Decentralization and Redistribution: A Counterfactual Scenario for Latin America[*]

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Abstract

This article aims to provide a comprehensive analysis of the impact of fiscal decentralization on income inequality in LATAM countries during the period 1980 – 2018. The study's central focus is exploring the counterfactual scenario by considering the absence of decentralization processes. The fundamental question target to address is: What would have been the implications for income inequality if the decentralization process had not been implemented? To address this question effectively, the analysis carefully distinguishes between federal and non-federal (decentralized) countries, adopting the methodological framework put forth by Hsiao, Ching, & Wan (2012) and Pesaran & Smith (2018) to estimate the macroeconomic impact of this policy change. The main results are the Average Treatment Effects (ATT) on the Treated (Decentralization LATAM countries) with 3.87% and 3.48% favoring decentralization public expenditure and tax revenue.

Keywords: Fiscal Decentralization, Fiscal Federalism, Redistribution, Counterfactual.
JEL Classification: C54, E65, E69, H11, H77.

Descentralización y redistribución: Un escenario contrafactual para América Latina

Resumen

Este artículo pretende ofrecer un análisis exhaustivo del impacto de la descentralización fiscal sobre la desigualdad de ingresos en los países de LATAM durante el período 1980 - 2018. El enfoque central del estudio es explorar el escenario contrafactual considerando la ausencia de procesos de descentralización. La pregunta fundamental que se pretende abordar es: ¿Cuáles habrían sido las implicaciones para la desigualdad de ingresos si no se hubiera implementado el proceso de descentralización? Para abordar esta pregunta de manera efectiva, el análisis distingue cuidadosamente entre países federales y no federales (descentralizados), adoptando el marco metodológico planteado por Hsiao, Ching, & Wan (2012) y Pesaran & Smith (2018) para estimar el impacto macroeconómico de este cambio de política. Los principales resultados son los Efectos Medios de Tratamiento (ETP) sobre los Tratados (países LATAM Descentralización) con 3,87% y 3,48% favoreciendo la descentralización el gasto público y los ingresos fiscales.

Palabras clave: Descentralización Fiscal, Federalismo Fiscal, Redistribución, Contrafactual.
Clasificación JEL: C54, E65, E69, H11, H77

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Motivation and Introduction

According to a recent report by ECLAC (2020), the Latin American (LATAM) region experienced a significant increase in its public debt stock, rising from 35.2% to 45.2% of GDP. Similarly, OECD countries experienced a notable increase of nearly 15 percentage points. This resulted in a public debt-to-GDP ratio of 90%. The ongoing COVID-19 pandemic has further exacerbated the trajectory of rising public debt. Against this backdrop, the traditional Keynesian approach of stimulating demand through increased public spending brings to the fore the critical analysis of subnational entities in the management of their public finances, the promotion of economic growth, and the provision of essential public goods such as health care, education, and housing. While this discussion is not new, the current circumstances underscore the heightened importance of institutional capacity to effectively allocate and manage resources, given the limited room for maneuvering of government agendas on social issues. For example, a few estimations suggest that income inequality will reach levels reminiscent of the 2008 global financial crisis. Emerging economies will face particularly severe challenges (Cugar & Narita, 2020). This highlights the importance of understanding different government systems' different forms and management mechanisms in addressing social concerns.

Within the realm of governance systems, two distinct categories emerge Federalism and Decentralization, which represent different facets of the same issue, namely the transfer of authority and responsibility from central governments to intermediate[1] and local government bodies. Fiscal federalism is closely related to fiscal decentralization. They are often considered synonymous. Decentralization involves the central government devolving powers to lower levels to improve local representation and align decision-making with community preferences[2]. In this context, the territorial units do not have legal autonomy, the fiscal instruments remain unchanged, the collection of taxes is channeled through the central government for redistribution purposes, and additional resources authorized by the center are collected[3].

Fiscal federalism[4], on the other hand, presupposes a pre-existing distribution of powers regarding the mobilization of public revenues, where decentralization is not necessary. Federal systems provide a greater degree of autonomy than unitary state structures. Central governments assume responsibilities such as economic stabilization, income redistribution, and the provision of public goods that benefit the entire nation. On the other hand, local governments provide public goods that directly benefit residents within their jurisdictions (Musgrave & Musgrave, 1992).

The empirical literature in this field exhibits a consensus in recognizing the inherent endogeneity between economic growth and conventional indicators of decentralization. Furthermore, it has become increasingly evident that the treatment of decentralization and fiscal federalism as interchangeable concepts overlooks their fundamental distinctions. The prevailing assumption posits those greater levels of administrative autonomy result in an increased allocation of spending and taxes to territorial entities, thereby leading to favorable outcomes. However,

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[1] Cities and municipalities. Depending of the cities size in population terms, it can also be considered an intermediate or local figure. Likewise, to generalize, reference will be made to intermediate territorial entities (ITE) and local territorial entities (LTE).
[2] Second generation Fiscal Federalism, McKinnon (1995 y 1997) y Weingast y Qian (1997).
[3] Additionally, fiscal decentralization proposes static arrangements and definitive solutions to distribute fiscal functions and resources between levels.
[4] "… *Studies the role and interactions of governments in federal systems, with special attention to the tax collection, fiscal indebtedness, and expenditure. The operation of these systems is analyzed, and an attempt is made to offer a framework of principles to evaluate them. The study of fiscal federalism may also be relevant for the fiscal organization in decentralized regimes that are not strictly federal" (Kolling, 2010, p. 20)".*

recent studies have critically examined and questioned this assumption. Importantly, the literature has yet to explore the nuanced impacts of decentralization and fiscal federalism, failing to adequately consider the institutional elements that play crucial roles in shaping outcomes, as highlighted by (Blume and Voigt, 2011), (Asatryan, et. al. 2015), (Martinez-Vazquez, et. al. 2016).

From the comprehensive review of the existing literature, several key elements emerge. First and foremost, it is imperative to recognize that decentralization and fiscal federalism are not universal solutions for addressing all economic or social problems. Their success hinges upon underlying institutional characteristics (Rodden, 2003). In situations marked by uncertainty, institutional weaknesses, democratic or ethnic conflicts, or ill-defined property rights, decentralization may exacerbate existing challenges (Jütting et. al., 2004).

Notably, the literature has yet to explore the differential impacts on income distribution between federal and decentralized systems. Current studies often treat both processes interchangeably, employing similar measurement approaches. However, this represents an opportunity for further investigation, as decentralization and fiscal federalism are two distinct sides of the same coin, aimed at addressing regional needs within a country while yielding differing outcomes, (Canare & Caliso, 2020), (Fornasari, Web, and Zou, 2000).

This article contributes to the ongoing discourse on fiscal decentralization in two significant ways. While extensive literature on fiscal decentralization and inequality exists, studies that measure the impact using a counterfactual scenario are scarce. Secondly, this paper adopts a methodological and empirical strategy that departs from the conventional approaches prevalent in the literature. Instead of relying on standard panel data models, instrumental variables (2SLS, 3SLS), generalized method of moments, or generalized linear regression, the article treats decentralization as a "natural experiment" and estimates a counterfactual scenario in the absence of decentralization. This methodological approach is in line with the works of Hsiao, Ching, and Wan (2012) and Pesaran and Smith (2018).

