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## Income Inequality, Fiscal Decentralization and Transfer Dependency

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**IMF Working Paper**

Statistics Department

**Income Inequality, Fiscal Decentralization and Transfer Dependency<sup>1</sup>**

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**Abstract**

Within the context of reigniting post crisis macroeconomic growth, income inequality has emerged as a topic of significant interest for both academics and policymakers (Bastagli, Coady, and Gupta, 2012) This study builds on past literature on fiscal decentralization suggesting that redistribution is most effectively carried out at sub-central levels of government. Using the IMF's multi-sector *Government Finance Statistics Yearbook* database, this paper tests the impact of decentralized redistribution on income inequality for a globally representative sample of countries since 1980. The findings suggest that the decentralization of government *expenditure* can help achieve a more equal distribution of income. However, several conditions need to be fulfilled: *i*) the government sector needs to be sufficiently large, *ii*) decentralization should be comprehensive, including redistributive government spending, and, *iii*) decentralization on the expenditure side should be accompanied by adequate decentralization on the *revenue* side, such that subnational governments rely primarily on their own revenue sources as opposed to intergovernmental transfers.

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## I. INTRODUCTION

In the context of reigniting post crisis macroeconomic growth, income inequality has emerged as a topic of significant interest for both academics and policymakers (Bastagli, Coady, and Gupta, 2012). At the same time, fiscal decentralization has gained considerable attention in many countries with its potential to raise the efficiency of government (Oates, 2005; OECD, 2006; 2009a; 2009b). Where state and local governments gain a significant degree of autonomy in the formation of redistributive policies, the question arises whether, and how decentralization might interact with income inequality (Bahl, Martinez-Vazquez, and Wallace, 2000). The purpose of this paper is to provide some empirical evidence regarding this link, mainly: *i*) whether income inequality is systematically associated with the decentralization of government finances, and, *ii*) whether greater fiscal autonomy, or lower revenue dependency, at the state and local levels could improve a country's income distribution.

The relationship between redistributive fiscal policy and income distribution has a long history in the literature, suggesting that differences in the progressivity of tax and spending policies account for much of the observed variation in average disposable income inequality within countries (for example, Bastagli, Coady, and Gupta, 2012). A smaller niche of interregional literature on fiscal decentralization and income inequality suggests the two should be related, particularly when government redistribution is decentralized and subnational governments are not highly dependent on transfers to finance their expenditures. The inter-temporal variation in post-tax income inequality, and variation in the degree to which state and local governments engage in redistributive policies, allow us to empirically examine how they interact.

This paper tests for these potential links using macro-level data for a globally representative multi-sector sample of countries over a 30-year period. We examine decentralization patterns using an aggregate measure of decentralization, and redistributive spending sub-aggregates, to achieve a better fit with theoretical expectations. On the revenue side, we also test for effects from the decentralization of income taxation and level of subnational transfer dependency.

The results are generally consistent with past findings, suggesting that the decentralization of government expenditure can help achieve a more equal distribution of income. However, several conditions need to be fulfilled. First, the government sector needs to be sufficiently large. Second, decentralization should be comprehensive, including redistributive government spending. Third, decentralization on the expenditure side should be accompanied by decentralization on the *revenue* side, such that subnational governments rely primarily on their own revenue sources as opposed to relying on intergovernmental transfers.

## II. FISCAL DECENTRALIZATION AND INEQUALITY—LITERATURE REVIEW

In the large body of literature on income inequality, government redistribution plays a pivotal role in explaining both inter-regional and cross-country variance (Gustafsson and Johansson, 1999; Li, Xie, and Zou, 2000; Chu, Davoodi, and Gupta, 2000; Galli and van der Hoeven, 2001; Dollar and Kraay, 2002; Lundberg and Squire, 2003). The literature on fiscal federalism suggests that fiscal decentralization can affect redistributive efficiency within an economy. The empirical literature has generally confirmed the relationship between these two strands of literature, however, the theoretical connection between fiscal decentralization and income inequality remains somewhat less clear.

The first wave, or ‘first-generation theory’, of fiscal federalism argued that state and local governments should not engage in income redistribution (see Oates 2008). According to this literature, decentralized redistribution creates incentives for ‘poor’ households to migrate into alternative jurisdictions where more generous redistribution schemes are provided, while ‘rich’ households could move to areas with minimal tax and transfer schemes (Stigler, 1957; Musgrave, 1959; Oates, 1972). This “voting by feet” phenomenon would make redistribution at sub-central levels of government, or in economic unions with full mobility of labor, self-defeating and unsustainable (Tiebout, 1956; Prud’homme, 1995). In this case, income inequality within each homogenous income region might decrease, but this would be caused by the in-migration of the poor and the out-migration of the rich, while national income inequality would be left unaffected. As local authorities would be severely constrained in their capacity to alter the existing national income distribution, they would likely not engage in extensive redistribution (Oates, 1972). According to this strand of literature, system of decentralized redistribution should lead to lower levels of redistribution than is socially desirable (Tiebout, 1956; Prud’homme, 1995). In other words, local government attempts at redistribution through decentralization would be both too little and ineffective at altering the national income distribution. We should, therefore, expect less redistribution and more inequality when redistributive policies are decentralized.

The ‘second generation of fiscal federalism’ challenged this claim. McKinnon (1995; 1997) and Weingast and Qian (1997) suggested that jurisdictional competition triggered by comprehensive decentralization, including varying degrees of welfare provisions, could be more effective in reducing regional inequality than centrally-mandated redistribution. Local governments of poorer regions could take advantage of less generous welfare provisions and lower taxes to attract investment and increase growth (McKinnon, 1997). The resulting factor movements can therefore reduce regional income differentials, which would also lower income inequality on a national basis. Transfers from central to sub-central governments are also highlighted in the second generation literature as a potential source of distortion the spending priorities of recipient governments. This dependency could hinder the adjustment and convergence processes where reliance on own source revenue would otherwise induce equalization.

More recently, Padovano (2007) presents a political-economy model in which redistribution is more efficiently carried out by sub-central entities. In this model, regions must finance redistributive policies with own resources in decentralized fiscal systems. In contrast,

centralized redistribution allows regions to access revenues from other regions, which produces distortions that impede the relocation of factors of production that would normally lead to long-run income convergence. Because these forces more than offset the initial direction of redistribution, Padovano (2007, p.42) concludes that “centralizing income redistribution, rather than being a means to reduce income inequalities of less developed regions, tends to perpetuate the very problems that it is meant to solve.” Using the cases of Italy and the United States, his contribution provides evidence that centralized systems may lead to ‘more’ redistribution, while decentralized systems achieve greater effective incidence and stability of redistributive flows. In sum, the second-generation authors maintain that broad fiscal decentralization, encompassing redistribution, is likely to achieve more income equality when it is financed primarily by own revenues.

