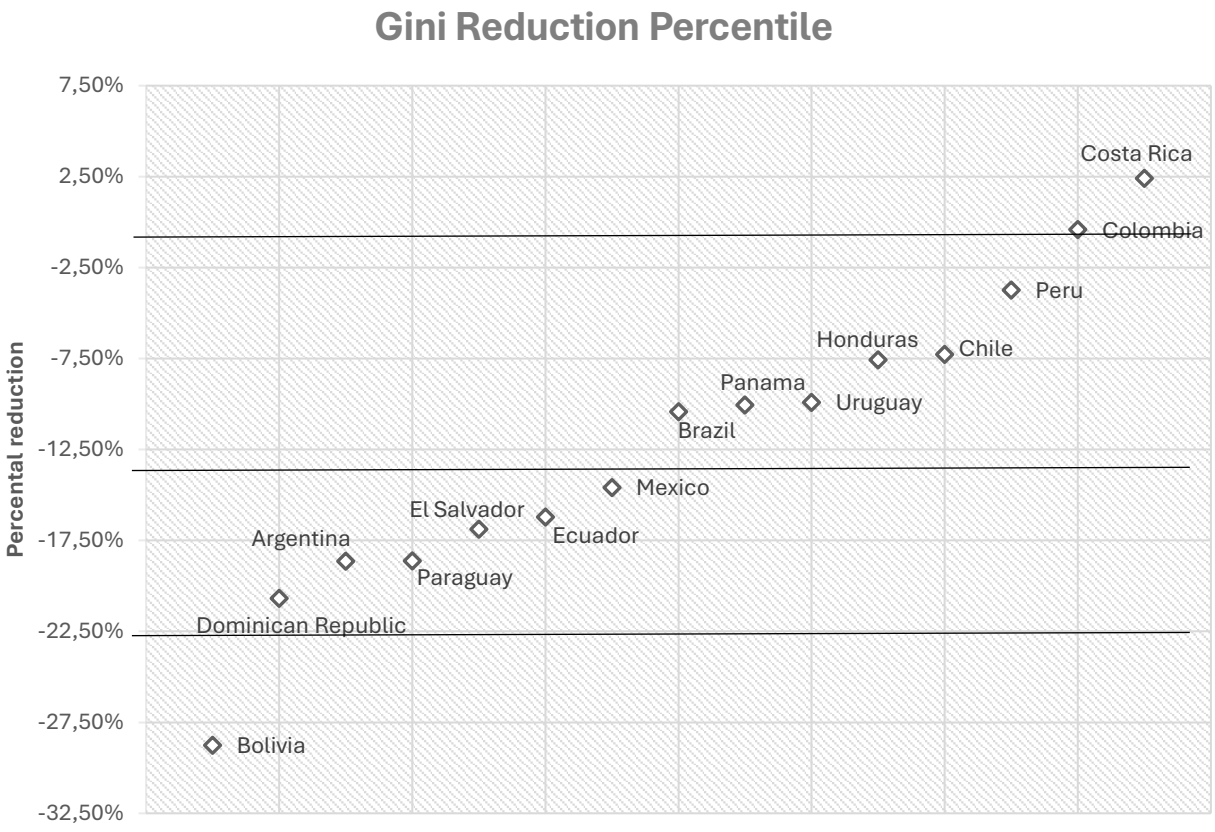
Gini reductions and fuzzy scores

Country	Gini reduction percentage	Manually Assigned Fuzzy Score	Label	Gini reduction absolute
Argentina	19	0,67	Moderate Reduction	-9,06
Bolivia	29	1	Significant Reduction	-18,06
Brazil	10	0,33	Limited reduction	-5,57
Chile	7	0,33	Limited reduction	-3,99
Colombia	0	0	Increase in inequality	-0,22
Costa Rica	-2	0	Increase in inequality	1,15
Dominican Republic	21	1	Significant Reduction	-10,51
Ecuador	16	0,67	Moderate Reduction	-8,97
El Salvador	17	0,67	Moderate Reduction	-8,54
Honduras	8	0,33	Limited reduction	-4,01
Mexico	15	0,67	Moderate Reduction	-7,78
Panama	10	0,33	Limited reduction	-5,67
Paraguay	19	0,67	Moderate Reduction	-10,68
Peru	4	0,33	Limited reduction	-1,79
Uruguay	10	0,33	Limited reduction	-4,35

Figure 1 shows the regional distribution of income inequality reduction and the determined anchor points.

Figure 1

Regional Distribution Percentage Gini Coefficient Reduction



Appendix C: Calibration of Conditions

Condition 1: Labor Market Formalization

Table 13 presents the labor market formality rates per country from 2000 to 2020. The average formality rate was calculated by taking the inverse of the informality rate (i.e., 1 - informality rate).

Table 13

Labor Market Formality Rates Per Country

Average of Formality Rate	Column Label														
	Argentina	Bolivia	Brazil	Chile	Colombia	Costa Rica	Dominican Republic	Ecuador	El Salvador	Honduras	Mexico	Panama	Paraguay	Peru	Uruguay	Grand Total
2000	48,60	28,38		60,20		50,00	9,59		30,80					9,80		33,91
2001	47,90	24,15	41,30			52,10	11,58	23,86	29,70				13,20	11,90	56,20	31,19
2002	44,10	21,35	41,10			52,10	8,99		30,90		34,19		11,80	12,40	54,90	31,18
2003	43,50		42,00	60,80		52,50	10,20	25,33	30,70		33,80	41,92	11,90	11,90	53,20	34,81
2004	39,60		43,10			53,70	10,58	24,80	30,30		34,02		10,50	8,93	52,00	30,75
2005	41,19	4,18	43,90			53,00	29,53	25,32	29,60				14,00	16,31	54,10	31,11
2006	43,98	3,85	45,00	63,30	28,60	53,50	34,62	25,15	30,70	25,74		44,04	11,90	18,04	55,64	34,58
2007	50,10	15,74	47,10		32,92	55,30	42,30	25,84	30,50	27,83		45,92	15,00	20,76	55,96	35,79
2008	48,86	14,06	49,10		33,16	57,20	42,01	27,41	30,00	20,29	41,21	48,99	22,31	21,16	57,23	36,64
2009	49,49	15,84	50,25	62,30	31,24	57,80	44,99	29,71	27,60	21,08	39,87	47,64	22,44	22,94	57,64	38,72
2010	50,66			57,90	31,93	62,15	46,06	33,20	28,40	19,52	39,48		23,25	23,15	59,10	39,57
2011	51,50	16,64	53,91	60,13	32,63	62,93	43,83	36,57		17,80	39,69	53,45	26,10	24,42	61,65	41,52
2012	51,53	17,87	54,86	61,53	33,05	60,89	43,74	38,76		16,06	39,66	53,03	25,76	29,30	63,80	42,13
2013	51,95	19,57	55,86	61,54	34,96	59,13	44,10	39,98		17,28	40,31	52,14	28,52	30,23	64,65	42,87
2014	52,56	14,78	55,16	61,10	36,57	58,78	45,76	42,07	30,66	21,00	41,30	51,98	29,87	31,40	76,36	43,29
2015		15,91	54,96	60,99	36,79	57,95	43,73	41,75	30,95	19,15	41,28	52,15	29,30	30,78	76,12	42,27
2016		23,75	63,09	60,45	37,58	59,84	43,67	38,98	30,56	20,17	41,91	51,48	27,84	31,94	75,46	43,34
2017	51,44	20,88	61,81	35,93	37,81	59,27	42,83	37,44	29,84	17,39	42,14	50,60	30,00	31,94	75,89	41,68
2018	51,27	19,30	61,31	71,87	37,58	59,08	43,21	37,34	31,51		42,38	48,64	29,70	31,55	76,05	45,77
2019	50,08	18,51	61,09	71,93	38,05	58,15	45,72	36,50	30,87		42,39	47,20	31,08	31,64	75,86	45,65
2020	53,02		63,27	74,17		59,98	45,55		31,23		44,33	43,86		29,86	78,38	52,37
Grand Total	**48,49**	**17,34**	**52,01**	**61,61**	**34,49**	**56,92**	**34,89**	**32,78**	**30,27**	**20,28**	**39,87**	**48,87**	**21,81**	**22,87**	**64,01**	**39,48**

