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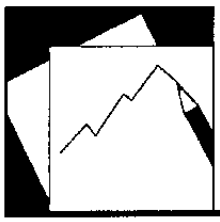

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Income Inequality and Redistributive Government Spending

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Income Inequality and Redistributive Government Spending [1]

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Abstract

The paper examines empirically the question of whether more unequal societies spend more on income redistribution than their more egalitarian counterparts. Theoretical arguments on this issue are inconclusive. The political economy literature suggests that redistributive spending is higher in unequal societies due to median voter preferences. Alternatively, it can be argued that unequal societies may spend less on redistribution because of capital market imperfections. Based on different data sources, the cross-country evidence reported in this paper suggests that more unequal societies do spend less on redistribution.

JEL Classification Numbers: I30, H53, E60

Keywords: Income distribution, government spending, capital deepening

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I. Introduction

Poverty reduction is high on the international development policy agenda. It is also widely accepted that the government can play a key role in redistributing income through public policies. Promoting equity by investing in human capital can lead to sustained economic growth. Policies that improve equity can help reduce political and economic disruption. In countries undergoing structural adjustment, greater equity can serve to promote the political sustainability of reforms.

Government intervention in income redistribution is justified because sustained economic growth alone may fail to reduce income inequality. Periods of sustained economic growth are associated with reductions in poverty, but not necessarily with improvements in the distribution of income, particularly in countries where income is less evenly distributed. However, it is often true that governments in more unequal societies tend to redistribute less, not more, than those in more egalitarian parts of the world. In this case, regrettably, the countries where redistributive public spending is more needed are the ones that are less likely to allocate public resources to these programs.

The literature on income inequality and redistributive government spending (to be surveyed below) is less controversial, but by no means polarized, in theory than in practice. Empirical evidence of an association between redistribution and inequality is far from clear-cut. Against this background, this paper aims at empirically testing two hypotheses. The first hypothesis is whether there is a negative association between income inequality and redistributive government spending; in other words, whether more unequal societies spend less on redistribution than their more egalitarian counterparts. The second hypothesis, as put forward by Bénabou (2000), is whether the relationship between redistributive spending and income inequality is nonlinear. If so, two steady states can be identified associating high (low) income inequality with low (high) redistribute spending. In doing so, we focus on the association between redistribution and income inequality, unlike the early empirical literature, in which attention was focused primarily on the association between inequality and growth.

Estimations of the association between inequality and redistribution in the empirical literature are sensitive to different data sources and definitions of the inequality and redistribution indicators. Against this background, particular attention will be focused in what follows on the robustness of parameter estimates to different model specifications and data sources. To do so, two sources of data on government transfers will be used: the IMF's *Government Finance Statistics* (GFS) and the United Nations' *System of National Accounts* (SNA). Unlike previous studies, we also extend the sample for a longer time period and to include a number of developing countries.

This paper is organized as follows: Section II surveys the literature, Section III describes the data and the estimation techniques used in the empirical section, Section IV reports the results of the empirical analysis, and Section V concludes.

II. A Survey of the Literature

A. The Theoretical Literature

Most theoretical models of redistribution and inequality are based on the median voter hypothesis put forward in the social choice literature following the seminal model of voting over redistribution developed by Meltzer and Richard (1981). Accordingly, in more unequal societies, the difference between the incomes of the median and the mean voters is greater. Consequently, the median voter is expected to exert more political pressure for redistributive government intervention in more unequal societies. This is because the benefit to the median voter of redistributive transfers from the government outweighs the costs of taxation (borne by the median voter) to finance redistribution. The key assumptions of these models are that the preferences of the median voter are taken into account in the political process under majority voting, and that taxation is progressive.

More recently, Bénabou (2000) developed a stochastic growth model in which more income inequality is associated with less, rather than more, redistributive government spending. It is argued that, when there are positive externalities to redistribution, for example capital and insurance markets are imperfect and individuals are heterogeneous, popular support for redistributive policies decreases with inequality. Low inequality creates wide political support for redistribution so as not to allow income disparities to grow over time as a result of capital market imperfections. The effective cost of redistribution, however, increases with the degree of inequality; consequently, support for redistribution is negatively related to inequality. As argued by Furman and Stiglitz (1998, p. 222), "capital market imperfections imply that consumption fluctuations induced by business fluctuations are far greater than they would be with perfect capital markets, with correspondingly large effects on welfare." In sum, if capital markets are imperfect, investment opportunities differ among individuals with low and high initial wealth and these unequal investment opportunities generate income inequalities that persist over time.[2] Moreover, nonlinearities in the model are shown to lead to two steady states defined for low inequality and high redistribution, on the one hand, and for high inequality and low redistribution, on the other. In the long run, a negative relationship is expected to prevail between redistribution and inequality.