Empirical work examining the effects of fiscal decentralization on income inequality has generally shown a (conditional) negative relationship between income inequality and fiscal decentralization. For example, Sepulveda and Martinez-Vazquez (2011) test the relationship between decentralization and inequality, using five-year-averages over the 1971–2000 period for a sample of 56 countries. Measuring fiscal decentralization as the share of subnational expenditure in total government expenditures, they estimate the effect of fiscal decentralization on income inequality conditional on the size of government with findings suggesting that fiscal decentralization reduces income inequality, conditional on the general government representing at least 20 percent of the economy.

Other related empirical work has examined the effect of decentralization on inequality within regions. Tselios and others (2012) investigate this relationship from a panel of 102 European Union regions over the 1995–2000 period. They find that greater fiscal decentralization, proxied by the subnational share in total government expenditure, reduces regional inequality. This effect, however, declines with rising levels of regional per capita income. Lessmann (2012) examines the impact of decentralization on inequality within regions using a panel of 54 developed and developing countries from 1980 to 2009. The general findings are consistent with those of Tselios and others suggesting that fiscal decentralization, measured either through the degree of ‘vertical imbalance’<sup>2</sup> or sub-central shares of overall expenditure, revenue, or taxes, tends to decrease regional inequality contingent on regional development. In other words, decentralization increases inequality at low levels of development.

All of the above empirical work constructs decentralization ratios covering aggregate expenditure or revenue, but not both. Such measures may be too broad to capture the channels through which decentralization affects inequality. For example, if decentralization can help reduce income inequality does it matter whether subnational governments are given greater responsibility over health care or defense spending? Does redistributive expenditure decentralization have a separate relationship from the decentralization of total expenditure with income inequality? The remainder of this paper will provide some initial empirical

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<sup>2</sup> See Eyraud and Lusinyan (2013).

evidence regarding the relationship between decentralization of redistributive expenditure sub-aggregates, progressive revenues, transfer dependency and income inequality.

### **III. WHAT DO THE DATA TELL US?**

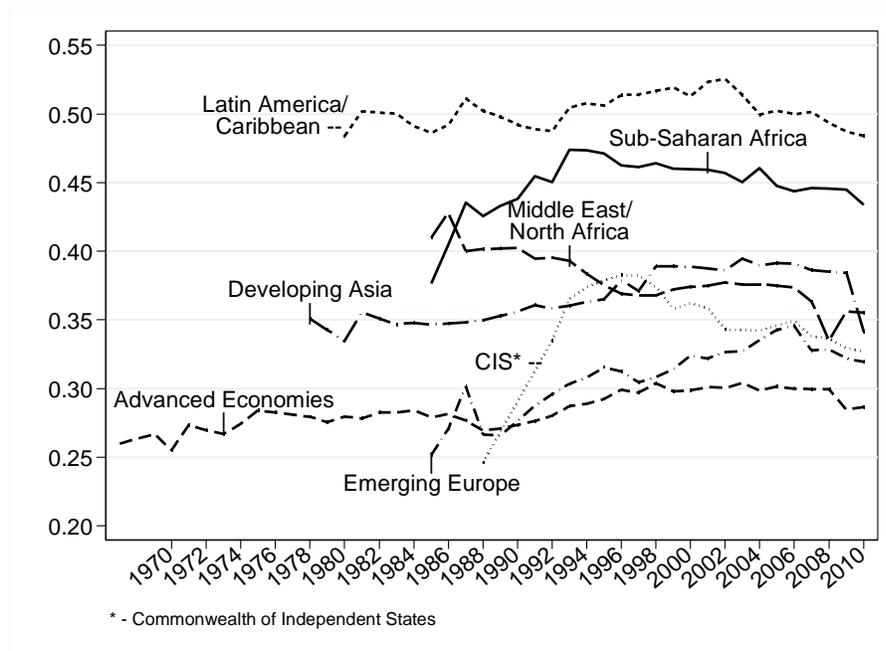
#### Income Inequality

Over the past 40 years, income inequality has undergone significant dynamic and cross-regional changes in several part of the world. Figure 1 shows annual Gini coefficient averages for post-tax-and-transfer income by regional country groups for a total of 150 countries.<sup>3</sup> Despite significant changes in average Gini coefficients over time in some regions or country groups, differences in disposable income inequality across regions tends to exceed variation within country groups over time.<sup>4</sup>

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<sup>3</sup> Income inequality data are based on disposable income where possible, and are otherwise based on consumption or expenditure. Post tax Gini coefficient data are obtained from Bastagli, Coady, and Gupta (2012), covering 150 advanced and developing economies drawing data from five data sources: European Union Statistics on Income and Living Conditions (EU-SILC); Luxembourg Income Study (LIS); Organization for Economic Cooperation and Development (OECD); Socio-Economic Database for Latin America and the Caribbean (SEDLAC); and the World Bank World Development Indicators (WDI). Country groups are defined following the classification of the World Economic Outlook (WEO).

<sup>4</sup> Due to a small number of missing observations for some country-years and the slow-moving nature of income inequality over short periods of time, we also linearly interpolate missing values for a small group of countries with sufficient data to derive meaningful estimates. This appears to be justified because the degree of income inequality as measured by the Gini coefficient typically evolves slowly and steadily over time, which is also reflected in the available data. Linear interpolation represents a cautious approach because it assumes that Gini coefficients do not fluctuate beyond the range defined by the given data points. The extent of variation in income inequality may therefore be slightly understated due to interpolation.

**Figure 1: Average Gini Coefficients by Country Groups (1970–2010)**

Source: Bastagli, Coady, and Gupta (2012) and World Bank World Development Indicators.

While variation within these regional groupings exists, income inequality appears to be somewhat clustered over time.<sup>5</sup> Latin America and the Caribbean countries have, on average, consistently experienced the highest levels of income inequality, with Gini coefficients ranging around the 0.5 mark since the early 1980s. There appears to be a trend since early 2000 of reduced income inequality. Sub-Saharan Africa, the second most unequal region, has closely followed the dynamic path of Latin American and the Caribbean in the 1980s, but average inequality began a gradual downward trend beginning in the early 1990s. Income distribution in advanced economies has consistently been, on average, the most equal, but has also experienced a slow upward trend since the 1980s, with Gini coefficients increasing from an average of 0.27 to over 0.3 in the early 2000s.