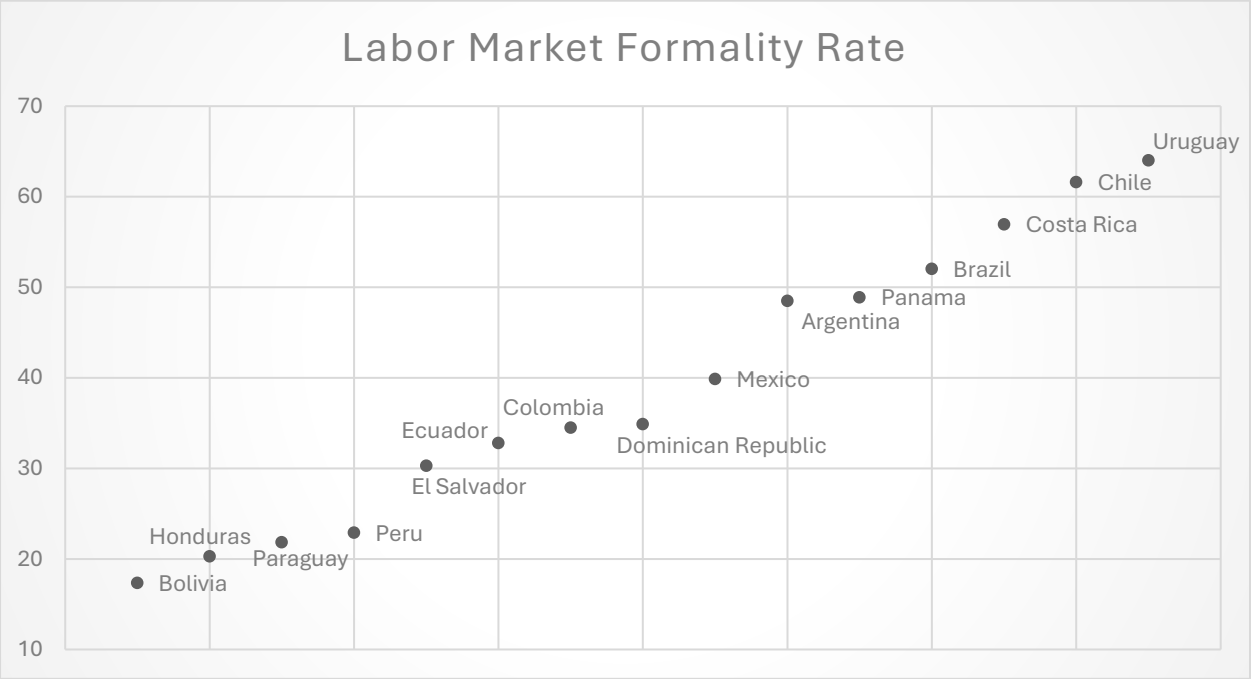
Table 14

Average Labor Market Formality and Informality Rates

Country	Average Formality rate	Average Informality Rate
Argentina	48	51
Bolivia	17	83
Brazil	52	46
Chile	62	37
Colombia	34	64
Costa Rica	57	42
Dominican Republic	35	64
Ecuador	33	67
El Salvador	30	69
Honduras	20	80
Mexico	40	59
Panama	49	52
Paraguay	22	76
Peru	23	76
Uruguay	64	35

Figure 2

Regional Distribution of Average Labor Market Formality Rates



Condition 2: Share of Skilled Workers

The raw data represented the percentage of the labor force with an intermediate (secondary) or advanced (tertiary) level of education over the relevant period. Data from the ILO included the labor force by age, sex, and education. However, this data showed the number (in thousands) of people in the workforce. For this research, only those with secondary (intermediate) and tertiary (advanced) education were needed. All calculations were done in Excel. First, the column for the different levels of education was separated. Next, the intermediate and advanced levels were added to form the column “Skilled Workers”. The data for the “education level total” showed some inconsistencies, with extremely low values sometimes. To account for this, a control column was set up to calculate the size of the labor force. The total size of the labor force was calculated by summing all education levels (advanced, intermediate, basic, and less than basic). These values were compared with the control column and, in most cases, were very close. In cases where the first column showed an unreliable value, the calculated value was used. The following step was to calculate the share of skilled workers in the labor force. This was done by dividing the total number of skilled workers by the total number of people in the labor force, multiplied by 100. This led to the following table, showing the share of skilled workers per year for each country.