The rest of the paper is organized as follows. The first part is composed of this short introduction. The second part presents the conceptual aspects needed to shape the research problem. Next, we show short-written the differences between fiscal decentralization and federalism. The methodology and empirical analysis are presented in the fourth and fifth sections, respectively. The sixth section illustrated the results. Finally, We concluded.

Reference Framework.

The purpose of this section is to provide an overview of the differences between decentralization and federalism concepts. As will be seen, both concepts are treated as the same, but, at least from a political science perspective, they are very different.

Two issues have garnered renewed interest: income inequality and fiscal systems. The latter has perennially been a subject of concern, but the COVID-19 pandemic has accentuated profound differences in approaches. A persisting debate revolves around the relevance of implementing a wealth tax as a redistributive mechanism to mitigate the need for price interventions in factor markets (Piketty, 2015). On the front of fiscal decentralization, the pandemic has compelled governments to set aside budgetary and monetary discipline, expand debt, and resort to unconventional measures such as negative interest rates. Consequently, the scope for implementing fiscal policies has become severely constrained. Understanding the intricate interplay between inequality and fiscal decentralization assumes paramount importance in this context. Factors such as heightened dependence on government revenues, institutional instability,

and conflicts, among others, can engender undesirable outcomes (Bahl, Martinez-Vazquez, & Wallace, 2002).

Advanced economies generally exhibit higher levels of fiscal decentralization compared to emerging economies (Sow & Razafimahefa, 2015, p. 9), owing to the administrative and legal autonomy granted to subnational units in federal systems. However, it is crucial to recognize that although both systems are akin in terms of measurement, i.e., the proportion of total resources allocated and/or spent by recipients and/or issuers, substantial institutional disparities necessitate consideration when assessing their effects. Predominantly works underscore that territorial autonomy engenders improved social and economic outcomes when buttressed by robust and coherent institutional frameworks that engender pertinent incentives (Shah, Thompson & Zou, 2004).

Like this, studies on decentralization can be categorized based on their rationales (Willis, Garman, & Haggard, 1999), (Eaton & Prieto, 2017), (Falleti, 2010), (Bird & Vaillancourt, 1998), (Miller, et. al., 2010), (Beramendi, 2007), (Arends, 2020), (Otero-Bahamon, 2019), variables of interest, and empirical strategies.

A synthesis of the literature review reveals that decentralization and fiscal federalism do not proffer universal solutions to economic or social problems; their efficacy hinges on the underlying institutional characteristics (Rodden, 2003). In countries beset by pervasive insecurity or institutional weakness, democratic conflicts, such as ethnic tensions, and ill-defined property rights, decentralization may exacerbate an already precarious situation (Juetting et al., 2004). In this line, some authors emphasize the need to differentiate between federalism and decentralization (Diamond, 1969; Elazar, 1976), yet the empirical literature has generally disregarded this distinction in its analyses. To close, a dearth of studies has endeavored to identify the transmission mechanisms by which government systems, including federalism and decentralized states, impact income inequality. This measurement gap can be attributed to the pragmatic assumption of their functional equivalence. Nevertheless, it is crucial to acknowledge that both processes represent two sides of the same coin, involving the delegation of powers and autonomies from the national (center) to other regions. Despite broad empirical literature about exploring the impact of decentralization, Few studies have addressed the problem in a differentiated way.

Federalism and decentralization can be understood as twin concepts. The former is a political system whereby the center and subnational units share powers and responsibilities. Subnational units can be regional states and central states (i.e. United States, Canada, Germany, Switzerland, Belgium, Austria, and Australia – As representative case studies in random asymmetric federalism). It is different when we talk about unitary states such as a nation, a state, or a legal system, in which there is a single order of government in the whole country without autonomous regional states (i.e. France) [5].

On the other hand, decentralization may be seen as a stage within federalism; in fact, the empirical literature considers it so. It shares a certain degree of responsibility in the intermediate and lower subnational units, without having the complete autonomy that occurs in federalism (Even the names of the subnational units can be different. For example, Canada has provinces, and the United States has its states, Switzerland has the cantons, Germany has the Lander – federated states).

After the cold war, federalism and decentralization have emerged as ways to improve democracy, governance, and territorial diversity. In LATAM, most countries are decentralized, and some have opted for federal schemes such as Brazil, Mexico, Venezuela, and Argentina (the

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[5] This section is based on Norris (2008).

latter is considered federal more because of the way it is implemented than because of its constitution). In Africa, unitary states such as Kenya, Uganda, Mozambique, Zimbabwe, Namibia, and many others, have followed suit with decentralization reforms, before a constitutional reform to federalism.

Federalism or decentralization leads to increasing democracy, empowers territorial governments, getting closer to the citizens, and horizontal separations of power.

Table 1. Categories by Government System.

Category	Fiscal Federalism	Fiscal Decentralization
Constitutional quality of the regions	States	Local Administrations
Competence	Central and constituent governments	Central level only
Concept of sovereignty	People	Parliament
"Guaranteed existence" of the regions	Constitutional	Non
Financial competence	Central and constituent governments	Transfers from the central state
Principle of allocation of task	Subsidiarity (bottom-up)	Delegation (Top-down)
Co-decisions in Central legislation	Second chamber	Non
Conflict resolution mechanism	Negotiation aims to find concensus among states	Negotiation with central gov.
Legal aspects	Pre-existence of competence sharing in what concerns the mobilization of public revenue	Tranfers the centrla power at lower levels
Economics aspects	Indepedence	Measurement critireium
Institutional setup	Constitutional	Degree

Source: Blueme & Voigt (2011).

Table 1 shows the main aspects that differentiate both systems. We highlight four aspects: Recognition of subnational units, financial competence, conflict resolution mechanism, and institutional configuration.

A key aspect of the two systems is that they are not majoritarian political arrangements it is the opposite: They seek to give recognition and protection to deviations from the majority

political positions of the country, seeking recognition of the minority views of the subnational units (i.e. the Basque country).

The most important point to note is that the notion of decentralization plays a very important role in the theory of fiscal federalism; regardless of whether the theory is core or non-core, first or second generation, decentralization is the main issue of concern. The above discussion provides a general and brief overview of the main insights from the literature on fiscal decentralization, focusing exclusively on the differences between fiscal federalism and decentralization.

Methodology.

This article aims to provide a comprehensive analysis of the impact of fiscal decentralization on income inequality in LATAM countries during the period 1980 – 2018. The fundamental question research to address is: What would have been the implications for income inequality if the decentralization process had not been implemented?

First of all, our dependent variables include market Gini (pre-tax) income and net Gini income, which are used to calculate absolute redistribution (redabs). Absolute redistribution is determined as the difference between market Gini and net Gini. In addition, we examine relative redistribution (redrel), which is derived from the ratio of absolute redistribution to net Gini. Concerning decentralization measures, we adopt the methodological framework of Schneider (2003). The three types of decentralization considered in this paper are fiscal decentralization, administrative decentralization, and political decentralization. For this analysis, we focus on two dimensions: fiscal decentralization and political decentralization.