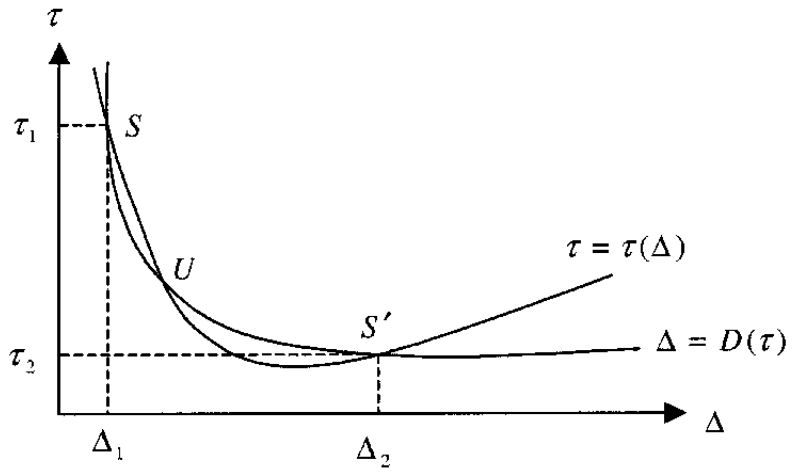
Figure 1 is reproduced from Bénabou (2000, Figure 2, p. 101) and illustrates the basic idea. The redistributive tax base chosen by the electorate (τ) depends on the level of inequality

[2] An obvious example is private spending on education. Individuals may not be able to borrow to finance spending on human capital investment and therefore increase their future earnings possibilities. Even if individuals can borrow, investment on education is risky and, in the absence of insurance markets, poorer individuals may be unwilling, and unable, to incur these risks. By the same token, Galor and Zeira (1993) show that poor households will be caught in a poverty trap and inequality will be perpetuated across generations in the presence of imperfect capital markets. A similar argument is put forward by Lee and Roemer (1998). Agricultural risk is another example of inequality-inducing imperfections in capital and insurance markets, particularly in the developing world.

(Δ), as depicted by the U-shaped τ schedule. The equilibrium level of inequality Δ is a downward-sloping function of τ because of the income accumulation process with imperfect capital markets. As a result, under relatively mild conditions, two stable steady states (S and S') are shown to exist, as well as an unstable steady state (U). At S, low inequality is associated with large transfers and, at S', high inequality is associated with low levels of redistributive spending. Earlier versions of the model are presented in Bénabou (1996).

The main assumptions in Bénabou's model, which is highly stylized, are (1) the focus on redistribution among producers (the generations that overlap are children and adults, not workers and retirees), (2) lognormality of all relevant variables, (3) redistribution decisions are based only on capital endowment, not random income shocks, (4) tax rates (transfer rates) continuously increase with before-tax income, (5) all redistribution is "perfectly" targeted, and (6) the government plays no role other than to redistribute. These assumptions will not hold in general. The question addressed here is whether they yield an empirical relationship between redistribution and inequality similar to the theoretical relationships in the model.

Figure 1. Inequality and Redistribution:
Dynamics and Steady States



The association between inequality and redistribution is known to depend on other political economy factors.[3] Interestingly, recent research yields predictions broadly similar to those of Bénabou (1996, 2000). For instance, Rodriguez (1999b) shows that inequality may be negatively associated with redistribution via rent-seeking and political influence. In his analysis, greater inequality translates into an increased share of public resources accruing to

[3] See Persson and Tabellini (1999) for a survey of other political economy determinants of redistributive government spending.

individuals who are in a position to influence policymakers. As shown by the political economy-growth literature, in unequal societies, organized individuals pursue their interests outside the usual channels of political representation (Alesina and Perotti, 1994 and 1996), thereby weakening the median voter hypothesis. Similarly, Lee and Roemer (1999) show that, with greater inequality, a given tax rate yields less revenue for the same tax base, which then induces less public spending.

B. The Empirical Literature

The empirical literature has focused on testing two hypotheses: the negative association between inequality and redistributive government spending, and the role played by the median voter in explaining this negative relationship.

The median voter hypothesis has been tested almost exclusively in the political economy-growth literature.[4] Accordingly, income distribution affects growth through its impact on government spending and taxation: redistributive spending financed by distortionary taxation reduces the incentive for capital accumulation and investment and, therefore, output growth (Alesina and Rodrik, 1994; Perotti, 1996). Perrson and Tabellini (1994), for example, report a negative relationship between income inequality and growth in which government transfers constitute a key mechanism. Because the median voter argument is only valid in democracies, most empirical studies on the association between redistribution and income inequality have focused on developed countries, which tend to be mature democracies (Perotti, 1996).

Table 1 summarizes the main findings and particular characteristics of different empirical studies. The parameter estimates reported in the empirical literature have been, in general, insignificant. Cross-country studies typically regress aggregate government spending on a measure of income distribution and control for other determinants of public expenditure. Fiscal data are often drawn from the IMF's *Government Finance Statistics* (GFS), combined with information from other sources. Until 1996, data on income distribution had been drawn from different data sets. Cross-country studies conducted after 1996 have relied on data collected by Deininger and Squire (1996), noting their superior reliability to data collected earlier.[5] Panel data studies are few and typically use U.S. state data. In these studies, the variables are defined using 10-year averages, rather than annual data.