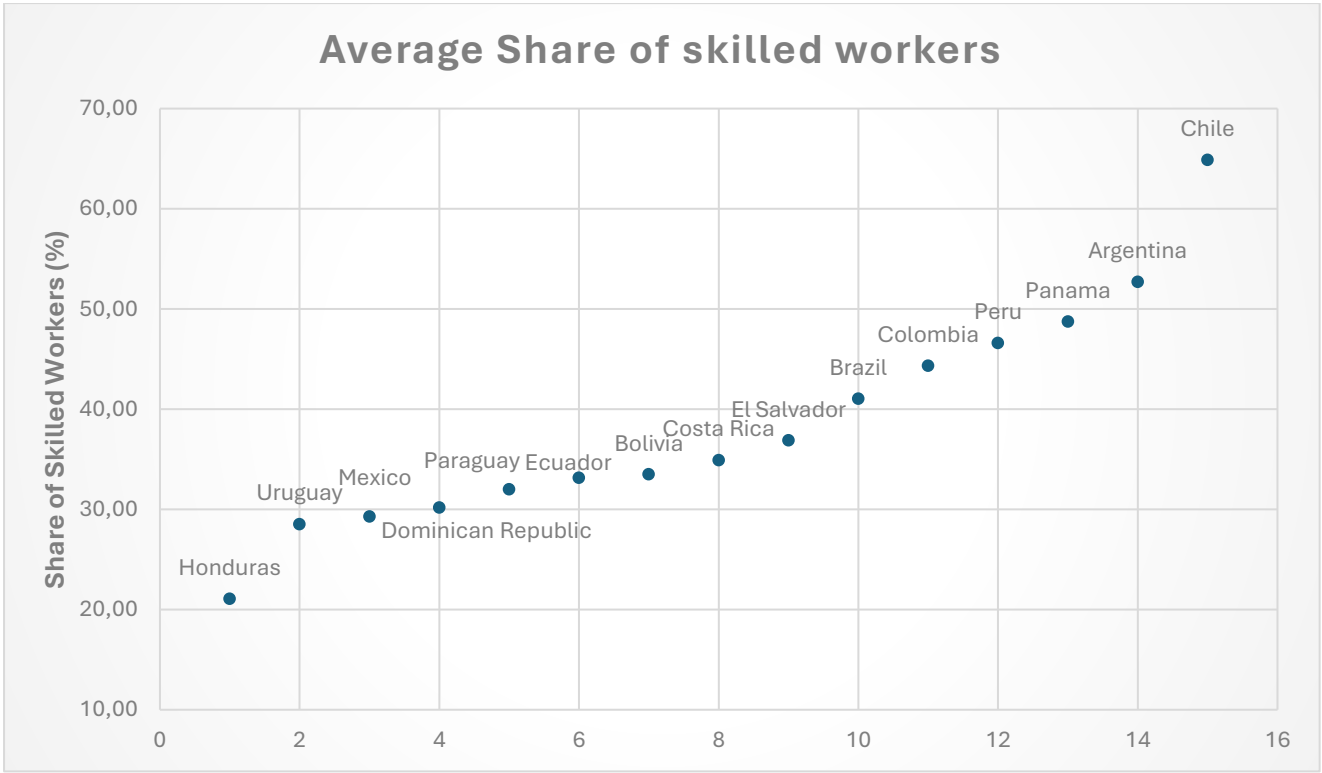
Table 15

Average share of skilled labor per country

Average of Share of skilled labor	Countries														
Year	Argentina	Bolivia	Brazil	Chile	Colombia	Costa Rica	Dominican Republic	Ecuador	El Salvador	Honduras	Mexico	Panama	Paraguay	Peru	Uruguay	Grand Total
2000		0,00		53,19		31,78	18,78	43,79			0,00			43,67	32,20	27,93
2001		25,68	22,43			31,09	10,57	45,31			31,18		18,78	45,01	11,34	26,82
2002	57,87	23,31	30,70		16,79	36,33	29,46	0,00			25,34		22,02	4,17	36,28	25,66
2003	59,28		7,77	56,71	40,03	38,20	31,39	19,05			26,47	52,78	25,80	44,71	36,39	36,55
2004	36,63	31,23	33,73		42,01	38,80	32,00	19,10			27,39	53,70	24,64	19,12	38,66	33,08
2005	52,36	21,50	35,45		39,88	33,89	32,89	19,99		16,94	14,93	72,35	28,52	49,04	38,43	35,09
2006	53,96	30,95	41,99	74,12		39,27	34,00	20,14		17,82	15,57	54,43	29,38	50,37	37,64	38,43
2007		33,34	39,17	74,65	47,64	40,66	24,47	36,88		14,85	32,43	54,01	21,25	36,34	37,00	37,90
2008	22,82	33,79	41,33	75,00	48,95	42,06	36,23	24,31		19,62	3,27	30,47	32,95	53,46	28,99	35,23
2009	39,82	35,75	43,23	62,75	47,92	43,39	37,73	25,26		19,52	34,02	48,00	34,64	22,02	39,54	38,11
2010	58,93			50,56	49,21	38,98	16,04	40,36	33,22	21,48	34,67	48,41	33,60	54,79	29,59	39,22
2011	37,44	35,68	81,47	65,08	50,47	16,77	28,58	19,33	33,22	22,61	35,75	50,22	38,67	55,78	24,23	39,69
2012	60,20	28,69	15,61	66,64	51,29	34,56	29,82	43,95	34,75	18,19	36,48	50,53	37,46	38,14	24,36	38,04
2013	61,37	42,77	16,67	67,73	29,44	3,70	42,77	43,95	36,19	23,81	16,31	27,48	22,56	57,88	24,55	34,48
2014	42,02	56,03	17,05	68,54	54,57	40,53	42,90	44,53	31,48	25,43	37,49	51,16	42,54	58,15	13,95	41,76
2015		44,43	29,14	69,64	55,51	38,89	43,31	44,77	37,97	26,06	37,84	19,38	44,69	41,08	25,51	39,87
2016		28,09	61,02	70,45	57,17	40,00	17,08	45,96	38,49	28,35	38,87	39,05	42,35	58,74	25,16	42,20
2017	63,32	44,98	62,63	24,01	58,06	39,53	38,58	4,65	38,25	25,64	39,97	53,69	43,79	60,05	25,57	41,51
2018	65,15	24,97	64,38	73,49	32,07	38,18	28,06	47,27	36,33	26,55	41,30	54,10		61,14	25,22	44,16
2019	66,06	44,36	66,08	74,67	32,55	22,65	29,93	74,03	41,99	9,03	41,87	54,73		61,87	15,58	45,38
2020	65,68	50,33	69,28	75,39		43,57	28,98		43,54		43,63	62,33		62,61		54,53
Grand Total	**52,68**	**33,47**	**41,01**	**64,86**	**44,33**	**34,90**	**30,17**	**33,13**	**36,86**	**21,06**	**29,28**	**48,71**	**31,98**	**46,58**	**28,51**	**38,27**

Figure 3

Regional Distribution of Average Share of Skilled Labor



Condition 3: Trade Openness

Table 16 presents the percentage of trade openness for each country from 2000 to 2020.