The measurement of fiscal decentralization includes several variables, namely fiscal revenue decentralization (share of government), revenue decentralization (ratio of own revenue to government revenue[6]), and expenditure decentralization (ratio of own expenditure to government expenditure). These variables are considered at four levels: State government, local government, central government, and subnational government. We have omitted the revenue variable because of its significance. The data for these measures were obtained from government finance statistics. Specifically, the International Monetary Fund (IMF) provides relevant indicators in its Government Finance Statistics database (GFS database). This database covers 75 countries and spans the period from 1980 to 2018, with data available on an annual basis.

Irrespective of state governments, fiscal and political decentralization has always been closely related. The two forms of government have not been treated differently, although there is limited correspondence between federal states and decentralized countries. The Treistamn (2008) database, which classifies countries as federal states, monarchical republics, unitary republics, and other forms of government using a consistent data source, was used to distinguish between different types of government (D1).

The assessment of political decentralization in this study focuses on the influence of a federal political system. To achieve this, an additional variable called "pd" was introduced, as defined by Gerring and Thacker (2004). This variable has two components: territorial government and bicameralism. The territorial government refers to a political system in which the national government may or may not have sovereignty over its territorial units, i.e. unitary and federal

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[6] Given the continuous nature of the indicators exposed by Scheneider (2003), these are the main indicators used in studies on physical decentralization.

countries. Bicameralism, on the other hand, refers to the relative distribution of power between the lower and upper houses at the national level. Thus, a federal state is characterized by a federal territorial government and strong bicameralism (where the upper house has effective veto power), and the variable "federalism" takes the highest value. Specifically, a fully federal state recognizes subnational authorities, has an independently elected territorial legislature, reserves specific political powers for territorial units, and gives them the power to collect taxes.

The political decentralization (DP) variable was constructed using principal component analysis (PCA) techniques based on a composite index, considering three aspects: the latent variable of federalism, the number of variables in the models (following the principle of parsimony), and the importance of the weighting of each component. The components considered in the index are as follows:

- Parliamentary (2), Assembly-elected President (1), Presidential (0) (System)
- Total seats in the legislature (total seats).
- 1" if there was a legislative election that year (legal).
- 1" if there was an executive election this year (exelec).
- Existence of autonomous regions (auton).
- Whether local governments are elected locally (muni).
- Whether state/provincial governments are locally elected (state).
- Whether state/provinces have the power to tax, spend, or legislate (author).

To construct the counterfactual scenario, it was essential to identify when centralized countries began to decentralize. We created a dummy variable indicating the year in which the decentralization process began (otherwise 0) by obtaining this information from Treistamn (2008). Finally, the variables such as Trade Openness (share of GDP), remittances (share of GDP), Foreign Direct Investment (share of GDP), Unemployment Rate (share of Total Labor), government size (share of GDP) – consumption, Urban Population (share of Total Pop), per capita Real Gross Domestic Product (2000), Country Area Urban, Cash Transfers (share of GDP), Total Taxes Direct (share of GDP) served as controls. The database used for these variables is the World Bank.

Finally, several control variables were considered, including trade openness (as a share of GDP), remittances (as a share of GDP), foreign direct investment (as a share of GDP), unemployment rate (as a share of total labor force), size of government (as a share of GDP) - consumption, urban population (as a share of total population), per capita real gross domestic product (2000), urban land area, cash transfers (as a share of GDP), and total direct taxes (as a share of GDP). The World Bank database was used for these control variables.

Empirical Analysis[7].

This article aims to estimate the impact of fiscal decentralization and fiscal federalism on redistribution in LATAM countries from 1980 to 2018, considering two crucial issues. First, the majority of LATAM countries have experienced decentralization processes, except for Mexico, Brazil, and Argentina, which are considered federalist countries in the existing literature, Treistman (2008). Second, to accurately assess the impact, it is imperative to establish a counterfactual scenario based on the absence of decentralization policies. These three elements together help to address the central question, leading to a proposed two-stage approach to the analysis.

The first step is to estimate the counterfactual (baseline) scenario using a panel data approach (PDA). This approach, as emphasized in the macroeconomic[8] literature (Hsiao, Ching, & Wan, 2012) for constructing counterfactual scenarios, relies on the dependence among cross-sectional units and the presence of common factors affecting these units.

$$\delta_{1t} = y_{1t}^1 - y_{0t}^1 \qquad [1]$$

Where Y_{1t}^1 is unit 1 with treatment at time t, Y_{0t}^1 is unit 1 without treatment at time t, and δ_{1t} is the impact on unit 1 after treatment at the moment t. The underlying problem is that both results cannot be observed at the same time, therefore, we proceed to the estimation of one of the results

$$\hat{\delta}_{1,T_0+h} = y_{1,T_0+h}^1 - \hat{y}_{0,T_0+h}^1 \qquad [2]$$

To estimate $\hat{\delta}_{1,T_0+h}$, we derive the counterfactual estimate that represents the hypothetical scenario in country 1 if a decentralization process had not been implemented. Eq. [2] presents two main challenges. First, it requires the identification of the most appropriate model for the construction of the counterfactual estimate in the absence of decentralization. Second, there is the inference problem of determining whether the difference between the observed and counterfactual, $\hat{\delta}_{1,T_0+h} < 0$, is statistically significant.

The need for a structural model to explain the outcome determination is reduced by using appropriate control units for the counterfactual analysis, and identification concerns are mitigated. As a result, following the insights of Pesaran & Smith (2018), policy evaluation can adopt a data-driven and relatively atheoretical approach.

Panels for countries and/or regions with data in y_{it} with $i = 1,2,3 \dots n$ and $t = 1,2,3 \dots T$ where n and T are potentially large, and that belongs to the group of untreated that can be used to

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[7] For the statistical descriptives of the database see Append.

[8] The problem of impact evaluation in microeconomics is to measure the effect of a program (or treatment) on a set of outcome variables among a group of individuals. For example, the effect of a nutrition program on the anthropometric indicators (height and weight) of the participating individuals. The outcome variables are the variables that are expected to be affected by the program on the individual beneficiaries of the evaluated program. The fundamental problem with an impact evaluation is that to construct the effect of the treatment, we would need to know the difference between the outcome variable of the participating individual after the implementation of the program and the outcome variable that individual would have had in the hypothetical case that the program did not exist. In macroeconomics, although progress has been made in this area, it is different from typical macroeconomic policy evaluation, which considers, for example, a monetary policy shock calculated as a shift in a standard error of the structural shock of a policy equation, such as Taylor's rule. For an extension, see Hsiao, C., & Zhou, Q. (30,2019).

construct the counterfactual allowing the estimation of $\hat{\delta}_{1,T_0+h}$ to be the effect of the intervention (decentralization policy) and policy evaluation:

$$\delta = (\bar{y}_{A1} - \bar{y}_{A0}) - (\bar{y}_{C1} - \bar{y}_{C0}) \qquad [3]$$

Where δ is the difference-in-difference estimator.