Recent cross-country evidence provides inconclusive results on the association between inequality (of disposable income) and the share of transfers in total government spending or the ratio of government spending to GDP. The earliest test of the inequality-redistribution

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[4] For recent surveys, see Bénabou (1996), Panizza (1999), and Milanovic (2000).

[5] Notwithstanding the improvement in the quality of data on income distribution, researchers have also recently criticized the data compiled by Deininger and Squire (1996). See also Panizza (1999).

hypothesis, carried out by Meltzer and Richard (1983), has met some opposition (Tullock, 1983). The main objections have been methodological. More recently, Gouveia and Masia (1998) replicated the Meltzer and Richard (1983) study using panel data for the U.S. states, covering the period 1979–91 and found little evidence to support the hypothesis. Finally, Moffitt, Ribar, and Wilhelm (1998) test the hypothesis that the decline in welfare benefits in the U.S. is related to the increase in wage inequality and to the decline of real wages at the lower end of the income distribution. That is, voters prefer welfare benefits that are tied to low-skill wages. Using state panel data for 1962–92, the authors indeed find support for the hypothesis.

The cross-state study of Bassett, Burkett, and Putterman (1999) is one of the empirical studies reporting a negative association between inequality and redistribution. Inequality is measured as the share of income accruing to the third quintile to proxy for the median voter. A positive association is reported between inequality and redistribution only when the inequality variable is redefined as the income share of the very rich (highest 5 percent bracket of the income distribution). Their argument is based on a "soak-the-rich" effect due to a large concentration of income at the top of the country's income distribution.[6] This is because in societies where the income distribution is highly skewed, the median voter is substantially poorer than the "decisive voter," who controls the political process.[7]

To our knowledge, the hypothesis put forward by Bénabou (2000) of a nonlinear association between redistribution and inequality has not been tested in the literature. To our knowledge, the only test of nonlinearity was conducted by Figini (1998), using aggregate spending variables. The emphasis of his paper is on the political economy of economic growth and the impact of inequality on redistribution is estimated within a growth model framework.

Many studies in the literature point to data availability as an important limitation to the estimation of the association between redistribution and inequality for a large enough sample of countries. In principle, following the political economy argument, support for redistributive policies depends on pre-redistribution income. Detailed information on pre-tax, pre-transfer income (factor income) is only available for more developed countries, as well as data on the incidence of redistributive programs.[8] A recent test of the theory reported by

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[6] The inequality data used in the empirical section below, based on the distribution of income/expenditures by quintiles, do not allow for testing the "soak-the-rich" hypothesis put forward by Bassett, Burkett, and Putterman (1999) or to measure inequality based on the relative position of the median and decisive voters in the income distribution.

[7] Bénabou (1996, p. 21) assumes that the pivotal agent has a higher income than the median voter and shows that inequality can lead to *less* redistribution.

[8] Panizza (1999) uses an index of tax progressivity for the U.S. states as an additional explanatory variable in his regional growth regressions.

Table 1. Summary of Recent Studies: Inequality and Redistribution

Source	Sample size	Period	Data structure	Measures		Correlation	
				Redistribution 1/	Inequality	Sign 2/	Significance
Bassett, and others, 1999	Up to 54 countries	1970-85	Cross-country average	Social security and welfare	Mostly Q3 in 1960s 3/	Generally negative	Inconsistent
Easterly and Rebelo, 1993	Not available	1970-88	Cross-country average	Spending variables	Gini, various income shares	Positive	Significant
Figini, 1998	Up to 63 countries	1970-90	Cross-country average	Tax rates, total revenue and total spending	Gini coefficient in 1970	Nonlinear	Significant
Gouveia and Masia, 1998	50 US states	1979-91	Panel	Spending variables	Ratio of mean to median income	Generally negative	Generally significant
Lindert, 1996	14 OECD countries	1962-81	Panel	Spending variables	Income gap index	Negative	Generally insignificant
Meltzer and Richard, 1983	US average	1937-77	Time series	Spending variables	Ratio of mean to median income	Positive	Significant
Milanovic, 2000	24 mostly OECD countries	1967-97 4/	Panel	Gain by poorest quintile or poorest half	Pre-transfer Gini coefficient	Positive	Significant
Panizza, 1999	46 US states	1970-80	Cross-state average	Tax, tax progressivity, and spending variables	Q3 in 1970 3/	Generally positive	Inconsistent
Partridge, 1997	48 US states	1960-90 5/	Panel	Tax, employment and spending variables	Pre-tax Gini, Q3	Inconsistent	Generally significant
Perotti, 1992	40 democracies	1970-85	Cross-country average	Spending variables	Q3 in 1970 3/	Negative	Insignificant
Perotti, 1994	52 countries	1970-85	Cross-country average	Transfers	Q3 in 1960 3/	Negative	Insignificant
Perotti, 1996	49 countries	1970-85	Cross-country average	Tax rates and spending variables	Q3 and Q4 in 1960 3/	Generally positive	Generally insignificant
Persson and Tabellini, 1994	13 OECD countries	1960-81	Cross-country average	Transfers	Q3 in 1965 3/	Positive	Insignificant
Rodriguez, 1999a	50 US states	1984-94	Time series and cross-state average 6/	Spending variables	Distribution skewness	Inconsistent	Insignificant
Tanninen, 1999	Up to 45 countries	1970-88	Cross-country average	Spending variables	Adjusted Gini coefficient in 1970s 7/	Inconsistent	Generally insignificant