Table 16

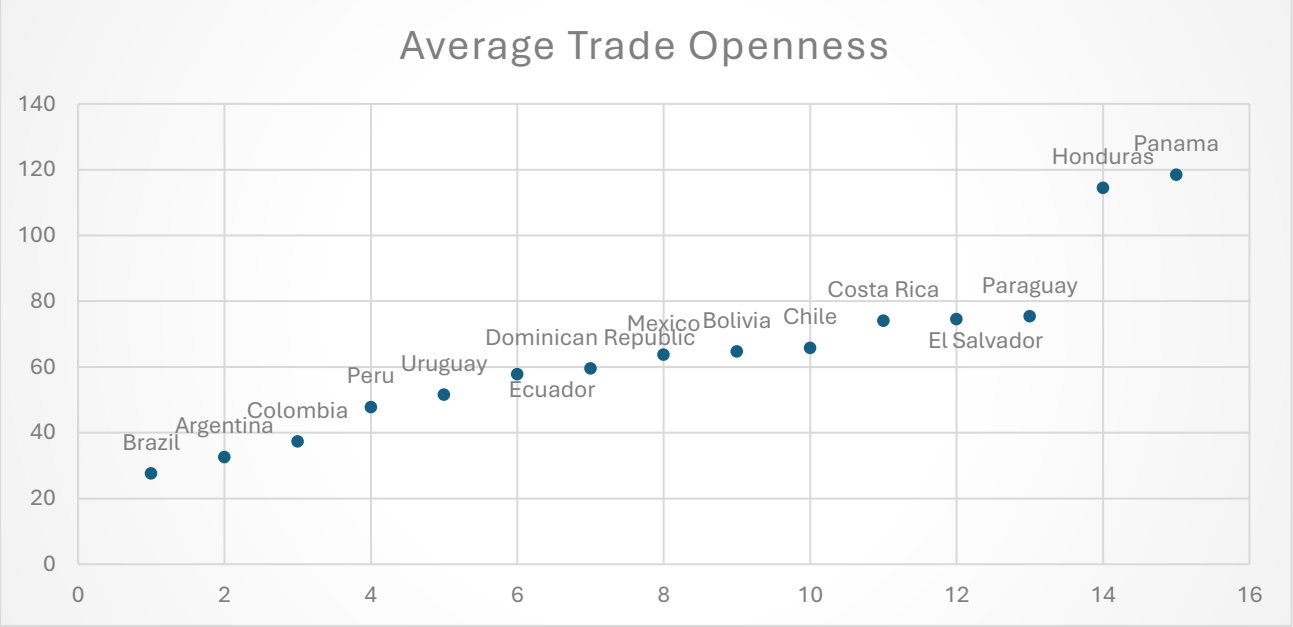
Trade openness Levels per country

Average of Trade Countries															
Year	Argentina	Bolivia	Brazil	Chile	Colombia	Costa Rica	Dominican Republic	Ecuador	El Salvador	Honduras	Mexico	Panama	Paraguay	Peru	Uruguay
2000	22,62	45,60	22,64	58,71	32,67	86,52	79,30	65,40	68,71	120,39	49,91	139,20	78,64	35,54	36,71
2001	21,85	45,23	26,94	62,14	33,90	80,85	70,51	56,13	65,89	115,94	44,74	135,58	72,61	35,06	36,31
2002	41,75	49,35	27,62	62,48	32,98	80,41	68,72	54,80	65,92	118,00	45,21	126,02	79,44	35,25	40,03
2003	40,64	51,97	28,14	65,69	36,52	83,33	84,45	52,36	68,24	122,25	48,70	117,27	81,13	37,62	51,76
2004	40,69	57,46	29,68	69,89	35,86	85,26	81,35	56,07	69,78	135,46	52,04	124,76	80,10	41,94	61,48
2005	40,55	67,64	27,09	72,06	37,42	89,22	61,65	61,96	69,72	136,49	52,56	139,21	85,02	47,36	58,88
2006	40,43	74,54	26,04	73,71	39,64	89,81	63,77	65,84	73,46	133,13	54,48	141,47	84,73	51,79	61,97
2007	40,95	76,06	25,29	76,98	37,10	86,46	61,95	68,85	77,62	135,07	55,26	148,67	79,00	55,69	59,21
2008	40,40	82,87	27,26	80,68	39,17	86,40	61,39	74,59	80,67	135,75	56,37	164,59	80,78	58,43	65,21
2009	34,06	68,63	22,11	66,69	35,16	69,76	50,61	57,35	66,07	96,91	54,59	137,05	70,84	48,11	53,39
2010	34,97	75,51	22,77	69,72	34,26	67,51	56,00	65,78	73,54	109,44	59,27	145,45	81,26	51,67	51,70
2011	35,21	82,48	23,93	72,48	39,47	68,64	58,99	70,04	79,28	122,22	62,16	158,21	78,49	55,99	53,25
2012	30,53	84,95	25,11	68,16	38,84	67,05	58,39	67,00	77,65	121,19	64,26	153,21	74,76	52,62	55,06
2013	29,33	81,23	25,79	65,14	37,99	64,07	56,68	63,43	80,45	116,31	62,69	133,07	73,37	49,79	49,72
2014	28,41	85,26	24,69	65,63	37,49	65,19	55,50	61,43	78,10	112,98	64,10	114,97	69,08	46,85	49,09
2015	22,49	67,93	26,95	59,35	38,36	60,75	52,17	47,83	76,56	107,26	70,41	96,58	66,92	45,16	45,33
2016	26,09	56,40	24,53	56,06	36,20	62,18	51,59	40,53	72,82	99,82	75,69	84,40	67,76	45,39	48,47
2017	25,29	56,70	24,32	56,03	35,28	65,07	50,23	43,62	74,30	101,81	76,95	84,05	71,08	47,51	46,38
2018	30,76	57,11	28,88	58,18	36,53	66,95	52,06	48,01	75,63	103,55	80,21	86,13	72,07	48,63	47,79
2019	32,63	56,40	28,89	57,61	37,56	65,76	51,01	48,08	76,04	99,46	77,46	80,43	71,22	46,94	49,74
2020	30,20	45,50	32,30	58,18	34,06	60,14	44,29	43,99	66,46	88,00	76,85	68,70	62,76	44,25	46,69
2021	33,08	59,02	37,66	64,84	40,06	70,78	52,73	53,15	81,85	103,37	83,07	80,13	69,74	55,27	56,82
2022	31,55	67,76	38,82	74,99	48,07	82,23	54,23	61,62	88,15	112,70	88,39	93,69	73,74	57,25	58,83
2023	26,64	56,46	33,85	60,97	40,49	72,47	49,62	57,85	80,92	97,95	73,16	89,53	82,99	50,91	51,73
Grand Total	**32,55**	**64,67**	**27,55**	**65,68**	**37,30**	**74,03**	**59,47**	**57,74**	**74,49**	**114,39**	**63,69**	**118,43**	**75,31**	**47,71**	**51,48**

Figure 4 shows the regional distribution of average trade openness levels from 2000 to 2020.