Some of these dynamics may be attributable to movement along the Kuznets curve (Kuznets, 1955), where rising inequality in many emerging market regions could be viewed as a side effect of the high economic growth experienced during a period of market liberalization. For example, average Gini coefficients rose steadily in developing Asia during periods of high growth. A sharp increase in income inequality also occurred in the countries of the former Soviet Union and emerging Europe following the breakup of the Soviet Union. Average Gini coefficients in the CIS region have, however, decreased since reaching a peak above 0.38 in 1996, while they continue to rise in emerging Europe. Much of the observed

<sup>5</sup> Standard deviations within regional groupings are: Latin America and Caribbean = 0.06; Sub-Saharan Africa = 0.08; Middle East/North Africa = 0.04; Developing Asia = 0.06; CIS = 0.05; Advanced Economies = 0.04; Emerging Europe = 0.05. Table 1 of Appendix A includes the countries within a group for which we have data on income inequality and fiscal decentralization.

differences in inequality between regions from Figure 1 can be explained by the level and progressivity of a country's redistributive systems (see Bastagli, Coady, and Gupta, 2012). For example, while the generous tax and transfer system reduced the average Gini coefficient in 15 European countries by about fifteen percentage points in the mid-2000s, government redistribution in six Latin American countries achieved only a two percentage point reduction (Goñi, López, and Servén, 2008). Given the significant role of the volume and effectiveness of government redistribution in explaining variation in income inequality, it is important to consider who holds fiscal authority over these redistributive functions.

### Fiscal Decentralization and Transfer Dependency

For the majority of countries, a reduction in inequality of income is achieved mainly through the expenditure side of the budget. Since not all government expenditures are equally redistributive or decentralized, it may be helpful to divide these into functions. On the revenue side, progressive tax structures—in particular income taxes—should be expected to play a significant role in shaping the income distribution. The degree to which such redistributive spending is financed by own-source revenues or intergovernmental transfers may also be an important factor in determining any potential effects on income inequality.

#### *Decentralized Redistributive Expenditure*

Government spending usually entails redistribution, but certain government activities have more explicit redistributive roles and achieve higher levels of income redistribution. The assignment of these functions to different levels of government is what fiscal federalism theories saw as crucial in triggering factor movements, which would be a factor in determining income inequality. Decentralization ratios do not imply that sub-central governments have full autonomy over the entirety of their spending share. A significant amount of state and local expenditure can still be mandated by higher-level governments and constrained through central government legislation or directives. However, it has been shown that even deferring the administrative responsibility of redistributive programs to sub-central levels of governments creates substantial within-country differences in the efficiency and generosity of welfare systems (Padovano, 2007).

Non-means-tested and means-tested cash transfers make up the majority of redistribution across countries. However, in-kind transfers have also been shown to significantly decrease inequality, with health and education achieving almost all of the redistributive impact. The Classification of Functions of Government (COFOG) data contained in the *GFSY* provide the necessary disaggregation of expenditure to isolate these spending categories. COFOG classifies government outlays into 10 divisions.<sup>6</sup> Social protection, health, and education correspond closely to the redistributive expenditure types. Table 1 provides in greater detail, the subcategories of government functional expenditure contained in each of the three categories.

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<sup>6</sup> The ten divisions are: General public services; Defense; Public Order and Safety; Economic Affairs; Environmental Protection; Housing and Community Amenities; Health; Recreation, Culture, and Religion; Education; and Social Protection.

**Table 1: Groups Contained in the COFOG Divisions  
Social Protection, Health, and Education**

| <b>Social Protection</b>                   | <b>Health</b>                               | <b>Education</b>                    |
|--|---|-------------------------------------|
| Sickness and disability                    | Medical products, appliances, and equipment | Pre-primary and primary education   |
| Old age                                    | Outpatient services                         | Secondary education                 |
| Survivors                                  | Hospital services                           | Postsecondary nontertiary education |
| Family and children                        | Public health services                      | Tertiary education                  |
| Unemployment                               | Research and Development Health             | Education not definable by level    |
| Housing                                    | Health not elsewhere classified             | Subsidiary services to education    |
| Social exclusion not elsewhere classified  |   | R&D Education                       |
| R&D Social protection                      |   | Education not elsewhere classified  |
| Social protection not elsewhere classified |   |                                     |

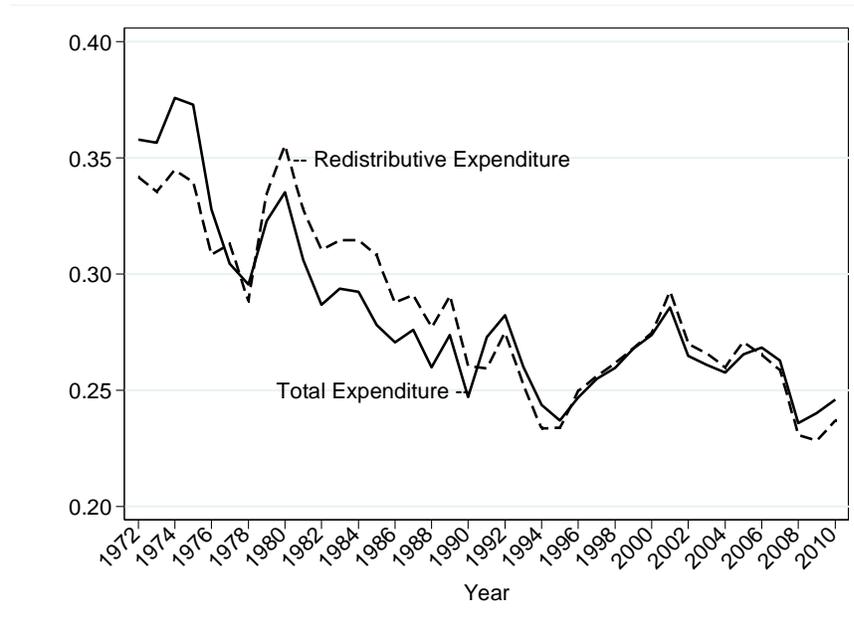
Source: *Government Finance Statistics Manual (GFSM2001), Annex to Chapter 6: Classification of the Functions of Government (COFOG)*

To measure expenditure decentralization, we construct an index of decentralization ( $\gamma$ ) for each area of functional expenditure ( $j$ ) by calculating the share of sub-central—state and local—government expenditure as a percentage of total government expenditure in country  $i$  in year  $t$ .<sup>7</sup> The index can range from 0 (when decentralization does not exist or there are no state and local governments) to 1 (where all expenditure is executed by state and local governments).

$$\gamma_{ijt} = \frac{\exp_{ijt}^{LG} + \exp_{ijt}^{SG}}{\exp_{ijt}^{CG} + \exp_{ijt}^{LG} + \exp_{ijt}^{SG}} \quad (1)$$

An additional index of decentralization is calculated for total expenditure and redistributive spending (the sum of the three selected COFOG areas). Cross-country averages for the decentralization of total and redistributive expenditure are depicted below in Figure 2. While these generally appear to move in parallel over the past 40 years, substantial differences of up to 40 percentage points exist within our sample of countries suggesting that decentralization of total expenditure can be quite different from decentralization of redistributive expenditure.