Source: As indicated. See text for further discussion of these results.

1/ In percent of GDP unless otherwise indicated.

2/ Negative means greater inequality is associated with *less* spending.

3/ A higher Q3 means greater income equality. For consistency with other studies in the reporting of main results, Q3 and Q4 are taken to mean -Q3 and -Q4.

4/ Total number of observations is 79.

5/ Total number of observations is 144.

6/ Refers to national time-series.

7/ Adjusted for variations in the Gini definition.

Milanovic (2000) uses factor income data available from the Luxembourg Income Study (LIS). Based on this data set, a positive and statistically significant association is reported between redistribution and inequality. The results reported by Milanovic (2000) nevertheless do not lend support to the median voter hypothesis, according to which redistribution is pursued in unequal societies through its increased benefits to the middle class.

III. Data and Estimating Equations

A. The Data

Data on government transfers are available from the IMF's *Government Finance Statistics* (GFS) and the United Nations' *System of National Accounts* (SNA) for a sample of between 41 and 56 countries, of which less than one-half are high-income countries. GFS data are available for government expenditure on social security and welfare for the period 1972–97. SNA data are available for current government transfers in the period 1970–96. Not all transfers are redistributive, however.

A widely used source of income inequality data is available from Deininger and Squire (1996). Information on income inequality is also available from the *World Income Inequality Database* (WIID), comprising data recently collected by the World Bank, the United Nations Development Program (UNDP), the United Nations University (UNU), and the World Institute for Development Economics Research (WIDER). The UNU-WIDER database includes the Deininger and Squire database augmented with data from other sources, thus covering more countries and a longer time span. In assembling their database, Deininger and Squire set minimum standards for quality; in particular, they required that observations be drawn from household surveys, and based on a comprehensive coverage of the population and on a comprehensive measurement of income or expenditure. Technical information on UNU-WIDER data allows for the adoption of the same minimum standards of quality.

We restrict the sample to higher-quality data, depending on whether the whole population is covered, and whether individuals or households are the focus of the household surveys. Income inequality data may also be based on expenditures or income. Data may be collected nationwide or only for selected regions of the country, such as urban areas. Typically, the distribution of income is more skewed than that of expenditures, reflecting individuals' or households' access to undeclared or nonmonetary income, for instance, and their ability to smooth consumption. Inequality data may also be measured for income net of taxes and transfers, or excluding certain types of income, such as taxable income and in-kind transfers, self-employment earnings, gifts, and factor income, among others.[9]

[9] According to Milanovic (2000), based on LIS data, government transfers and taxes reduce factor income inequality by 14 Gini points.

Basic descriptive statistics are presented in Table 2.[10] Transfers account for 7–10 percent of GDP on average. The GDP shares of transfers constructed with SNA and GFS data have a correlation coefficient of 0.95 (for averages for the whole period for which information is available). The Gini coefficient is used as the basic inequality indicator in what follows.

Additional variables used in the empirical section below are the share of the population aged 65 and over; GDP per capita; and instruments for capital market imperfection, including credit to the domestic economy, credit to the private sector, and the share of broad money (M2) to GDP. These are drawn from the World Bank's 2000 *World Development Indicators* (WDI). We also used data on the black market exchange rate premium, available from the *Global Development Network* database; and an indicator of democracy, available from La Porta and others (1999).

Evidence of an empirical association between redistribution and inequality is provided in Figures 2 and 3. The bivariate correlations are unequivocally negative, suggesting that more unequal societies tend to redistribute less, not more, in the form of cash transfers such as social security and assistance benefits.[11] The correlations are robust to different inequality data sources (UNU-WIDER and Deininger and Squire, 1996) and indicators, regardless of whether the data are based on expenditures or income, households or individuals, and pre-tax or after-tax income. The correlations are also robust to different data sources on public redistributive spending (GFS or SNA).

B. The Estimating Equations

The association between inequality and redistributive government spending is conventionally estimated as:

$$\frac{T_i}{Y_i} = a_0 + a_1 I_i + a_2 C_i + u_i, \qquad (1)$$

where T denotes government-financed redistributive transfers to individuals/households, Y is GDP, I is a variable that measures inequality (in this paper, the Gini coefficient), C is a vector of control variables, u is an error term, and i identifies the countries in the sample.