Figure 4

Regional distribution of average trade openness levels



Condition 4: Left-Leaning Governments in the Executive

Table 17 shows when each country had a left-leaning government in the executive. A 1 indicates that there was a left-leaning government in power, while a 0 indicates there was either a centrist or right-leaning government in power. The next table calculates the percentage of years that a left-leaning government was in power by dividing the sum value from the first table by 21 (years). Figure 5 shows the regional distribution of the share of left-leaning governments in power.

Table 17

Presence of Left-Leaning Government in the Executive

Sum of Left Leaning Government	Countries														
Year	Argentina	Bolivia	Brazil	Chile	Colombia	Costa Rica	Dominican Republic	Ecuador	El Salvador	Honduras	Mexico	Panama	Paraguay	Peru	Uruguay
1999	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2001	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2002	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2003	1	0	1	1	0	0	0	1	0	0	0	0	0	0	0
2004	1	0	1	1	0	0	0	1	0	0	0	1	0	0	0
2005	1	0	1	1	0	0	0	0	0	0	0	1	0	0	1
2006	1	1	1	1	0	1	0	0	0	1	0	1	0	1	1
2007	1	1	1	1	0	1	0	1	0	1	0	1	0	1	1
2008	1	1	1	1	0	1	0	1	0	1	0	1	1	1	1
2009	1	1	1	1	0	1	0	1	1	0	0	0	1	1	1
2010	1	1	1	0	0	1	0	1	1	0	0	0	1	1	1
2011	1	1	1	0	0	1	0	1	1	0	0	0	1	1	1
2012	1	1	1	0	0	1	0	1	1	0	0	0	0	1	1
2013	1	1	1	0	0	1	0	1	1	0	0	0	0	1	1
2014	1	1	1	1	0	1	0	1	1	0	0	0	0	1	1
2015	0	1	1	1	0	1	0	1	1	0	0	0	0	1	1
2016	0	1	0	1	0	1	0	1	1	0	0	0	0	0	1
2017	0	1	0	1	0	1	0	1	1	0	0	0	0	0	1
2018	0	1	0	0	0	1	0	1	1	0	1	0	0	0	1
2019	1	0	0	0	0	1	0	1	0	0	1	1	0	0	1
Grand Total	15	13	13	15	0	14	0	15	10	3	2	6	4	10	15

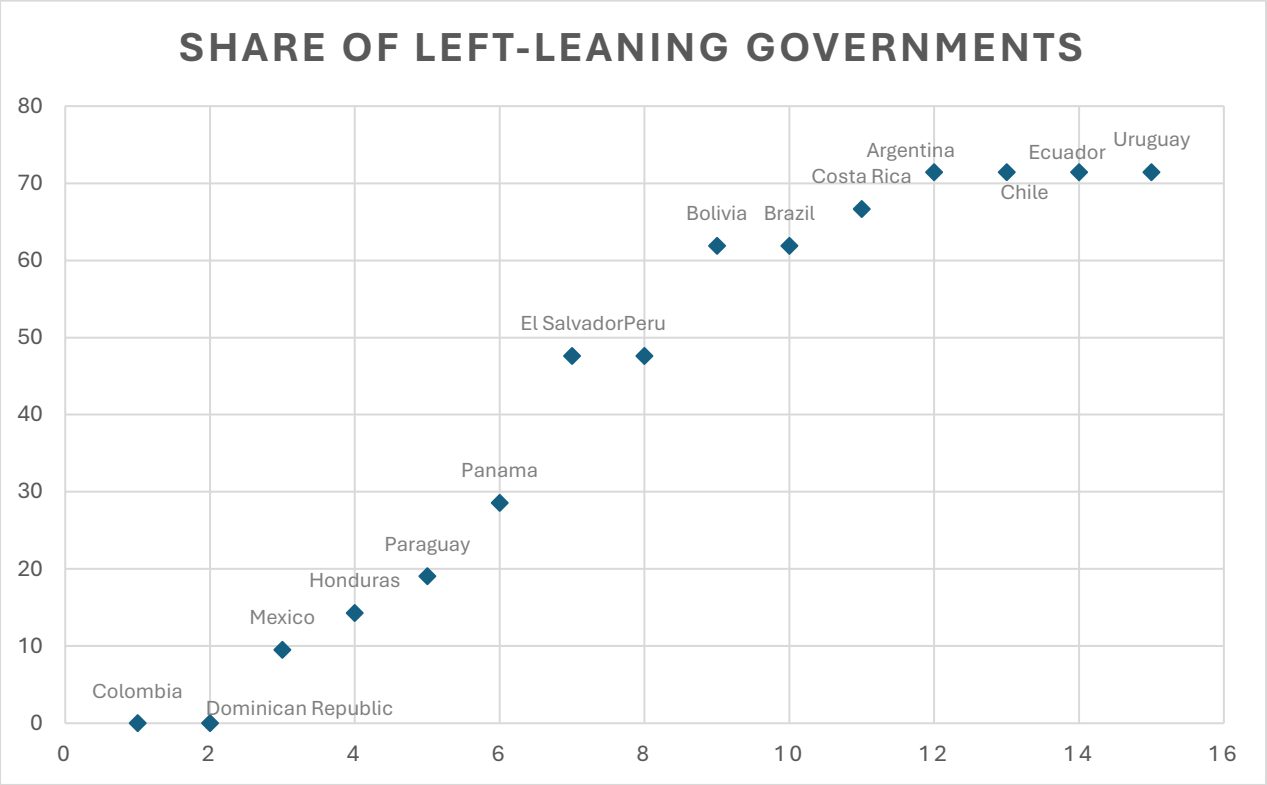
Table 18

Percentage of left-leaning governments in the executive per country

Country	Years of Left leaning government (1999-2020)	Percentage of Left leaning governments
Argentina	15	71
Bolivia	13	62
Brazil	13	62
Chile	15	71
Colombia	0	0
Costa Rica	14	67
Dominican Republic	0	0
Ecuador	15	71
El Salvador	10	48
Honduras	3	14
Mexico	2	10
Panama	6	29
Paraguay	4	19
Peru	10	48
Uruguay	15	71

Figure 5

Regional distribution share of left-leaning government in the executive



Appendix D: Calibrated Sets and Fuzzy Scores

Table 19 presents the calibrated conditions and the fuzzy scores that were assigned using fsQCA software version 4.1. Only the condition Income Inequality Reduction (IIR) was assigned manually (see Appendix B).