The first term of equation [3] measures the change in the averages for the intervened group (A); the second term controls any general trend, assuming that the control group trends are parallel to those of the treatment group. If you define a dummy variable for group A, D_A, and a dummy variable for period 1, D_1, using the original observations, it can be written as a two-way model plus a treatment effect:

$$y_{it} = \alpha + \alpha_A + D_A + \alpha_1 + D_1 + \delta D_A D_1 + \varepsilon_{it} \quad [4]$$

Where the four parameters of equation [4] are functions of the four averages of equation [3], in more general cases with broader T or more covariates or endogenous treatments, equation [5] is a more pertinent representation. As mentioned before y_{it}^1 is the variable with treatment (decentralization), and y_{it}^0 is the variable without treatment; given the context of the problem, we can write:

$$y_{it} = d_{it} y_{it}^1 + (1 - d_{it}) y_{it}^0 \qquad [5]$$

Where:

$$d_{it} = \begin{cases} 1: \textit{If the } i-th \textit{ country start and continue the decentralization process} \\ 0: \textit{Otherwise} \end{cases}$$

For example, in 1990, a decentralization process began with a constitutional reform, with a focus on expenditure and administrative autonomy in accordance with the performance capacity of the territorial entity (departments and municipalities). Here, 1990 is set at 1 to 2018, otherwise zero. Notwithstanding the foregoing, the estimation model:

$$red_{it} = \alpha_i + \lambda_t + \gamma_1 d1_{it} + \beta_1 FD_{it} + \beta_2 PD_{it} + \beta_3 (PD_{it} \times FD_{it}) \qquad [6]$$
$$+ \delta_1 (PD_{it} \times d1_i) + \delta_2 (FD_{it} \times d1_i) + \boldsymbol{X\beta} + \boldsymbol{Z\omega} + \varepsilon_{it}$$

Where:
red_{it}: Redistribution variable is calculated as the difference between market gini (-) net gini por the i-th country in the time t,
α_i: Fixed effects of the countries,
λ_t: Time Effect, this is common at all countries,

$d1_{it}$: Dummy variable (1: If the i-th country have fiscal decentralization process), this variable allows the policy-on and policy-off (counterfactual).

FD_{it}: fiscal decentralization indicator (Share Tax/Revenue/Expenditure decentralization, Local Government) of the i-th country in the time t,

PD_{it}: political decentralization indicator (PD) of the i-th country in the time t,

ε_{it}: error term, $E(\varepsilon_{js}|d_{it}) = 0$ for j ≠ i. This assumption allows estimate the counterfactual structure because just needed that j ≠ i.

The matrix $\boldsymbol{X}$, $\boldsymbol{\omega}$ are control matrix of economics and institutional variables, respectively. The impact on income redistribution of the decentralization countries it's give $\gamma_1 + \delta_1 + \delta_2$. The apriori signs are $\gamma_1, \delta_1, \delta_2 > 0$.

The impact on inequality of the federal structures is γ_1.

The counterfactual estimation strategy follows three steps to estimates the Average Treatment effects on the Treated (ATT). The following algorithm is performed to estimate the counterfactual scenario:

Step 1: We estimate a two-way fixed effect model using only the non-treated observations:

$$Y_{it}(0) = \boldsymbol{X}'_{it}\beta + \mu + \alpha_i + \varepsilon_{it} + v_t + D_{it}(0), \forall i, t,$$
$$\sum_{i=1}^{N} \alpha_i = 0 \; ; \; \sum_{t=1}^{T} v_t = 0 \qquad [16]$$

Obtaining $\hat{\mu}, \hat{\beta}+, \hat{\alpha}_i$ and $\hat{v}_t$. Two linear constraints over the fixed effects are imposed to achieve identification.

Step 2: We predict **the treated counterfactual** using the coefficients estimated in the first step:

$$\hat{Y}_{it}(0) = \boldsymbol{X}'_{it}\hat{\beta} + \hat{\mu} + \hat{\alpha}_i + \hat{\varepsilon}_{it} + \hat{v}_t + D_{it}(1), \forall i, t$$

Step 3: We obtain the ATT:
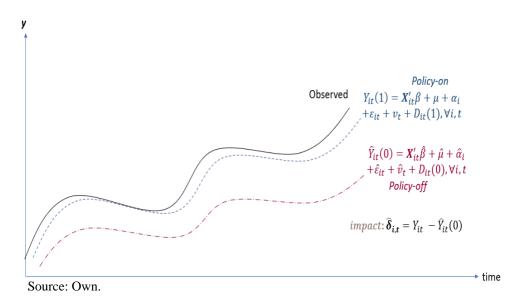
$$\hat{\delta}_{i,t} = Y_{it} - \hat{Y}_{it}(0)$$
$$ATT = \frac{1}{\sum_{i=1,t=1}^{N,T} D_{it}} \sum_{D_{it}=1} \hat{\delta}_{i,t}$$

Results.

To understand the result, we can see figure 2. This is an illustration of the estimation and the application of the policy-on/policy-off method. The blue line shows the fit model regarding the observed data. The red line shows us the estimation in the moment of applying the policy-off, which means, isolating the decentralization process in each country.

Source: Own.

For the estimates, the absolute redistribution was used as dependent variable. The fiscal decentralization variables were tax revenues and expenditures. We included economic control variables, group (LATAM), government forms (federal, unitary, monarchies and others) and decentralization moment (dm). The latter variable allowed us to estimate and simulate the counterfactual scenarios. As mentioned earlier, the literature recommends measuring fiscal decentralization as the share of income (tax revenues) or expenditure (expenditures) in the country's total income or expenditure. Having these two indicators, we decided to make estimates by type of redistribution for each indicator of decentralization, recognizing the potential for endogeneity between these indicators.

The counterfactual simulations for both the decentralized countries and the federal countries are presented in Table 2. To facilitate a comparative analysis, estimates for selected OECD countries have also been computed. The results show that in LATAM (Latin American) countries, fiscal decentralization processes have contributed to a cumulative absolute redistribution of income in terms of tax revenues of 3.87%. In the context of the article's objective, the absence of these fiscal decentralization processes would have resulted in a historical record 3.87 percentage points (pp) lower in terms of income redistribution.

For OECD countries, the distinction between federalism and decentralization provides a reference point for understanding the LATAM exercise. Specifically, the cumulative impact of fiscal decentralization in OECD countries is positive throughout the analysis period, amounting to 1.62 pp. This impact is closely related to the decentralized political and administrative structures that exist in federal countries. In these cases, fiscal decentralization emerges as a natural

cumulative outcome of various reforms over time, rather than being a primary cause of the impact on redistributive processes.

On the other hand, countries that are considered decentralized (as opposed to federal) show more substantial effects compared to their LATAM counterparts. The cumulative impact of fiscal decentralization in these decentralized countries would be 6.44 percentage points if they had not undergone fiscal decentralization processes.

This disparity raises a crucial empirical question that has been studied before: Fiscal decentralization processes of tax revenues differ significantly between decentralized and federal countries. This aspect is often overlooked in the empirical literature because the focus on decentralization indicators alone tends to obscure this fundamental difference. While this may seem like a semantic issue, it actually reveals underlying structural elements, such as differences in tax culture and other related factors.

Overall, these findings underscore the importance of recognizing and understanding the nuances between fiscal decentralization processes in different types of countries. Recognizing these differences can lead to more informed policymaking and a deeper understanding of the impact of fiscal decentralization on income redistribution and other socioeconomic outcomes.