<sup>7</sup> This is computed using consolidated general government as a denominator for total expenditure. In the case of functional expenditures, we run the analysis on both consolidated and unconsolidated data to maximize the number of observations. Although we are not able to consolidate between local and state governments in the numerator, transfers between these levels of government are probably small and, in most countries, a state government subsector does not exist. Data source is *Government Finance Statistics Yearbook*.

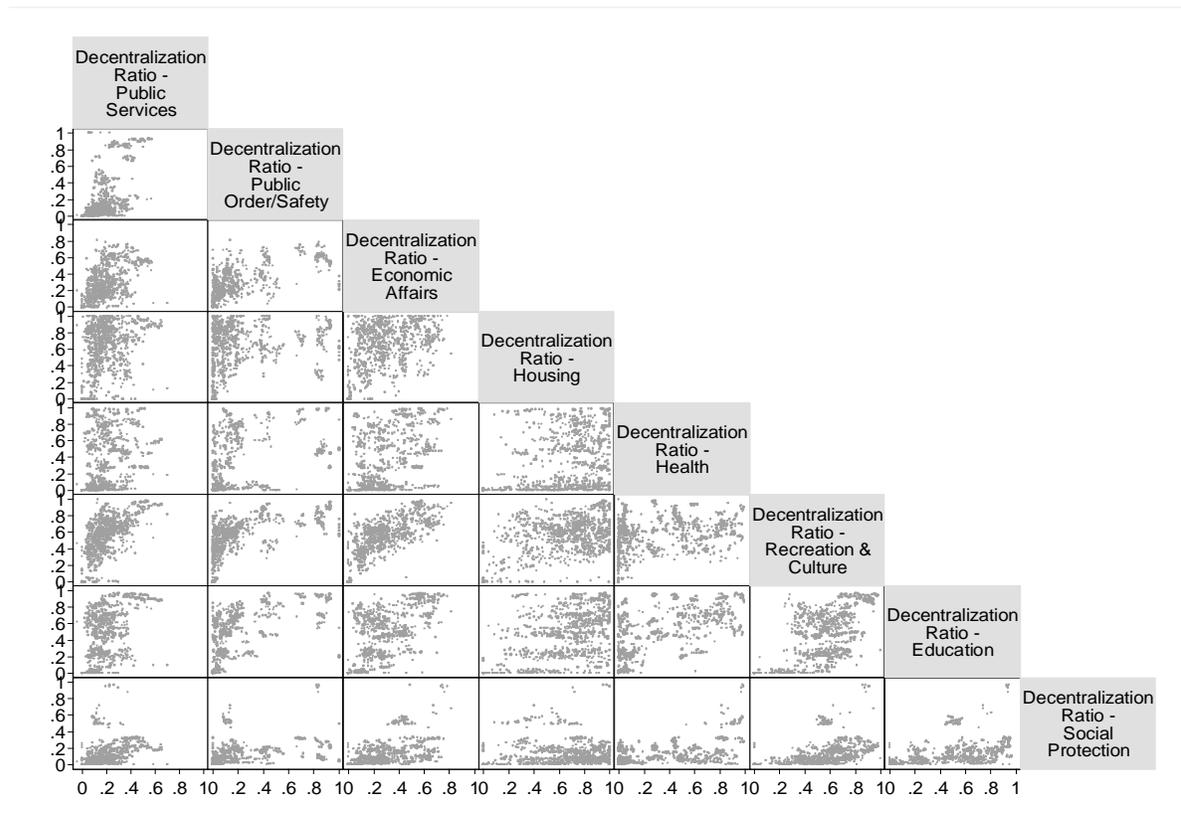
**Figure 2: Average Decentralization Ratio of Total and Redistributive Expenditure**

Based on a maximum sample size of 59 countries: Decentralization ratios range from 0 (no decentralization) to 1 (full decentralization).

Source: *Government Finance Statistics Yearbook* (1972–2011),

A more detailed breakdown of decentralization and government expenditure is shown in Figure 3 which depicts the decentralization ratios for eight categories of functional expenditure for the sample of 77 countries.<sup>8</sup> While areas such as public services, public order and safety, and social protection tend to be highly centralized (clustered around 0 on the y-axis for the first two categories and on the x-axis for social protection), we see a much larger degree of decentralization in economic affairs, housing, health, education, and recreation and culture. There also appears to be a positive correlation between all areas of functional expenditure, however, a significant variance exists around them suggesting a potential loss of information from aggregation. For example, for the redistributive categories of social protection, education, and health, although some degree of positive correlation is discernible, decentralization ratios do not appear to form a single underlying dimension.

<sup>8</sup> We exclude defense which is very highly centralized in all countries and environmental expenditure due to a small sample of data for this category.

**Figure 3: The Composition and Correlation of Decentralized Government Expenditure**

Based on a maximum sample size of 59 countries: Decentralization ratios range from 0 (highly centralized) to 1 (highly decentralized).

Each data point corresponds to one country in one year.

Source: *Government Finance Statistics Yearbook* (1972–2012).

Isolating redistributive spending categories, Figure 4 shows dynamic trends in average decentralization ratios over the 1976–2010 period.<sup>9</sup> The general trend suggests that these functions have become more centralized since the 1970s, with some interesting movement in the late 1990s and early 2000s.<sup>10</sup> Until the late 1980s, the majority of education spending was done at the subnational level with decentralization ratios frequently exceeded 50 percent. However, the degree of decentralization exhibits a downward trend, most recently seen since the mid-2000s. The cross-country average decentralization ratio has also fallen for health expenditure with about 38 percent of spending taking place at the subnational level in 1999 to

<sup>9</sup> The figure is based on 59 advanced, emerging, and developing economies where at least a local government level exists in addition to the central government, thus excluding completely centralized countries where decentralization ratios are always equal to zero. For most countries, data are not available for all years.