Table 19

Fuzzy scores per calibrated condition

		IIR		LMF		SSW		TRO		LLG	
No.	Country	Gini Reduction (%)	Fuzzy Score	FORMRATE	Fuzzy Score	SKILLSHARE	Fuzzy Score	TRADEOPE	Fuzzy Score	LEFTGOV	Fuzzy Score
1	Argentina	19	0,67	48	0,65	53	0,83	33	0,07	71	0,95
2	Bolivia	29	1	17	0,00	33	0,27	65	0,75	62	0,86
3	Brazil	10	0,33	52	0,80	41	0,56	28	0,05	62	0,86
4	Chile	7	0,33	62	0,97	65	0,95	66	0,79	71	0,95
5	Colombia	0	0	34	0,10	44	0,64	37	0,11	0	0,05
6	Costa Rica	-2	0	57	0,92	35	0,34	74	0,94	67	0,92
7	Dominican Republic	21	1	35	0,12	30	0,18	59	0,50	0	0,05
8	Ecuador	16	0,67	33	0,08	33	0,27	58	0,48	71	0,95
9	El Salvador	17	0,67	30	0,05	37	0,42	74	0,94	48	0,5
10	Honduras	8	0,33	20	0,01	21	0,05	114	1,00	14	0,11
11	Mexico	15	0,67	40	0,27	29	0,16	64	0,72	10	0,09
12	Panama	10	0,33	49	0,69	49	0,76	118	1,00	29	0,23
13	Paraguay	19	0,67	22	0,01	32	0,24	75	0,95	19	0,14
14	Peru	4	0,33	23	0,01	47	0,72	48	0,26	48	0,5
15	Uruguay	10	0,33	64	0,98	29	0,16	51	0,32	71	0,95

Appendix E: Output Main fsQCA

```
Analysis of Necessary Conditions

Outcome variable: INEQRED

Conditions tested:
     Consistency    Coverage
LMF  0.343792       0.445230
LLG  0.633013       0.572133
SSW  0.510231       0.570992
TRO  0.740790       0.611487
**********************
*TRUTH TABLE ANALYSIS*
**********************

File:  C:/Users/chris/Desktop/Auwerda Documenten/Master IMP/Thesis/Data/Analysis/fsQCA Income
Inequality Reduction/fsQCA Income Inequality Reduction.csv
Model: INEQRED = f(LMF, LLG, SSW, TRO)
Algorithm: Quine-McCluskey

--- COMPLEX SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.828283
                      raw       unique
                     coverage   coverage   consistency
                    ----------  ----------  ----------
~LMF*LLG*~SSW       0.43929     0.342428    0.944282
LMF*LLG*SSW*~TRO    0.223738    0.126876    0.828283
solution coverage: 0.566165
solution consistency: 0.908096


Cases with greater than 0.5 membership in term ~LMF*LLG*~SSW: Bolivia (0.73,1),
  Ecuador (0.73,0.67)
Cases with greater than 0.5 membership in term LMF*LLG*SSW*~TRO: Argentina (0.65,0.67),
  Brazil (0.56,0.33)
**********************
*TRUTH TABLE ANALYSIS*
**********************

File:  C:/Users/chris/Desktop/Auwerda Documenten/Master IMP/Thesis/Data/Analysis/fsQCA Income
Inequality Reduction/fsQCA Income Inequality Reduction.csv
Model: INEQRED = f(LMF, LLG, SSW, TRO)
Algorithm: Quine-McCluskey

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.828283
                     raw       unique
                    coverage   coverage   consistency
                   ----------  ----------  ----------
~LMF*LLG           0.488403    0.25648     0.866828
LMF*SSW*~TRO       0.242837    0.0190995   0.820276
LLG*SSW*~TRO       0.336971    0.00272852  0.786624
solution coverage: 0.61255
solution consistency: 0.819343


Cases with greater than 0.5 membership in term ~LMF*LLG: Ecuador (0.92,0.67),
  Bolivia (0.86,1)
Cases with greater than 0.5 membership in term LMF*SSW*~TRO: Argentina (0.65,0.67),
  Brazil (0.56,0.33)
Cases with greater than 0.5 membership in term LLG*SSW*~TRO: Argentina (0.83,0.67),
  Brazil (0.56,0.33)
**********************
```

```
**********************

File:  C:/Users/chris/Desktop/Auwerda Documenten/Master IMP/Thesis/Data/Analysis/fsQCA Income
Inequality Reduction/fsQCA Income Inequality Reduction.csv
Model: INEQRED = f(LMF, LLG, SSW, TRO)
Algorithm: Quine-McCluskey

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.828283
Assumptions:
                      raw       unique
                     coverage    coverage   consistency
                    ----------  ----------  ----------
~LMF*LLG*~SSW       0.43929     0.342428    0.944282
LMF*LLG*SSW*~TRO    0.223738    0.126876    0.828283
solution coverage: 0.566165
solution consistency: 0.908096


Cases with greater than 0.5 membership in term ~LMF*LLG*~SSW: Bolivia (0.73,1),
  Ecuador (0.73,0.67)
Cases with greater than 0.5 membership in term LMF*LLG*SSW*~TRO: Argentina (0.65,0.67),
  Brazil (0.56,0.33)
```