Table 2. Counterfactual by regions: Absolute Redistribution and Tax revenue

		Absolute redistribution	Policy-on:d1=1 (Baseline)	Policy-off: d1=0 (Counterfactual)	Impact
LATAM	**Decentralization**				
	1995	3.36%	3.40%	2.67%	-0.68%
	2000	3.58%	3.60%	2.87%	-0.71%
	2005	3.95%	3.51%	2.78%	-1.17%
	2010	3.79%	3.19%	2.47%	-1.32%
	ATT	**3.67%**	**3.42%**	**2.70%**	**-3.87%**
OCDE	**Federalism**				
	1995	15.16%	17.59%	15.93%	0.77%
	2000	16.03%	18.13%	16.47%	0.44%
	2005	16.63%	18.63%	16.97%	0.34%
	2010	17.33%	18.92%	17.26%	-0.07%
	2015	17.56%	20.07%	17.69%	0.13%
	ATT	**16.54%**	**18.67%**	**16.86%**	**1.62%**
	Decentralization	17.49%	16.45%	16.40%	-1.09%
	1995	17.10%	15.22%	15.18%	-1.92%
	2000	17.46%	15.93%	15.88%	-1.58%
	2005	17.87%	16.91%	16.85%	-1.02%
	2010	18.35%	17.58%	17.52%	-0.83%
	ATT	**17.65%**	**16.42%**	**16.37%**	**-6.44%**

Source: Own.

Table 3. Counterfactual by regions: Absolute Redistribution and Expenditure.

		Absolute redistribution	Policy-on:d1=1 (Baseline)	Policy-off: d1=0 (Counterfactual)	Impact
LATAM	**Decentralization**				
	1995	3.36%	3.44%	2.76%	-0.59%
	2000	3.58%	3.69%	3.01%	-0.57%
	2005	3.95%	3.50%	2.82%	-1.13%
	2010	3.79%	3.27%	2.59%	-1.19%
	ATT:	**3.67%**	**3.47%**	**2.80%**	**-3.48%**
OCDE	**Federalism**				
	1995	15.16%	17.71%	16.27%	1.12%
	2000	16.03%	18.15%	16.71%	0.68%
	2005	16.63%	18.70%	17.27%	0.64%
	2010	17.33%	19.02%	17.59%	0.26%
	2015	17.56%	20.69%	18.60%	1.04%
	ATT:	**16.89%**	**19.14%**	**17.54%**	**2.62%**
	Decentralization				
	1995	17.10%	15.50%	15.14%	-1.96%
	2000	17.46%	16.17%	15.84%	-1.61%
	2005	17.87%	17.14%	16.84%	-1.03%
	2010	18.35%	17.80%	17.50%	-0.85%
	ATT:	**17.69%**	**16.65%**	**16.33%**	**-5.45%**

Source: Own.

The results presented in Table 3 are the results for the expenditure side. The cumulative impact on the absolute redistribution is 3.48 pp, which is similar to that of tax revenues. Regarding the federal countries, there is a difference of 1 pp in this aspect compared to the impact of tax revenue. The decentralized countries in the OECD group, for their part, have a cumulative impact of 5.45 percentage points. This indicates that tax revenues have a greater weight than expenditures in terms of redistribution. This is consistent with the work of Formasi, et. al. (2000), which shows that tax expenditures have higher economic spillovers.

Table 4. Counterfactual by regions: Relative Redistribution and Tax Reveneu.

		Relative redistribution	Policy-on:d1=1 (Baseline)	Policy-off: d1=0 (Counterfactual)	Impact
LATAM	**Decentralization**				
	1995	7.36%	6.07%	6.22%	**-1.14%**
	2000	7.20%	6.03%	6.18%	**-1.02%**
	2005	7.35%	6.23%	6.37%	**-0.97%**
	2010	7.82%	6.10%	6.25%	**-1.57%**
	ATT	**7.43%**	**6.11%**	**6.26%**	**-4.70%**

	Federalism				
	1995	34.27%	36.67%	36.11%	**1.84%**
	2000	35.27%	36.84%	36.27%	**1.00%**
	2005	35.36%	37.29%	36.73%	**1.37%**
	2010	36.26%	37.56%	37.00%	**0.74%**
OCDE	**ATT**	**35.29%**	**37.09%**	**36.53%**	**4.95%**
	Decentralization				
	1995	37.22%	34.87%	34.54%	**-2.69%**
	2000	37.16%	35.13%	34.86%	**-2.30%**
	2005	37.29%	35.90%	35.65%	**-1.65%**
	2010	38.02%	36.44%	36.19%	**-1.83%**
	ATT	**37.42%**	**35.59%**	**35.31%**	**-8.46%**

Source: Own.

Table 5. Counterfactual by regions: Relative Redistribution and Expenditure.

		Relative redistribution	**Policy-on:d1=1 (Baseline)**	**Policy-off: d1=0 (Counterfactual)**	**Impact**
	Decentralization				
	1995	7.36%	5.67%	6.28%	**-1.07%**
	2000	7.20%	5.70%	6.31%	**-0.89%**
LATAM	**2005**	7.35%	5.79%	6.40%	**-0.94%**
	2010	7.82%	5.65%	6.26%	**-1.56%**
	ATT	**7.43%**	**5.70%**	**6.31%**	**-4.47%**
	Federalism				
	1995	34.27%	36.76%	36.23%	**1.96%**
	2000	35.27%	36.82%	36.28%	**1.02%**
	2005	35.36%	37.32%	36.78%	**1.42%**
	2010	36.26%	37.62%	37.08%	**0.82%**
	2015	36.35%	36.47%	36.05%	**-0.30%**
OCDE	**ATT**	**35.50%**	**37.00%**	**36.49%**	**4.91%**
	Decentralization				
	1995	37.22%	35.28%	34.55%	**-2.67%**
	2000	37.16%	35.64%	34.90%	**-2.26%**
	2005	37.29%	36.45%	35.71%	**-1.58%**
	2010	38.02%	37.01%	36.26%	**-1.76%**
	ATT	**37.42%**	**36.10%**	**35.36%**	**-8.27%**

Source: Own.

The aspects related to the expenditure have a cumulative impact of -4.47 pp for the LATAM countries. The countries within the OCD group have a cumulative impact of 8.27 pp; The implications of this are related to the high component of public spending that these countries manage, as well as its configuration throughout the analysis period.

Conclusions.

This paper aims to estimate how decentralization has affected absolute and relative redistribution in LATAM and OECD countries. A counterfactual scenario has been estimated in which the absence of decentralization processes in countries with unitary systems has been assumed.

The autonomy of subnational units in tax collection is the first implication of the results. First-generation theory suggests that subnational units are less efficient at achieving objectives, including distributional objectives. The results suggest that greater autonomy needs to be twofold: to allow the regions to generate their own revenues and to achieve the distributional objective.

One of the main conclusions is that decentralization and federalism are different processes. Empirical literature in economics is similar. The absolute redistribution results show that fiscal decentralization must be accompanied by political decentralization. This is similar to relative redistribution.

Future work can aim to include administrative decentralization processes and identify the moments of fiscal deepening that federal countries have to provide more evidence. Another aspect to consider is the estimation for the income distribution percentiles (90/10). The political cycle and its impact on decentralization is another extension. In fact, fiscal decentralization (any indicator) must be considered as a mediator variable to trace the transmission mechanisms and examine the impact in different variables such as poverty, inequality, education gap, and so on.

As indicated in the results section, the absolute and relative redistribution of income has improved on average over time, providing counterevidence in favor of Oakes' (1972) vision, at least for the regional ATT.

We can sustain decentralization, at least for centralized LATAM countries, if it has affected both redistributions. In fact, the scenarios generated by the simulation process reveal corresponding negative effects for both distributions.