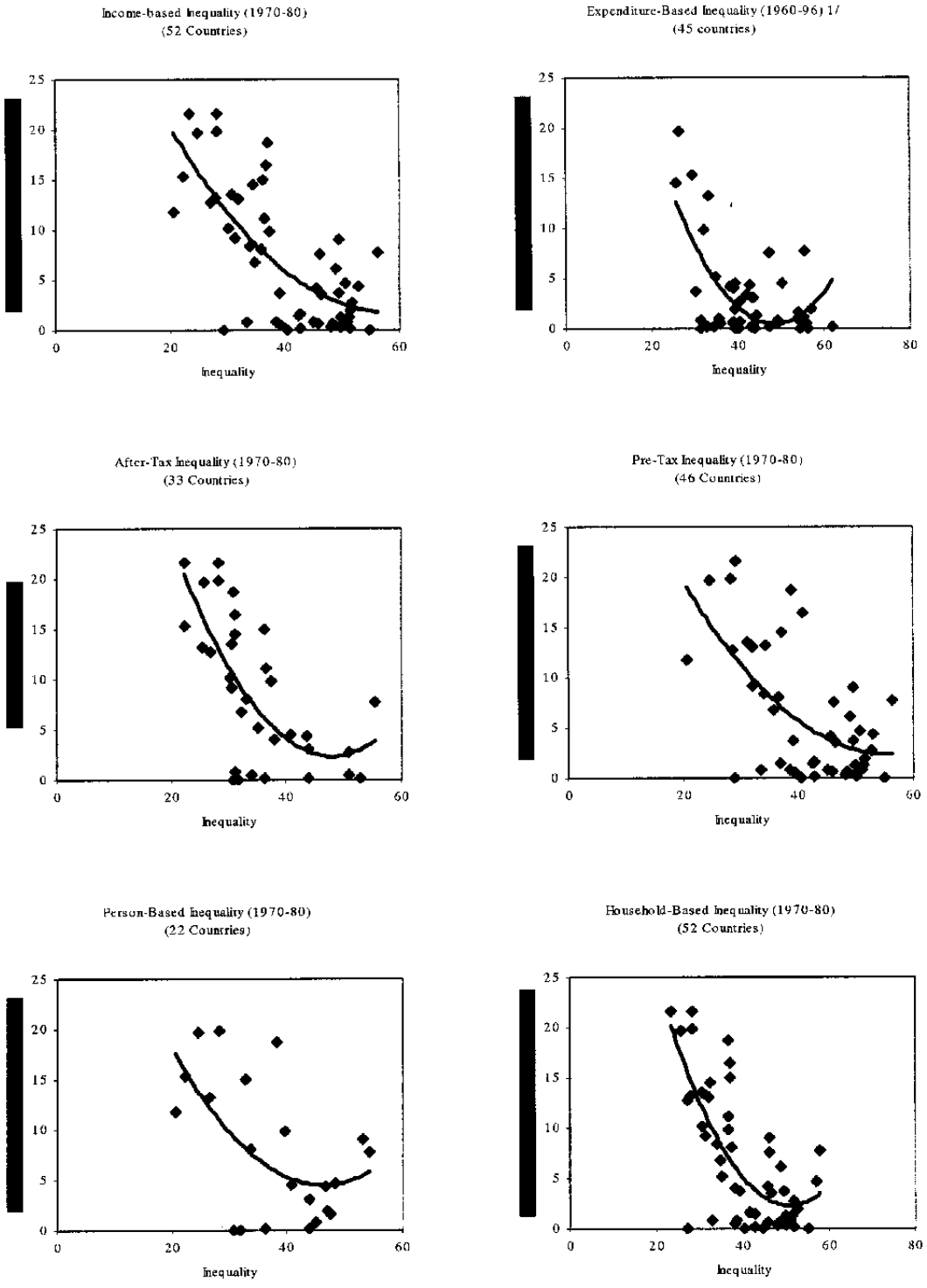
[10] See Appendix Table 1 for a list of countries in our sample.

[11] The quadratic trend lines are depicted in Figures 1 and 2 because they have a better fit than the alternative linear trend lines. The quadratic, rather than linear, nature of the relationship between inequality and redistribution will be explored in the empirical section.