Appendix F: Output of Non-Occurrence

```
Analysis of Necessary Conditions

Outcome variable: ~INEQRED

Conditions tested:
     Consistency    Coverage
LMF  0.581488       0.787986
LLG  0.657107       0.621455
SSW  0.663626       0.777099
TRO  0.662322       0.572072
**********************
*TRUTH TABLE ANALYSIS*
**********************

File:  C:/Users/chris/Desktop/Auwerda Documenten/Master IMP/Thesis/Data/Analysis/fsQCA Income
Inequality Reduction/fsQCA Income Inequality Reduction.csv
Model: ~INEQRED = f(LMF, LLG, SSW, TRO)
Algorithm: Quine-McCluskey

--- COMPLEX SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.813131
                          raw       unique
                        coverage    coverage   consistency
                       ----------  ----------  ----------
LMF*LLG                0.494134    0.245111    0.781443
LMF*SSW*TRO            0.310301    0.0573666   0.901515
~LMF*~LLG*SSW*~TRO     0.229466    0.140809    0.846154
solution coverage: 0.707955
solution consistency: 0.800885



Cases with greater than 0.5 membership in term LMF*LLG: Chile (0.95,0.67),
  Uruguay (0.95,0.67), CostaRica (0.92,1), Brazil (0.8,0.67),
  Argentina (0.65,0.33)
Cases with greater than 0.5 membership in term LMF*SSW*TRO: Chile (0.79,0.67),
  Panama (0.69,0.67)
Cases with greater than 0.5 membership in term ~LMF*~LLG*SSW*~TRO: Colombia (0.64,1)
**********************
*TRUTH TABLE ANALYSIS*
**********************

File:  C:/Users/chris/Desktop/Auwerda Documenten/Master IMP/Thesis/Data/Analysis/fsQCA Income
Inequality Reduction/fsQCA Income Inequality Reduction.csv
Model: ~INEQRED = f(LMF, LLG, SSW, TRO)
Algorithm: Quine-McCluskey

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.813131
                   raw       unique
                 coverage    coverage   consistency
                ----------  ----------  ----------
LMF             0.581488    0.156454    0.787986
SSW             0.663626    0.112125    0.777099
~LLG*~TRO       0.284225    0.0338984   0.77305
solution coverage: 0.86832
solution consistency: 0.748314



Cases with greater than 0.5 membership in term LMF: Uruguay (0.98,0.67),
  Chile (0.97,0.67), CostaRica (0.92,1), Brazil (0.8,0.67),
  Panama (0.69,0.67), Argentina (0.65,0.33)
Cases with greater than 0.5 membership in term SSW: Chile (0.95,0.67),
  Argentina (0.83,0.33), Panama (0.76,0.67), Peru (0.72,0.67),
```

```
  Colombia (0.64,1), Brazil (0.56,0.67)
Cases with greater than 0.5 membership in term ~LLG*~TRO: Colombia (0.89,1)
**********************
*TRUTH TABLE ANALYSIS*
**********************

File:  C:/Users/chris/Desktop/Auwerda Documenten/Master IMP/Thesis/Data/Analysis/fsQCA Income
Inequality Reduction/fsQCA Income Inequality Reduction.csv
Model: ~INEQRED = f(LMF, LLG, SSW, TRO)
Algorithm: Quine-McCluskey

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.813131
Assumptions:
                          raw        unique
                        coverage    coverage   consistency
                       ----------  ----------  ----------
LMF*LLG                0.494134    0.245111    0.781443
LMF*SSW*TRO            0.310301    0.0573666   0.901515
~LMF*~LLG*SSW*~TRO     0.229466    0.140809    0.846154
solution coverage: 0.707955
solution consistency: 0.800885


Cases with greater than 0.5 membership in term LMF*LLG: Chile (0.95,0.67),
  Uruguay (0.95,0.67), CostaRica (0.92,1), Brazil (0.8,0.67),
  Argentina (0.65,0.33)
Cases with greater than 0.5 membership in term LMF*SSW*TRO: Chile (0.79,0.67),
  Panama (0.69,0.67)
Cases with greater than 0.5 membership in term ~LMF*~LLG*SSW*~TRO: Colombia (0.64,1)
```

Appendix G: Robustness Tests

No condition was found to be necessary in the robustness test. All conditions scored relatively low, with the highest score being 0.59 for Trade openness. Following this, several robustness tests for sufficiency were conducted.

The first robustness test consisted of increasing the consistency threshold to 0.9 using the original fuzzy scores. This produced a single highly consistent configuration (~LMF*LLG*~SSW), reinforcing the central role of left-leaning governments. However, this came at the cost of excluding cases such as Argentina and Brazil, illustrating the trade-off between consistency and coverage. This supports the original decision of using a consistency threshold of 0.8, which better captures the diversity of inequality reduction across Latin America. Another test was conducted with a consistency threshold of 0.75 with the original fuzzy scores. This resulted in an intermediate solution with a consistency of 0.83 and coverage of 0.32. This solution represents a very limited number of cases than the main analysis, and its consistency is significantly lower, decreasing the validity of its results. Because of this, the original consistency threshold of 0.8 was deemed most appropriate to include in the main analysis.

The second test consisted of recalibrating conditions using stricter measures. The initial test with stricter conditions resulted in no condition reaching the consistency threshold of 0.8. Because of this, the threshold was lowered to 0.75. This recalibration reaffirmed the configuration from the main analysis involving left-leaning governments combined with weak labor formality and low shares of skilled workers (as well as low trade openness). Consistency remained relatively low for all three solutions. Interestingly, the Dominican Republic, El Salvador, and Peru, which were excluded from the main analysis due to low membership in configurations, were included in this robustness test, while Bolivia was excluded. The results of this test suggest that the main findings remain stable under reasonable changes in calibration, with key configurations persisting across thresholds, albeit with varying degrees of consistency.

QCA is often criticized for inconsistency and sensitivity (Mello, 2021). To address these issues, robustness tests often incorporate additional cases or conditions into the analysis. However, these solutions were not possible in this research. All Latin American countries with reliable data were already included, so adding any cases was either impossible or would have affected the validity of the analysis. Adding additional conditions, while possibly leading to interesting insights, would not be without problems. Adding any more conditions to the

analysis would result in the ideal case to condition ratio of 1:4 being significantly exceeded, limiting the validity of the findings. One solution would have been to divide each country into multiple cases based on, for example, inequality trends, governments in power, or other theoretically informed measures. However, the time needed to perform a meaningful study of this magnitude fell beyond the scope of the authors' limited time.

Overall, the results prove robust. Even as the calibration thresholds shifted to restrict set-membership, the role of left-leaning governments in reducing inequality remained consistent with the main analysis. This confirms that the conclusions are not overly sensitive to calibration and methodological choices and reflect meaningful results. The outputs for the robustness tests are presented below.