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Appendix

Table A1. Descriptive Statistics.

Variable			Mean	Std. dev.	Min	Max	Observations
Difference in Market Gini and NET Gini (redabs)	redabs	overall	0.0733	0.0739	-0.0950	0.2590	N = 3267
		between		0.0703	-0.0852	0.2440	n = 154
		within		0.0070	0.0238	0.1178	T-bar = 21,2143

Gini market income (pre-tax) (gini_mk)	gini_mk	overall	0.4618	0.0613	0.3220	0.7230	N =	3267
		between		0.0605	0.3325	0.7015	n =	154
		within		0.0149	0.3957	0.5117	T-bar = 21,2143	
Political Decentralization Index (pd)	pd	overall	0.4752	0.1386	0.0868	0.7923	N =	3200
		between		0.1354	0.3300	0.7903	n =	144
		within		0.0278	0.2320	0.6334	T = 22,2222	
Decentralization moment, 1: Year start the decentralization process, 0: Otherwise (dm)	dm	overall	0.6339	0.4818	0.0000	1.0000	N =	4004
		between		0.4764	0.0000	1.0000	n =	154
		within		0.0812	-0.3277	0.9416	T =	26
Dummy Variable 1: if the country have the decentralization process, 0: Otherwise (d1)	d1	overall	1167742	0.3737	1.0000	2.0000	N =	4030
		between		0.3748	1.0000	2.0000	n =	155
		within		0.0000	1167742	1167742	T =	26
Logarithm percapita GDP (lgdpp)	lgdpp	overall	8472694	1483705	5212476	1162597	N =	3828
		between		1470127	54385	1149774	n =	155
		within		0.2315	7004396	9388926	T = 24,6968	
Logarithm percapita GDP square (lgdpp2)	lgdpp2	overall	7398736	2534699	271699	1351632	N =	3828
		between		251585	2957966	1322128	n =	155
		within		3711756	5176276	8930494	T = 24,6968	
TO: Trade Openess (Share GDP) (tradewb)	tradewb	overall	-0.0721	0.1824	-209652	1039167	N =	3701
		between		0.1607	-0.70	0.46	n =	148
		within		0.0869	-1469818	0.56	T = 25,0068	
FDI: Foreing Direct Invesment (Share GDP) (fdishare)	fdishare	overall	0.0586	0.1801	-0.5832	4490828	N =	3763
		between		0.1143	-0.0140	0.9792	n =	154
		within		0.1390	-0.8199	3782241	T = 24,4351	
Earning workers as a	employshare	overall	0.5798	0.2691	0.0516	0.9959	N =	3848

share of total employ (employshare)		between		0.2682	0.0526	0.9917	n =	148
		within		0.0315	0.4008	0.7997	T =	26
REM: Remitances (Share GDP) (remittshare)	remittshare	overall	0.0492	0.0924	0.0000	1292617	N =	3508
		between		0.0830	0.0001	0.6141	n =	151
		within		0.0406	-0.2500	0.7277	T =	23,2318
Total Unemployment as a share of total active popolation - World Bank (unemp2)	unemp2	overall	0.0759	0.0577	0.0008	0.3798	N =	3848
		between		0.0535	0.0087	0.2959	n =	148
		within		0.0220	-0.0105	0.2290	T =	26
Urban Population as a share of total popalation - World Bank (urbpopshar)	urbpopshar	overall	0.5552	0.2316	0.0000	1.0000	N =	3851
		between		0.2298	0.1002	1.0000	n =	154
		within		0.0341	-0.1532	0.7058	T =	25,0065

Source: The authors.

Table A2. Variables to Analysis.

Variables	Description	Source	Frequency	Research Center
gini_mk	Gini market income (pre-tax)	The Standardized World Income Inequality	1980-2018	SWIID
gini_net	Gini net income			
redabs	Difference in Market Gini and NET Gini			
redrel	Ratio Absolute Redistribution and NET Gini			

		Database (SWIID).		
taxrev1	Tax revenue decentralization, State Government - IMF			
taxrev2	Tax revenue decentralization, Local Government - IMF			
taxrev3	Tax revenue decentralization, Central Government - IMF			
taxrev4	Tax revenue decentralization, Sub-nation Government - IMF	Government finance statistics database (GFS database)	1980-2018	IMF
rev1	Revenue decentralization, State Government			
rev2	Revenue decentralization, Local Government			
rev3	Revenue decentralization, Central Government			
rev4	Revenue decentralization, Sub-nation Government			
expend1	Expenditure decentralization, State Government			
expend2	Expenditure decentralization, Local Government			
expend3	Expenditure decentralization, Central Government			
expend4	Expenditure decentralization, Sub-nation Government			
pd	Parliamentary (2), Assembly-elected President (1), Presidential (0) (system) Are there autonomous regions? - (auton) Are municipal governments locally elected? - (muni) Are there state/province governments locally elected? (state) Do the state/provinces have authority over taxing, spending, or legislating? (author) Are the constituencies of the senators the states/provinces?	Database of Political Institutions 2019	1980-2018	IADB
dm	Dummy Variable 1: Year start the decentralization process, 0: Otherwise	Treistamn (2008): Decentralization Dataset	1980-2018	UCLA - Social Science Faculty
d1	Dummy Variable 1: if the country have the decentralization process, 0: Otherwise	Own Elaboration based on Treistamn (2008)	1980-2018	
Control Variables				
tradewb	TO: Trade Openess (Share GDP)		1980-2018	
remittshare	REM: Remitances (Share GDP)		1980-2018	
fdishare	FDI: Foreing Direct Invesment (Share GDP)		1980-2018	
unemp1	UN: Uneployment Rate (Share of Total Labor)		1980-2018	
GS	GC: Government size (Share GDP) - consumption	World Bank Database	1980-2018	WB
UP	UP: Urban Population (Share of Total Pop)		1980-2018	
gdpp	Per-capita Real Gross Domestic Product (2000)		1980-2018	
CAU	Country Area Urban		1980-2018	
trx	Cash Transfers (share gdp)		1980-2018	
taxincshare	Sum taxes direct (share gdp)		1980-2018	

Source: Own elaboration on based (Hanif, Wallace, & Gago-de-Santos, 2020), (Martinez-Vazquez, Lago-Peñas, & Sacchi, 2016).

Table A3. Evolution of the Political system in the World.

1980	Presidential	Assembly - Elected Presidente	Parlamentary	Total
Non-OCDE countries	**59**	**11**	**22**	**92**
Central system	54	9	20	83
Federal system	5	2	2	9
OCDE countries	**5**	**3**	**22**	**30**
Central system	3	3	13	19
Federal system	2	0	9	11
Total general	**64**	**14**	**44**	**122**

2017	Presidential	Assembly - Elected Presidente	Parlamentary	Total
Non-OCDE countries	**73**	**8**	**26**	**107**
Central system	67	6	23	96
Federal system	6	2	3	11
OCDE countries	**6**	**2**	**27**	**35**
Central system	4	1	17	22
Federal system	2	1	10	13
Total general	**79**	**10**	**53**	**142**

Source: Database of Political Institutions – IADB (2020).

Table A4. Market Gini by government system, 1980-2018.