Table 2. Summary Statistics

Variable	Period	Mean	Standard Deviation	Minimum	Maximum	Number of observations	Source
Dependent variables							
Social security and welfare spending (in percent of GDP)	1981-98	6.7	6.5	0.0	21.6	56	GFS
Government transfers (in percent of GDP)	1981-98	10.6	8.0	0.3	30.7	41	SNA
Independent variables							
Gini coefficient	1970-80	39.6	9.2	20.6	56.2	56	UNU-WIDER
PPP GDP per capita (US dollars)	1970-80	3632.0	2619.0	297.0	9976.0	56	WDI
Population over 65 years of age (in percent of total)	1981-98	7.8	4.6	2.4	17.5	56	WDI
Democracy index	1970-94	5.8	3.7	0.0	10.0	54	La Porta, and others, 1999
Instruments							
Money and quasi money (M2) (in percent of GDP)	1970-80	31.9	14.7	11.9	79.5	44	WDI
Domestic credit provided by banking sector (in percent of GDP)	1970-80	43.4	28.5	9.1	166.3	44	WDI
Credit to private sector (in percent of GDP)	1970-80	31.0	22.2	4.1	129.1	44	WDI
Others							
Black market premium (in percent)	1970-80	26.7	58.0	0.0	360.0	52	GDN
Interest rate spread (lending rate minus deposit rate)	1970-80	4.3	5.3	1.5	29.3	30	WDI

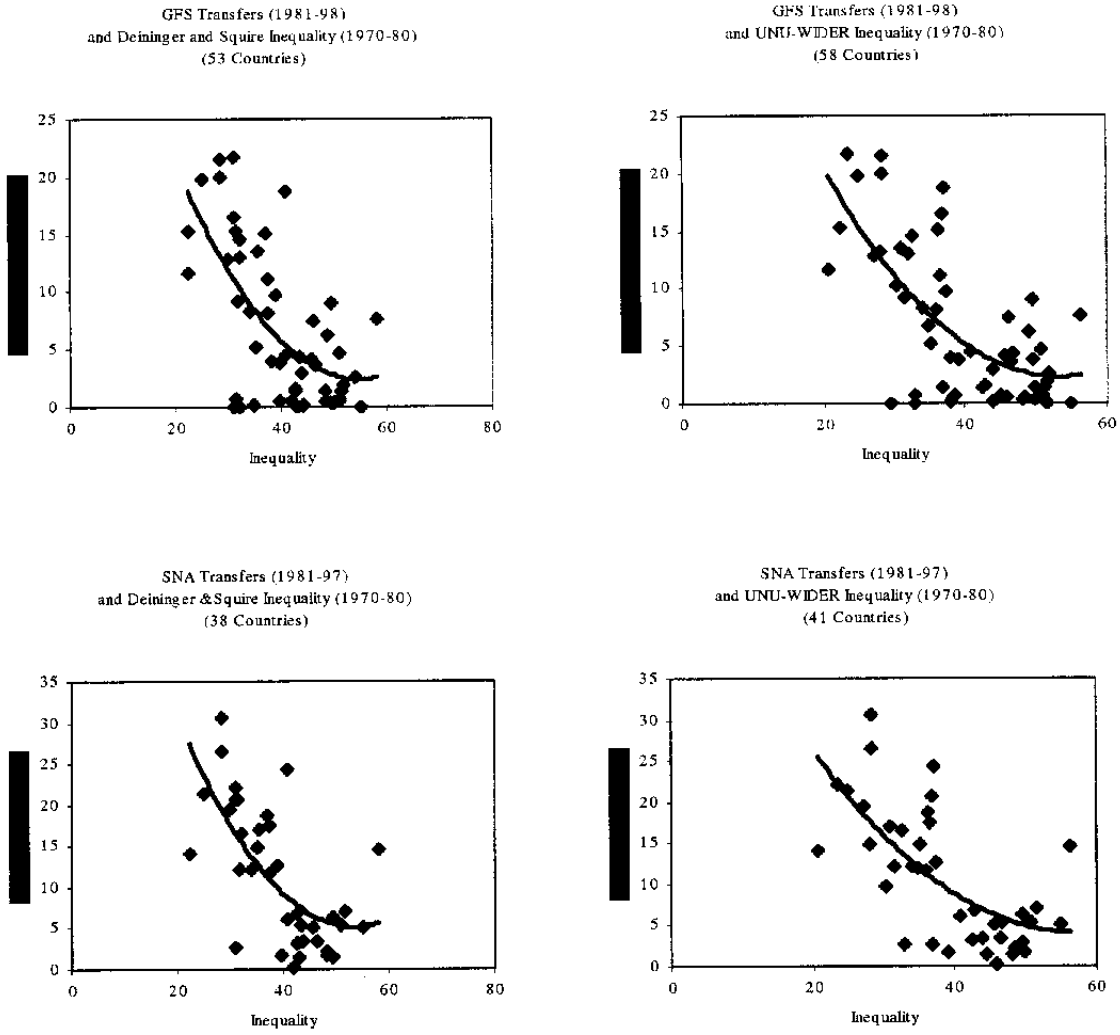
Figure 2. Transfers (1981–98) and Inequality (1970–80):
Variations in the Definition of the Gini Coefficient



Sources: GFS database (2000); UNU-WIDER Inequality Database (2000).
Note: The trend lines are derived from a regression of the form $y = a_0 + a_1x + a_2x^2$. The value of the R-square ranges from 0.35–0.51.