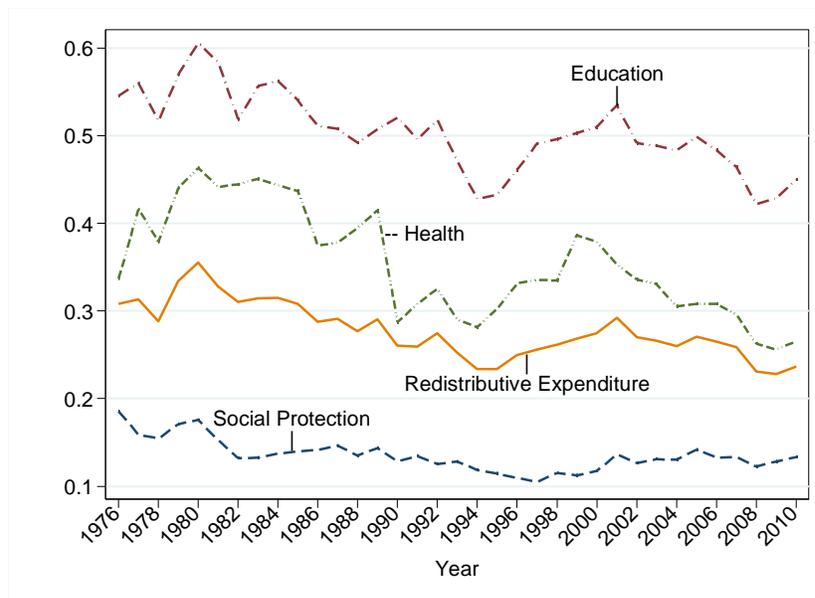
<sup>10</sup> The online appendix provides cross-country averages may hide substantial variation in the degree of decentralization between countries. The online appendix provides the online country-by-country summary statistics.

about 26 percent in 2010. Social protection expenditure appears to have a relatively stable highly centralized history over the entire 1976–2010 period. Finally, the solid line in Figure 4

shows the aggregate measure of decentralization of the three redistributive spending areas which has, on average, ranged between 20 and 30 percent since the 1970s.

The higher average degree of decentralization in health and education spending compared to social protection can also be interpreted as a reflection of fiscal federalism theory: these two areas—while also contributing to an equitable income distribution—contain a mixture of local and national public goods, and should therefore involve subnational government participation.

**Figure 4: Evolution of Average Decentralization Ratios by Redistributive Function**



Based on maximum sample size of 59 countries.

Source: *Government Finance Statistics Yearbook* (1976–2011).

### *Transfer Dependency and Decentralized Redistributive Revenue*

Transfers to subnational government are frequently designed to play an equalizing role and to reduce differences in fiscal capacity across jurisdictions (OECD, 2009b) but can also reduce their policy autonomy. As noted in Section II, the second generation of fiscal federalism advocates decentralized redistribution in a setting of jurisdictional competition which are financed primarily by own-source revenues, as opposed to intergovernmental transfers (Weingast and Qian 1997; Padovano 2007). Following this line of argument, we measure the extent to which state and local governments rely on transfers from other government units to fund their redistributive and other expenditures.

The *GFSY* database provides information on “grants from other general government units” for all subsectors of general government, allowing us to construct an indicator of transfer dependency. We calculate transfer dependency as the share of total subnational expenditure

( $exp_{it}^{LG} + exp_{it}^{SG}$ ), which is financed through transfers from other levels of government ( $grant\_rev_{it}^{LG} + grant\_rev_{it}^{SG}$ ):

$$trans\_dep_{it} = \frac{grant\_rev_{it}^{LG} + grant\_rev_{it}^{SG}}{exp_{it}^{LG} + exp_{it}^{SG}} \quad (2)$$

An additional important ingredient on the revenue side is the progressivity of the tax system. For theoretical and empirical reasons, an analysis of decentralized redistribution and its impact on inequality should also consider redistributive revenues—in particular progressive taxation—raised by government. As the main counterpart of transfers, tax revenues are as much a part of the motivation for household and factor mobility in the theoretical models of both generations of fiscal federalism as the transfers and public services that they help to finance.

Income taxes are generally those which achieve the greatest amount of redistribution (Bastagli, Coady, and Gupta, 2012). Given their important role, we calculate an index of income tax decentralization using the *GFSY* revenue category “Taxes on income, profits and capital gains” broken down by subsectors (central, local, state)<sup>11</sup>. Similar to the spending decentralization ratios, this is calculated as state and local income tax revenue ( $inctax_{it}^{LG} + inctax_{it}^{SG}$ ) relative to total income tax revenue ( $inctax_{it}^{CG} + inctax_{it}^{LG} + inctax_{it}^{SG}$ ):

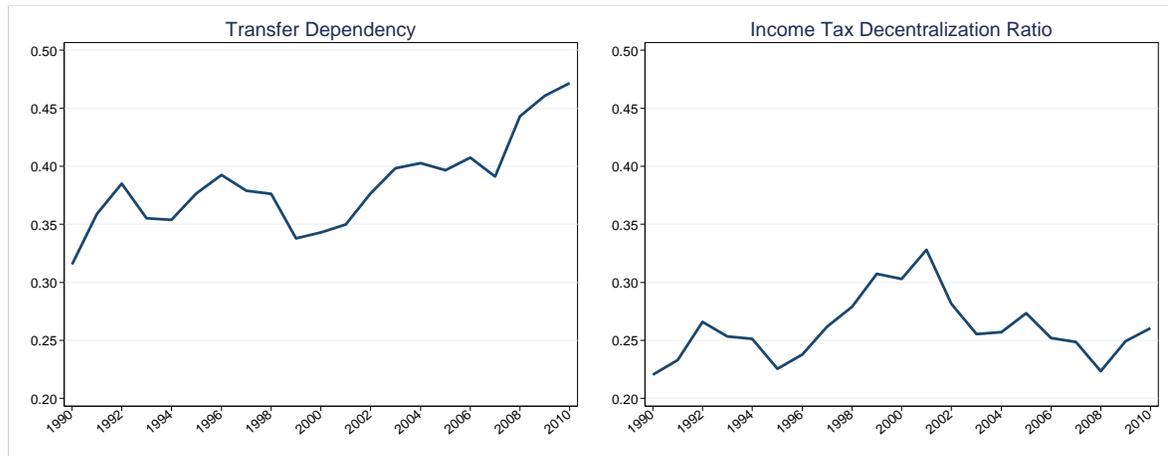
$$inctax\_dec_{it} = \frac{inctax_{it}^{LG} + inctax_{it}^{SG}}{inctax_{it}^{CG} + inctax_{it}^{LG} + inctax_{it}^{SG}} \quad (3)$$

Figure 5 plots average movements in our transfer dependency and income tax decentralization indices. Since the mid- to late 1990s, subnational governments’ reliance on intergovernmental transfers has steadily increased, reaching about half of their total expenditure by 2010. Average expenditure decentralization remained relatively constant over the same time period, suggesting a relative increase of transfers in the revenue mix of state and local governments. rising transfer dependency is accompanied by falling shares in income tax revenues since the early 2000s. Income taxes appear to have become less important revenue sources for subnational governments.

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<sup>11</sup> Under the *GFS* classification, taxes are attributed to the government unit that “(i) exercises the authority to impose the tax; and (ii) has final discretion to set and vary the rate of the tax.” (*GFSM* 2014 forthcoming). Consequently, income tax revenues which are collected by state and local governments under tax-sharing arrangements, where they have no authority to impose the tax or vary its rate, should not be classified as tax revenue under *GFS*. Such revenues should be recorded as current grants. Thus, the income tax decentralization ratio is a useful measure for subnational engagement in income redistribution through taxation.