	Decentralization	Federalism
1980		
Africa	0.4962	0.4830
Americas	0.5018	0.4728
Asia	0.3946	0.4260

Europe	0.4398	0.4094
Oceania	0.4320	0.3980
2018		
Africa	0.4158	0.4380
Americas	0.4608	0.4844
Asia	0.4321	0.4155
Europe	0.4715	0.4882
Oceania	0.4690	0.4820

Source: SWIID (2020).

Table A5. Correlations redistribution and taxes,
expenditure, and transfers by government system.

Variables	Federals System	Decentralization System
gini_mk	-0,3784*	-0,3964*
gini_net	-0,6551*	-0,5903*
taxrev1	-0,2627*	0.0044
taxrev2	-0,2061*	-0,4442*
taxrev3	-0,5049*	-0,3686*
taxrev4	-0,3148*	-0,3819*
rev1	-0,2478*	0.0071
rev2	-0.0968	-0,3105*
rev3	-0,3620*	-0.0807
rev4	-0,2335*	-0,2561*
expend1	-0,2494*	0.0045
expend2	-0,2659*	-0,2039*
expend3	-0,3562*	-0.0575
expend4	-0,3006*	-0,1879*
trx	-0.149	-0,1944*
consgovshare	-0,6193*	-0,2674*

Note: Significative at 1%,

Source: SWIID (2020), World Bank, Decentralization
database IMF and authors' calculations.

Table A6. Results Regression: Absolute Redistribution and Tax revenue Decentralization.

Figure 2. Empirical strategy.

	(1) OLS	(2) LSDV	(3) FE	(4) FE	(5) FE
taxrev1	.1608***	.1608***	.1608**	.1608**	.1749***
	(.053)	(.053)	(.0656)	(.0656)	(.056)
taxrev2	.1904***	.1904***	.1904***	.1904***	.2037***
	(.0537)	(.0537)	(.0653)	(.0653)	(.0563)
taxrev3	.0003	.0003	.0003	.0003	0
	(.002)	(.002)	(.003)	(.003)	(.0028)
taxrev4	-.1874***	-.1874***	-.1874***	-.1874***	-.2048***
	(.0525)	(.0525)	(.0629)	(.0629)	(.0523)
0bn.dm	-.0067*	-.0067*	-.0067	-.0067	
	(.0037)	(.0037)	(.0041)	(.0041)	
1.dm					-.0238***
					(.009)
pd	.0195	.0195	.0195	.0195	.0641**
	(.0144)	(.0144)	(.0183)	(.0183)	(.0316)
1bn.subregions#~m					-.1026***
					(.018)
1bn.subregions#~m					-.0959***
					(.0152)
2.subregions#0b~m					-.0951***
					(.0208)
2.subregions#1.dm					-.1003***
					(.0223)
4.subregions#0b~m					-.0982***
					(.0217)
4.subregions#1.dm					-.0787***
					(.0241)
1bn.d1#0bn.dm					.0145
					(.0281)
1bn.d1#1.dm					.0411
					(.031)
1bn.d1#c.pd					-.0673*
					(.0347)
_cons	.5164***	.5164***	.4038**	.4038**	.4237***
	(.0675)	(.0675)	(.152)	(.152)	(.1293)
/var(e.redabs)					.0001**
					(.0001)
/var(redabs[countr~)					.0018***
					(.0004)
Observations	1125	1125	1125	1125	1125
Pseudo R^2	.z	.z	.z	.z	.z
ECONOMY	YES	YES	YES	YES	YES
COUNTRY	YES	YES	YES	YES	YES
YEAR	YES	YES	YES	YES	YES

Robust standard errors are in parentheses
*** p<.01, ** p<.05, * p<.1

Table A7. Results Regression: Relative Redistribution and Tax revenue Decentralization.

	(1) OLS	(2) LSDV	(3) FE	(4) FE	(5) FE
taxrev1	.388***	.388***	.388***	.388***	.374***
	(.0557)	(.0557)	(.0734)	(.0734)	(.0774)
taxrev2	.405***	.405***	.405***	.405***	.3909***
	(.0536)	(.0536)	(.0671)	(.0671)	(.0703)
taxrev3	.0001	.0001	.0001	.0001	.0002
	(.0014)	(.0014)	(.0033)	(.0033)	(.0032)
taxrev4	-.402***	-.402***	-.402***	-.402***	-.3889***
	(.0534)	(.0534)	(.067)	(.067)	(.0708)
0bn.dm	-.002	-.002	-.002	-.002	
	(.0029)	(.0029)	(.0039)	(.0039)	
1.dm					-.0063
					(.0084)
pd	-.0255***	-.0255***	-.0255	-.0255	-.0342*
	(.0093)	(.0093)	(.0223)	(.0223)	(.0197)
1bn.subregions#~m					-.2569***
					(.0397)
1bn.subregions#~m					-.2307***
					(.0351)
2.subregions#0b~m					-.2457***
					(.0506)
2.subregions#1.dm					-.2335***
					(.0528)
4.subregions#0b~m					-.1664***
					(.0541)
4.subregions#1.dm					-.1459***
					(.0556)
1bn.d1#0bn.dm					-.0186
					(.0362)
1bn.d1#1.dm					-.0202
					(.0326)
1bn.d1#c.pd					.009
					(.0324)
_cons	.6822***	.6822***	.4995*	.4995*	.6364***
	(.0812)	(.0812)	(.2548)	(.2548)	(.2238)
/var(e.redrel)					.0001***
					(0)
/var(redrel[countr~)					.007***
					(.0018)
Observations	1097	1097	1097	1097	1097
Pseudo R^2	.z	.z	.z	.z	.z
ECONOMY	YES	YES	YES	YES	YES
COUNTRY	YES	YES	YES	YES	YES
YEAR	YES	YES	YES	YES	YES

Robust standard errors are in parentheses

*** $p<.01$, ** $p<.05$, * $p<.1$

	(1) OLS	(2) LSDV	(3) FE	(4) FE	(5) FE
expend1	.0204*	.0204*	.0204	.0204	.0287**
	(.0124)	(.0124)	(.0176)	(.0176)	(.0135)
expend2	.0395***	.0395***	.0395***	.0395***	.0427***
	(.0104)	(.0104)	(.0128)	(.0128)	(.0103)
expend3	-.0033	-.0033	-.0033	-.0033	-.0033
	(.0027)	(.0027)	(.0043)	(.0043)	(.0042)
expend4	-.0384***	-.0384***	-.0384**	-.0384**	-.0451***
	(.0108)	(.0108)	(.0156)	(.0156)	(.0114)
0bn.dm	-.0076**	-.0076**	-.0076*	-.0076*	
	(.0037)	(.0037)	(.0042)	(.0042)	
1.dm					-.0209**
					(.0084)
pd	.0212	.0212	.0212	.0212	.069**
	(.0144)	(.0144)	(.0189)	(.0189)	(.0316)
1bn.subregions#~m					-.1034***
					(.0182)
1bn.subregions#~m					-.0963***
					(.0156)
2.subregions#0b~m					-.0971***
					(.021)
2.subregions#1.dm					-.1003***
					(.0229)
4.subregions#0b~m					-.1001***
					(.022)
4.subregions#1.dm					-.0797***
					(.0246)
1bn.d1#0bn.dm					.0198
					(.0284)
1bn.d1#1.dm					.0429
					(.0315)
1bn.d1#c.pd					-.0729**
					(.0343)
2.d1#c.pd					
_cons	.4855***	.4855***	.3766**	.3766**	.4089***
	(.062)	(.062)	(.1461)	(.1461)	(.126)
/var(e.redabs)					.0001**
					(.0001)
/var(redabs[countr~)					.0018***
					(.0004)
Observations	1125	1125	1125	1125	1125
Pseudo R^2	.z	.z	.z	.z	.z
ECONOMY	YES	YES	YES	YES	YES
COUNTRY	YES	YES	YES	YES	YES
YEAR	YES	YES	YES	YES	YES

Robust standard errors are in parentheses
*** p<.01, ** p<.05, * p<.1

Table A9. Results Regression: Relative Redistribution and Expenditure Decentralization.