1/ Few observations exist for expenditure-based inequality. A longer period (1960–96) is used to calculate country averages to maximize the number of observations.

Figure 3. Transfers (1981–98) and Inequality (1970–80):
Variations in the Source of Data



Sources: Government Finance Statistics (GFS) database; UN System of National Accounts (SNA) database; Deininger and Squire (1996); and UNU-WIDER database (2000).
Note: The trend lines are derived from a regression of the form $y = a_0 + a_1x + a_2x^2$. The value of the *R*-square ranges from 0.41–0.47.

In the presence of nonlinearities in the relationship between the Gini coefficient and redistribution, equation (1) can be reestimated as follows:

$$\frac{T_i}{Y_i} = a_0 + a_1 I_i + a_2 I_i^2 + a_3 C_i + \dots \qquad (2)$$

The basic hypotheses to be tested in equation (2) are that $a_0 \neq 0$, $a_1 < 0$, and $a_2 > 0$.

Equations (1) and (2) do not allow for estimating the determinants of inequality, as hypothesized above. In this case, they can be reestimated together with equation (3) below:

$$I_i = \alpha_0 + \alpha_1 M_i + \alpha_2 C_i + e_i, \qquad (3)$$

where M is a proxy for capital market development.

The basic hypothesis to be tested is that $\alpha_1 < 0$ in equation (3).

IV. The Results

A. The Baseline Regressions

All regressions are estimated by OLS and Tobit and use, as the dependent variable, either government spending on social security and welfare programs in relation to GDP, available from the GFS database, or government transfers in percent of GDP, available from the SNA database. The estimation of the regressions by a truncated-error model such as Tobit takes into account the nonnegativity constraint on the spending shares. Ideally, the regressions should distinguish Gini coefficients based on expenditures or income, households or individuals, and pre-tax or after-tax income. To keep the sample size as large as possible, given data constraints, the regressions make use of all available data on the Gini coefficient. Figures 2 and 3 provide some evidence that the relationship between inequality and redistributive government spending is robust to the measurement of the Gini coefficient. In addition, the regression results reported below hold for much smaller samples of countries with Gini coefficients defined consistently.

The baseline estimates for equation (1) are reported in Tables 3 and 4. The parameter estimates show that more inequality, measured by the initial Gini coefficient is associated with less redistribution.[12] The estimated coefficients of the Gini coefficient are greater in absolute value in the regressions estimated by Tobit. Initial income per capita is associated with a larger share of redistributive spending in GDP, indicating that distributive spending is a luxury social good.[13]

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[12] In the following regressions, we use all available data for the Gini coefficient from the UNU-WIDER database, regardless of how it is measured. Re-running these regressions using after-tax Gini coefficient or pre-tax Gini coefficient reproduces the same patterns described in this section. This is not surprising, since a significant share of redistribution possibly occurs outside the tax system.

[13] To avoid reverse causality, the initial, rather than current, level of income is used as the control variable in the estimating equations.

As a further robustness check, we estimated the baseline regressions for subsamples of high-income countries, which tend to have less skewed income distributions, with income per capita higher than US$2,880 in 1970. Another reason for re-running the regressions for the samples of low- and high-income countries is to deal with the possibility that the association between income and redistribution is driven by the rich countries in the sample, which typically have larger welfare states and less skewed income distributions.[14] The findings (not reported) hold for the high-income country sample and parameter estimates are in general higher in this sample, regardless of how the dependent variable is defined and the estimation technique (OLS or Tobit).

It can also be argued that the relationship between inequality and redistribution depends on the initial level of inequality. To test this hypothesis, we re-ran the regressions for the sub-sample of low-inequality countries, defined as those countries with initial Gini coefficients less than 0.36, and for the sub-sample of high-inequality countries.[15] The coefficient of the inequality indicator is highest in the sample of low-inequality countries and almost six times higher than that estimated for the sample of high-inequality countries. The findings are robust to the different definitions of the dependent variable and the use of SNA or GFS data in the construction of the dependent variable.

A consistent finding in the literature is that inequality becomes statistically insignificant when demographics (the share of the population aged 65 and over) is controlled for (Perotti, 1996; Bassett, Burkett, and Putterman, 1999). The likely reason for this is that spending on the elderly redistributes primarily according to age, and only indirectly according to income, and the share of transfers varies depending on the population share of the elderly. Exclusion of demographics would bias parameter estimates, given that the population share of the elderly is likely to correlate with inequality. The results (Models 3 and 4 in Tables 3 and 4) confirm the regularity reported in the literature: demographics tends to swamp the direct channels through which inequality is associated with redistributive spending. The loss of significance of the inequality indicator holds regardless of the data source used, the definition of the dependent variable (GFS or SNA), and the estimation technique (OLS or Tobit).