**Figure 5: Average Transfer Dependency and Income Tax Decentralization Ratios**  
(1990–2011)



Charts are based on a maximum sample size of 62 for transfer dependency and 68 for income tax decentralization countries. Transfer Dependency measures the share of state and local government expenditure financed from transfers from other levels of government. Income tax decentralization ratios measure the share of state and local income tax revenue relative to total income tax revenue.

Source: *Government Finance Statistics Yearbook* (1990–2011).

#### IV. ESTIMATION<sup>12</sup>

Building on past findings, we estimate the impact of decentralized redistributive expenditure on income inequality from the following equation:

$$gini_{it} = \alpha_i + \delta_1 \gamma_{j,it} + \delta_2 \gamma_{j,it}^2 + \delta_3 (size_{it}) + \delta_4 (size_{it})^2 + \delta_5 \gamma_{j,it} * size_{it} + \delta_6 trans\_dep_{it} + \mathbf{X}\boldsymbol{\beta} + \varepsilon_{it} \quad (4)$$

Where,

$\gamma_{j,it}$  is the decentralization ratio for functional expenditure on  $j$  (social protection, health, education, redistributive) in country  $i$  at time  $t$ ;

$size_{it}$  is the size of the general government in country  $i$  at time  $t$ , measured as general government expenditures as a percentage of GDP;

$trans\_dep_{it}$  is subnational government transfer dependency for country  $i$  at time  $t$ .

Following theoretical expectations and past specifications,  $\mathbf{X}$  is a matrix containing income tax decentralization ratios, GDP per capita (log), total government expenditure as a percentage of GDP, openness (exports plus imports as a percentage of GDP), and,  $\delta_k$

<sup>12</sup> Summary statistics are shown in the online Appendix.

( $k = 1, \dots, 4$ ),  $\beta$  are unknown parameters to be estimated. We also estimate a ‘baseline’ specification from past literature using  $\gamma_{j,it}$  where  $j$ = total government expenditure.

Due to serial correlation and the unbalanced nature of our panel, we use the estimator proposed by Baltagi and Wu (1999) where the disturbance term in equation (4) follows a stationary AR(1) process ( $\varepsilon_{it} = \rho\varepsilon_{i,t-1} + v_{it}$ ) where  $|\rho| < 1$ ,  $\varepsilon_{it} \sim (0, \sigma_v^2 / (1 - \rho^2))$ ,  $v_{it} \sim N(0, \sigma_v^2)$ , and  $cov(\alpha_i, v_{it}) = 0$ . This estimator is a modification of the Prais-Winsten transformation, which accounts for the unbalanced nature of the panel.<sup>13</sup> This paper differs from the standard approach by focusing exclusively on within-country effects.

We focus on within-country effects for three reasons. First, because the theoretical literature is based on within-country income distributions, we want to examine changes in national income distribution as they relate to within-country circumstance. Second, being interested in the relationship between fiscal decentralization and income inequality over time, the relatively large static cross-country variance in Gini coefficients, and difficulty in explaining this variance, makes the parametric results potentially misleading. Isolating the estimates to within country effects avoids any ecological fallacy (Simpson’s paradox) problems—especially in the presence of omitted variable bias. Thirdly, we are able to ignore any country-constant information which are important in cross-country analysis (region, federal, culture, etc). This allows us to contain the number of explanatory factors to a small subset of what is necessary to correctly specify a cross-country equation.

There is also a potential reverse causality argument stemming from the seminal work of Meltzer and Richard (1981). In this, and several subsequent papers, the results indicate that the size of government, or level of government redistribution, within a country is a function of the distance between mean and median income (income inequality) within that country. In contrast to Meltzer and Richard’s model, our specification focuses on net and not gross inequality. Reverse causality between Gini coefficients of post-tax-and-transfer income and the size of government should not pose a concern as this measure nets out government income redistribution. While it is difficult to provide clearer insight into causality using lags or granger causality tests, with slow-moving series (income inequality and size of government) we run a series of government size lagged specifications (one, two, and three period) and still cautiously report parametric results as correlative.

A related reverse causality issue concerns the type of inequality found in an economy and the degree of decentralization of redistribution. One might argue along the lines of Beramendi (2007) that preferences for decentralization of redistribution are a function of the degree of regional inequality within a country. The specification employed in this paper focuses on national inequality and not regional inequality, so that reverse causality of this form seems less likely.

## V. RESULTS

The results in Table 3 show estimates from five specifications. The first column of results breaks down the decentralization of redistributive expenditures into three categories

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<sup>13</sup> For balanced panels this is equivalent to the Prais-Winsten transformation.

(education, health, social protection). The second and third column of Table 4 show estimates from an aggregate redistributive decentralization measure for a full sample and subsample of countries (those with at least ten years of observations). The fourth and fifth column of Table 3 show estimates from an aggregate expenditure decentralization measure for a full sample and subsample of countries (those with at least ten years of observations).

**Table 2: Econometric Results**  
(standard errors in parentheses)

|                                   | Income<br>Inequality | Income<br>Inequality | Income<br>Inequality        | Income<br>Inequality | Income<br>Inequality |
|-----------------------------------|----------------------|----------------------|-----------------------------|----------------------|----------------------|
| Variables                         | (1)                  | (2)                  | Income<br>Inequality<br>(3) | (4)                  | (5)                  |
| Income Tax Decentralization Ratio | 2.28*<br>(1.36)      | 2.33*<br>(1.37)      | 4.16**<br>(1.61)            | 1.42<br>(1.35)       | 3.26**<br>(1.64)     |
| Size                              | 0.25***<br>(9.67)    | 0.29***<br>(0.97)    | 0.40***<br>(0.10)           | 0.33***<br>(0.10)    | 0.41***<br>(0.12)    |
| Size sq                           | -0.28**<br>(11.28)   | -0.27**<br>(0.11)    | -0.39***<br>(0.12)          | -0.26**<br>(0.11)    | -0.34***<br>(0.13)   |
| GDP per capita (log)              | 1.51***<br>(0.27)    | 1.47***<br>(0.27)    | 1.36***<br>(0.27)           | 1.43***<br>(0.26)    | 1.43***<br>(0.30)    |
| Openness                          | 1.67**<br>(0.77)     | 1.50*<br>(0.77)      | 2.14**<br>(0.87)            | 1.23<br>(0.75)       | 1.96**<br>(0.87)     |
| Transfer Dependency               | 3.14**<br>(1.28)     | 2.46*<br>(1.33)      | 2.57*<br>(1.49)             | 2.45*<br>(1.24)      | 2.59*<br>(1.45)      |
| Ratio –<br>Health                 | -1.20<br>(0.85)      |                      |                             |                      |                      |
| Ratio –<br>Education              | 0.97<br>(1.22)       |                      |                             |                      |                      |
| Ratio –<br>Social Protection      | 0.59<br>(2.63)       |                      |                             |                      |                      |
| Ratio –<br>Redistribution         |                      | 0.11*<br>(0.63)      | 0.12<br>(0.08)              |                      |                      |
| Ratio –<br>Redistribution sq      |                      | -0.07<br>(0.08)      | -0.06<br>(0.11)             |                      |                      |
| Ratio –<br>Redistribution*Size    |                      | -0.22**<br>(0.11)    | -0.28**<br>(0.12)           |                      |                      |
| Ratio –<br>Total Expenditure      |                      |                      |                             | 0.33***<br>(0.12)    | 0.38***<br>(0.13)    |
| Ratio –<br>Total Expenditure sq   |                      |                      |                             | -0.29*<br>(0.16)     | -0.35**<br>(0.17)    |
| Ratio –<br>Total Expenditure*Size |                      |                      |                             | -0.37***<br>(0.14)   | -0.47***<br>(0.16)   |
| Country Sample                    | 48                   | 48                   | 27                          | 48                   | 27                   |
| Sample Size                       | 521                  | 521                  | 416                         | 554                  | 430                  |
| $\rho$ (AR(1))                    | 0.72                 | 0.71                 | 0.64                        | 0.77                 | 0.73                 |
| R <sup>2</sup> (within)           | 0.20                 | 0.21                 | 0.31                        | 0.34                 | 0.43                 |