	(1) OLS	(2) LSDV	(3) FE	(4) FE	(5) FE
expend1	.0704***	.0704***	.0704***	.0704***	.0676***
	(.0129)	(.0129)	(.0219)	(.0219)	(.0218)
expend2	.0775***	.0775***	.0775***	.0775***	.0752***
	(.0107)	(.0107)	(.0131)	(.0131)	(.0136)
expend3	-.0017	-.0017	-.0017	-.0017	-.0012
	(.0023)	(.0023)	(.0055)	(.0055)	(.0055)
expend4	-.083***	-.083***	-.083***	-.083***	-.0833***
	(.0113)	(.0113)	(.0153)	(.0153)	(.0157)
0bn.dm	-.0029	-.0029	-.0029	-.0029	
	(.003)	(.003)	(.0041)	(.0041)	
1.dm					-.0042
					(.0085)
pd	-.0253***	-.0253***	-.0253	-.0253	-.0299
	(.0095)	(.0095)	(.0227)	(.0227)	(.0189)
1bn.subregions#~m					-.2589***
					(.0379)
1bn.subregions#~m					-.231***
					(.0339)
2.subregions#0b~m					-.2481***
					(.0485)
2.subregions#1.dm					-.2347***
					(.0509)
4.subregions#0b~m					-.17***
					(.0524)
4.subregions#1.dm					-.1474***
					(.0538)
1bn.d1#0bn.dm					-.0144
					(.0361)
1bn.d1#1.dm					-.0186
					(.0326)
1bn.d1#c.pd					.0024
					(.0315)
_cons	.6609***	.6609***	.4783*	.4783*	.6257***
	(.0797)	(.0797)	(.2491)	(.2491)	(.2264)
/var(e.redrel)					.0001***
					(0)
/var(redrel[countr~)					.0071***
					(.0018)
Observations	1097	1097	1097	1097	1097
Pseudo R^2	.z	.z	.z	.z	.z
ECONOMY	YES	YES	YES	YES	YES
COUNTRY	YES	YES	YES	YES	YES
YEAR	YES	YES	YES	YES	YES

Robust standard errors are in parentheses
*** p<.01, ** p<.05, * p<.1

Table A10. Results Regression: Absolute Redistribution and Revenue Decentralization.

	(1) OLS	(2) LSDV	(3) FE	(4) FE	(5) FE
rev1	.3715***	.3715***	.3715***	.3715***	.3588***
	(.0535)	(.0535)	(.0758)	(.0758)	(.0775)
rev2	.3933***	.3933***	.3933***	.3933***	.3782***
	(.0506)	(.0506)	(.0652)	(.0652)	(.0662)
rev3	-.002	-.002	-.002	-.002	-.0017
	(.0019)	(.0019)	(.0042)	(.0042)	(.0041)
rev4	-.3946***	-.3946***	-.3946***	-.3946***	-.3826***
	(.0502)	(.0502)	(.0638)	(.0638)	(.0657)
0bn.dm	-.0026	-.0026	-.0026	-.0026	
	(.0029)	(.0029)	(.0039)	(.0039)	
1.dm					-.0058
					(.008)
pd	-.0256***	-.0256***	-.0256	-.0256	-.0312
	(.0093)	(.0093)	(.0217)	(.0217)	(.0194)
lgdpp	-.0552**	-.0552**	-.0552	-.0552	-.0759
	(.0249)	(.0249)	(.0746)	(.0746)	(.0683)
lgdpp2	.0034**	.0034**	.0034	.0034	.0049
	(.0016)	(.0016)	(.0049)	(.0049)	(.0045)
demcgv	-.0005	-.0005	-.0005	-.0005	-.0004
	(.0017)	(.0017)	(.0033)	(.0033)	(.0033)
tradewb	.0078**	.0078**	.0078	.0078	.0091
	(.0037)	(.0037)	(.0062)	(.0062)	(.006)
fdishare	.0021***	.0021***	.0021**	.0021**	.0025**
	(.0008)	(.0008)	(.001)	(.001)	(.001)
employshare	.0803***	.0803***	.0803*	.0803*	.0945**
	(.019)	(.019)	(.0445)	(.0445)	(.0419)
remittshare	.0169	.0169	.0169	.0169	.0045
	(.018)	(.018)	(.0397)	(.0397)	(.0469)
unemp2	.0987***	.0987***	.0987**	.0987**	.1085***
	(.0233)	(.0233)	(.0417)	(.0417)	(.042)
urbpopshar	-.0761***	-.0761***	-.0761	-.0761	-.0488
	(.0213)	(.0213)	(.0622)	(.0622)	(.0591)
1bn.subregions#~m					-.2579***
					(.0383)
1bn.subregions#~m					-.2327***
					(.0341)
2.subregions#0b~m					-.2469***
					(.0488)
2.subregions#1.dm					-.2348***
					(.051)
3.subregions#0b~m					
3.subregions#1.dm					
4.subregions#0b~m					-.167***
					(.0521)
4.subregions#1.dm					-.1464***
					(.0534)
1bn.d1#0bn.dm					-.0165
					(.0358)
1bn.d1#1.dm					-.0181
					(.0326)
2.d1#0bn.dm					
2.d1#1.dm					

A11. Results Regression: Relative Redistribution and Revenue Decentralization.

	(1) OLS	(2) LSDV	(3) FE	(4) FE
rev1	.3715***	.3715***	.3715***	.3715***
	(.0535)	(.0535)	(.0758)	(.0758)
rev2	.3933***	.3933***	.3933***	.3933***
	(.0506)	(.0506)	(.0652)	(.0652)
rev3	-.002	-.002	-.002	-.002
	(.0019)	(.0019)	(.0042)	(.0042)
rev4	-.3946***	-.3946***	-.3946***	-.3946***
	(.0502)	(.0502)	(.0638)	(.0638)
0bn.dm	-.0026	-.0026	-.0026	-.0026
	(.0029)	(.0029)	(.0039)	(.0039)
1.dm				
pd	-.0256***	-.0256***	-.0256	-.0256
	(.0093)	(.0093)	(.0217)	(.0217)
_cons	.6511***	.6511***	.4676*	.4676*
	(.0812)	(.0812)	(.2475)	(.2475)
Observations	1097	1097	1097	1097
R-squared	.9948	.9948	.1344	.1344
ECONOMY	YES	YES	YES	YES
COUNTRY	YES	YES	YES	YES
YEAR	YES	YES	YES	YES

Robust standard errors are in parentheses
*** $p<.01$, ** $p<.05$, * $p<.1$