Robustness Test with Consistency Thresholds of 0.75 and 0.9

```
Analysis of Necessary Conditions

Outcome variable: IIR

Conditions tested:
     Consistency    Coverage
LMF  0.210826       0.338673
LLG  0.556980       0.550704
SSW  0.324786       0.482030
TRO  0.589744       0.568681
**********************
*TRUTH TABLE ANALYSIS*
**********************

File:  C:/Users/chris/Desktop/Auwerda Documenten/Master IMP/Thesis/Data/Analysis/Robustness tes
Calibrated Fuzzy scores Robustness Test.csv
Model: IIR = f(LMF, LLG, SSW, TRO)
Algorithm: Quine-McCluskey

--- COMPLEX SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.761745
                          raw       unique
                       coverage    coverage   consistency
                      ----------  ----------  ----------
~LMF*LLG*~SSW*~TRO     0.323362    0.323362    0.761745
solution coverage: 0.323362
solution consistency: 0.761745


Cases with greater than 0.5 membership in term ~LMF*LLG*~SSW*~TRO: Ecuador (0.67,0.75)
**********************
*TRUTH TABLE ANALYSIS*
**********************

File:  C:/Users/chris/Desktop/Auwerda Documenten/Master IMP/Thesis/Data/Analysis/Robustness tes
Calibrated Fuzzy scores Robustness Test.csv
Model: IIR = f(LMF, LLG, SSW, TRO)
Algorithm: Quine-McCluskey

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.761745
                    raw       unique
                 coverage    coverage   consistency
                ----------  ----------  ----------
~LMF*LLG*~SSW     0.44302     0.44302     0.779449
solution coverage: 0.44302
solution consistency: 0.779449


Cases with greater than 0.5 membership in term ~LMF*LLG*~SSW: Ecuador (0.86,0.75),
  Bolivia (0.7,1)
```

```
**********
*TRUTH TABLE ANALYSIS*
**********

File:  C:/Users/chris/Desktop/Auwerda Documenten/Master IMP/Thesis/Data/Analysis/Robustness test/
Calibrated Fuzzy scores Robustness Test.csv
Model: IIR = f(LMF, LLG, SSW, TRO)
Algorithm: Quine-McCluskey

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.761745

   Assumptions:
                          raw       unique
                        coverage    coverage   consistency
                       ----------  ----------  ----------
   ~LMF*LLG*~SSW*~TRO     0.323362    0.323362    0.761745
   solution coverage: 0.323362
   solution consistency: 0.761745



   Cases with greater than 0.5 membership in term ~LMF*LLG*~SSW*~TRO: Ecuador (0.67,0.75)
   *** ERROR(Quine-McCluskey): The 1 Matrix is Empty. ***

   Algorithm: Quine-McCluskey

   --- COMPLEX SOLUTION ---
   frequency cutoff: 1
   consistency cutoff: 1
   **********
   *TRUTH TABLE ANALYSIS*
   **********

   File:  C:/Users/chris/Desktop/Auwerda Documenten/Master IMP/Thesis/Data/Analysis/Robustness test/
   Calibrated Fuzzy scores Robustness Test.csv
   Model: IIR = f(LMF, LLG, SSW, TRO)
   Algorithm: Quine-McCluskey

   --- PARSIMONIOUS SOLUTION ---
   frequency cutoff: 1
   consistency cutoff: 1
                     raw       unique
                   coverage    coverage   consistency
                  ----------  ----------  ----------
   LMF*~LLG         0.155271    0.0213675   0.685535
   LMF*SSW*~TRO     0.145299    0.0384615   0.621951
   ~LMF*LLG*TRO     0.287749    0.205128    0.84874
   solution coverage: 0.39886
   solution consistency: 0.734908



   No cases with greater than 0.5 membership in term LMF*~LLG
   No cases with greater than 0.5 membership in term LMF*SSW*~TRO
   No cases with greater than 0.5 membership in term ~LMF*LLG*TRO
   **********
   *TRUTH TABLE ANALYSIS*
   **********

   File:  C:/Users/chris/Desktop/Auwerda Documenten/Master IMP/Thesis/Data/Analysis/Robustness test/
   Calibrated Fuzzy scores Robustness Test.csv
   Model: IIR = f(LMF, LLG, SSW, TRO)
   Algorithm: Quine-McCluskey

   --- INTERMEDIATE SOLUTION ---
   frequency cutoff: 1
   consistency cutoff: 1
   Assumptions:
                          raw       unique
                        coverage    coverage   consistency
                       ----------  ----------  ----------
   ~LMF*LLG*~SSW*~TRO     0.323362    0.323362    0.761745
   solution coverage: 0.323362
   solution consistency: 0.761745


Cases with greater than 0.5 membership in term ~LMF*LLG*~SSW*~TRO: Ecuador (0.67,0.75)
```

Robustness test with stricter calibration thresholds

```
**********************
*TRUTH TABLE ANALYSIS*
**********************

File:  C:/Users/chris/Desktop/Auwerda Documenten/Master IMP/Thesis/Data/Analysis/Robustness test/
Calibrated Fuzzy scores Robustness Test.csv
Model: IIR = f(LMF, LLG, SSW, TRO)
Algorithm: Quine-McCluskey

--- COMPLEX SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.761745
                          raw       unique
                       coverage    coverage   consistency
                      ----------  ----------  ----------
~LMF*LLG*~SSW*~TRO     0.323362    0.323362    0.761745


solution coverage: 0.323362
solution consistency: 0.761745


Cases with greater than 0.5 membership in term ~LMF*LLG*~SSW*~TRO: Ecuador (0.67,0.75)
**********************
*TRUTH TABLE ANALYSIS*
**********************

File:  C:/Users/chris/Desktop/Auwerda Documenten/Master IMP/Thesis/Data/Analysis/Robustness test/
Calibrated Fuzzy scores Robustness Test.csv
Model: IIR = f(LMF, LLG, SSW, TRO)
Algorithm: Quine-McCluskey

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.761745
                    raw       unique
                 coverage    coverage   consistency
                ----------  ----------  ----------
~LMF*LLG*~SSW     0.44302     0.44302     0.779449
solution coverage: 0.44302
solution consistency: 0.779449


Cases with greater than 0.5 membership in term ~LMF*LLG*~SSW: Ecuador (0.86,0.75),
  Bolivia (0.7,1)
**********************
*TRUTH TABLE ANALYSIS*
**********************

File:  C:/Users/chris/Desktop/Auwerda Documenten/Master IMP/Thesis/Data/Analysis/Robustness test/
Calibrated Fuzzy scores Robustness Test.csv
Model: IIR = f(LMF, LLG, SSW, TRO)
Algorithm: Quine-McCluskey

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1
consistency cutoff: 0.761745
Assumptions:
                          raw       unique
                       coverage    coverage   consistency
                      ----------  ----------  ----------
~LMF*LLG*~SSW*~TRO     0.323362    0.323362    0.761745
solution coverage: 0.323362
solution consistency: 0.761745

Cases with greater than 0.5 membership in term ~LMF*LLG*~SSW*~TRO: Ecuador (0.67,0.75)
```