\* -  $p < .10$ ; \*\* -  $p < .05$ ; \*\*\* -  $p < .01$

Column 1: decentralization ratios for three redistributive expenditure categories (health, education, social protection), full sample. Column 2: decentralization ratio for redistributive expenditure, full sample. Column 3: decentralization ratio for redistributive expenditure, subsample of countries with at least ten years of observations. Column 4: decentralization ratio of aggregate expenditure, full sample. Column 5: decentralization ratio of aggregate expenditure, subsample of countries with at least ten years of observations.

These results are largely consistent with past findings. GDP per capita and relative economic openness have a significant and robust relationship with income inequality (log-linear for GDP per capita). This finding is consistent with a complex and well-developed history on the

relationship between economic growth and income inequality (see, for example, Persson and Tabellini, 1994; Barro, 2000; and Barro, 2008).

With respect to our variables of interest, despite a battery of specifications, there appears to be no significant relationship between redistributive expenditure and income inequality, for any of the redistributive spending categories (see the first column of results in Table 2). There appears to be a significant relationship between income inequality, aggregate redistributive and total expenditure. This finding suggests that expenditure decentralization can have a significant effect on income inequality only when aggregate rather than a select area of expenditure is decentralized. While it is clear from Figure 3 that some areas are more likely targets for decentralization, an aggregate increase (regardless of its dispersion) is the only way to achieve greater income equality.

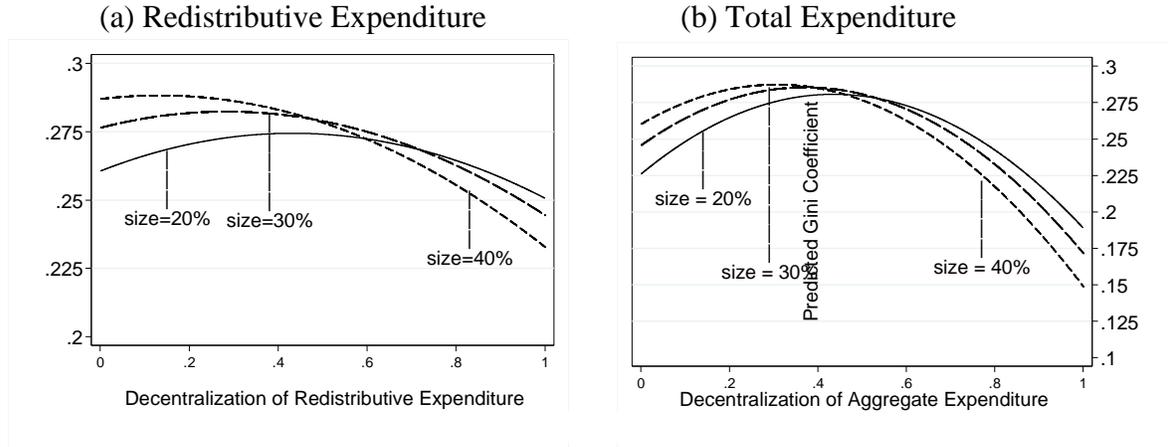
Taking the first derivative of equation (4) with respect to our measure of expenditure decentralization breaks the marginal effect of fiscal decentralization down into:

$$\frac{\partial gini}{\partial \gamma_j} = \delta_1 + 2\delta_2\gamma_j + \delta_5(size) \implies \gamma_j^* = \frac{-(\delta_1 + \delta_5(size))}{2\delta_2} \quad (5)$$

While  $\delta_1$  is consistently positive, while  $\delta_5$  and  $\delta_2$  are consistently negative, and  $\gamma_j^*$  (from (5)) is the threshold at which the quadratic effect of decentralization begins to negatively affect income inequality.

Due to the significant interaction between the size of general government and degrees of decentralization, the relationship with income inequality is mutually dependent. Figure 7 plots this relationship with fiscal decentralization (redistributive and total expenditure) on the x-axis and predicted Gini coefficient from equation (4). We plot this relationship for three discrete levels of government size (20 percent, 30 percent, and 40 percent of GDP). As the estimates from Table 2 suggest, the effect of decentralization of redistributive expenditure has a significantly softer slope than that of total expenditure.

**Figure 6: Decentralized Expenditure, Income Inequality and the Size of General Government**



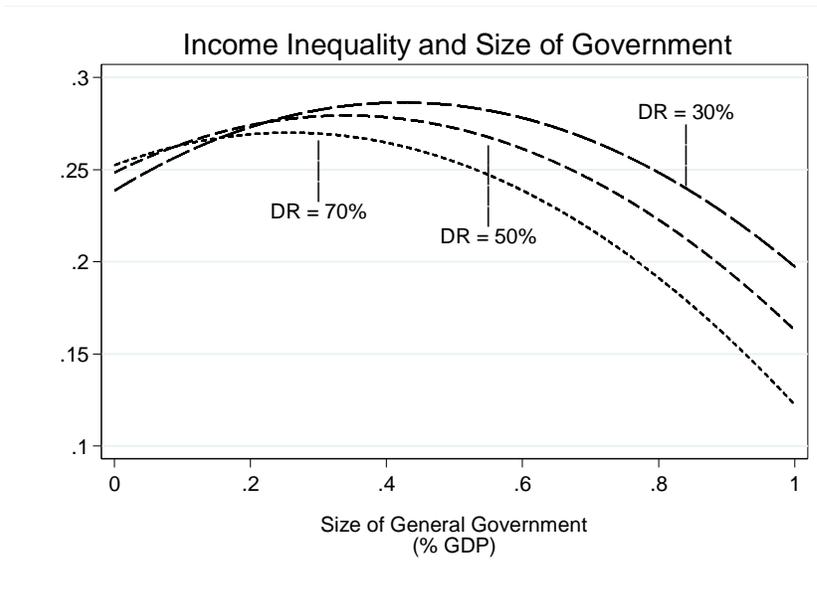
Size refers to general government expenditure in percent of GDP  
 Predicted effects hold all other control variables at their mean values

Looking more closely at the continuous effect of government expansion (measured as total general government expenditure as a percentage of GDP), the results are relatively consistent with those of Sepulveda and Martinez-Vazquez (2011). Again, taking the first derivative of equation (4), the marginal effect of a change in government size can be shown as:

$$\frac{\partial gini}{\partial size} = \delta_3 + 2\delta_4(size) + \delta_5\gamma_j; \Rightarrow size^* = \frac{-(\delta_3 + \delta_5\gamma_j)}{2\delta_4}; \quad (6)$$

Where,  $\delta_3$  is positive,  $\delta_4$  and  $\delta_5$  are both negative. As in Sepulveda and Martinez-Vazquez (2011), the marginal effect of government expansion on income inequality is positive at low levels, however, significantly decreases income inequality once past a threshold (where  $size = \frac{-(\delta_3 + \delta_5\gamma_j)}{2\delta_4}$ ). The magnitude of this effect, and location of the threshold, is dependent on what proportion of an increase in general government is at the subnational level  $\gamma_j$ . For example, plugging the results from column three of Table 2 into (6) gives  $size^* = 0.51 - .36\gamma_j$  implying that, for a fully decentralized government ( $\gamma_j = 1$ ), this ‘threshold’ government size is 15 percent of GDP, while for a fully centralized government, the threshold is 51 percent.

Figure 8 illustrates this dependence, plotting the predicted relationship between income inequality and the size of general government for three fixed levels of decentralization (as measured by decentralization ratios of 30, 50, and 70 percent).

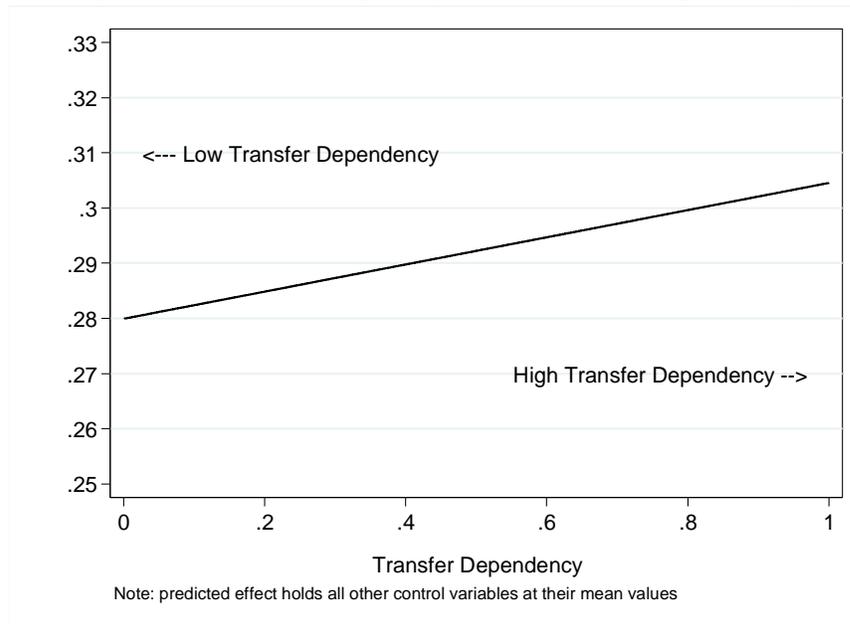
**Figure 7: Decentralized Redistribution and Size of General Government**

DR = Decentralization Ratio

Size refers to general government expenditure in percent of GDP.

The predicted effect holds all other control variables at their mean values.

Consistent with the expectation of Padovano (2007) and Weingast and Qian (1997), transfer dependency also appears to have a significant relationship with income inequality. Where sub-central revenues are less dependent on intergovernmental transfers, we should expect lower levels of income inequality within countries. This result is fairly robust across specifications. Figure 9 plots this relationship with transfer dependency on the x-axis (0 – no transfer dependency; 1 – full transfer dependency).

**Figure 8: Income Inequality and Transfer Dependency**

These empirical results are generally consistent with past analytical work, and with the second generation of fiscal federalism, regarding the relationship between income inequality and fiscal decentralization. We provide further evidence that the effect of an expansion of government on income inequality depends on the extent to which the expansion takes place at the subnational level. We also confirm past approaches which measure redistribution on the aggregate level. Where decentralization takes place for only selected expenditures, without any increase in total decentralization, the results suggest that there will be no effect on income inequality. Consistent with the second-generation literature of fiscal federalism, the extent to which subnational governments are dependent on transfers from other government levels appears to have a negative effect on income inequality within countries. These results should be interpreted carefully as interesting correlations which require further work on a micro level to validate the path of causation.

## VI. CONCLUSION

The purpose of this paper was to empirically test the relationship between fiscal decentralization and income inequality within countries. Past research on interregional income inequality and fiscal decentralization suggests that the two should be related, particularly when government redistribution is decentralized and subnational governments are not highly dependent on transfers to finance their expenditures. This paper lends support to these findings, and, more generally the tenets of the second generation of fiscal federalism, which recommends redistribution in a setting of comprehensive fiscal decentralization where subnational governments have sufficient access to own resources (as opposed to transfers).

The decentralization of categories of redistributive spending appears to have no significant impact on income inequality, suggesting that decentralization should be achieved on an aggregate level in order to reduce income inequality. A significant quadratic relationship only emerges once we move to a higher level of aggregation by jointly considering all redistributive,

or total, spending items. In all cases, the effect of expenditure decentralization is also contingent on the total size of government, consistent with evidence in past empirical literature.

In sum, the decentralization of government expenditure can help achieve a more equal distribution of income. However, several conditions need to be fulfilled. First, the government sector needs to be sufficiently large. Second, decentralization should be comprehensive, including redistributive government spending. Given the softer slope of decentralizing redistributive expenditure, this may be a good target for an initial move towards greater decentralization. Third, decentralization on the expenditure side should be accompanied by adequate decentralization on the revenue side, so that subnational governments rely primarily on their own revenue sources as opposed to intergovernmental transfers. Given limited empirical work in this area and growing interest in achieving inclusive growth, further evidence and qualitative case studies would be beneficial to clarify policy conclusions for achieving a more equal income distribution.

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