B. Nonlinearities

Equation (2) was estimated to test the nonlinearity hypothesis put forward by Bénabou (2000). The results, reported in Table 5, show that inequality is negatively and significantly associated with redistribution and the relationship is U-shaped, as depicted in Figures 2 and 3. The turning points implied by the parameter estimates vary between a Gini coefficient of approximately 43 in Model 2, somewhat higher than the sample mean of 40, and about 76 in

[14] We also experimented with different cut-off levels and found that the results are not sensitive to the choice of cut-off points.

[15] We also experimented with different cut-off levels for the Gini coefficient (0.30 and 0.40). The results, available upon request, are not sensitive to the choice of the cut-off point.

Table 3. Inequality and Redistribution[1]
(Dependent variable: Social security and welfare spending in percent of GDP, 1981-98)

	(1)	(2)	(3)	(4)
Constant	12.70 ***	18.45 ***	-0.61	-3.46
	(3.42)	(2.72)	(-0.13)	(-0.41)
GDP per capita	0.001 ***	0.001 ***	0.0001	0.0003
	(4.31)	(4.11)	(0.34)	(0.65)
Gini coefficient	-0.27 ***	-0.59 ***	-0.044	-0.13
	(-3.74)	(3.45)	(-0.51)	(-0.69)
Population over 65 years of age			1.10 ***	1.43 ***
			(3.98)	(4.17)
F statistic	50.59 ***		56.45 ***	
P-value	0.00		0.00	
Adjusted R-squared	0.64	0.65	0.76	0.73
Log likelihood		-130.06		-122.38
N	56	54	56	54
Estimation method	OLS	Tobit	OLS	Tobit

[1]Variables are defined as averages over the period 1970-80 for the Gini coefficient and GDP per capita, and 1981-98 for the population over 65. (***), (**), and (*) at the 1, 5, and 10 percent levels, respectively. White-consistent t-statistics and Huber/White z-statistics are in parentheses.

Table 4. Inequality and Redistribution[1]
(Dependent variable: Government transfers in percent of GDP, 1981-98)

	(1)	(2)	(3)	(4)
Constant	16.53 ***	18.99 ***	1.11	-1.92
	(2.74)	(2.37)	(0.15)	(-0.19)
GDP per capita	0.001 ***	0.001 ***	0.0005	0.0006
	(3.56)	(3.57)	(1.02)	(1.14)
Gini coefficient	-0.32 **	-0.48 ***	-0.06	-0.09
	(-2.59)	(-2.63)	(-0.41)	(-0.44)
Population over 65 years of age			1.10 ***	1.34 ***
			(3.66)	(4.01)
F statistic	31.92 ***		30.56 ***	
P-value	0.00		0.00	
Adjusted R-squared	0.60	0.60	0.71	0.68
Log likelihood		-116.32		-111.69
N	41	41	41	41
Estimation method	OLS	Tobit	OLS	Tobit

[1]Variables are defined as averages over the period 1970-80 for the Gini coefficient and GDP per capita, and 1981-98 for the population over 65. (***), (**), and (*) at the 1, 5, and 10 percent levels, respectively. White-consistent t-statistics and Huber/White z-statistics are in parentheses.

Model 4. The control variables (income and demographics) remain correctly signed and statistically significant. Parameter estimates are in general greater in magnitude than those reported in Tables 3 and 4. The statistical regularity observed above, that the parameter estimate of the measure of inequality loses significance when demographics is controlled for, does not hold when the quadratic term is included as an additional regressor. The inequality indicator remains negatively signed and statistically significant even if demographics and the quadratic term are included in the estimating equation.[16]

Table 5. Inequality and Redistribution: Nonlinearities[1]
(Dependent variable: As indicated in percent of GDP)

	Government Transfers		Social Security and Welfare	
	(1)	(2)	(3)	(4)
Constant	25.41	26.38 *	17.45	20.11
	(1.53)	(1.74)	(1.45)	(1.51)
GDP per capita	0.001	0.001	0.000	0.0005
	(1.26)	(1.60)	(0.72)	(1.12)
Gini coefficient	-1.36 *	-1.75 **	-0.97 *	-1.52 **
	(-1.75)	(-2.25)	(-1.83)	(-2.26)
(Gini coefficient)^2	0.01 *	0.02 **	0.01 *	0.01 **
	(1.76)	(2.19)	(1.89)	(2.24)
Population over 65 years of age	1.03 ***	1.32 ***	0.98 ***	1.35 ***
	(3.39)	(3.25)	(3.52)	(4.23)
F statistic	26.01		46.76	
P-value	0.00		0.00	
Adjusted R-squared	0.71	0.69	0.76	0.74
Log likelihood		-109.47		-120.09
N	41	41	56	54
Estimation Method	OLS	Tobit	OLS	Tobit

[1]Variables are defined as averages over the period 1970-80 for the Gini coefficient and GDP per capita, and 1970-98 for the rest. (***), (**), and (*) denote significance at the 1, 5, and 10 percent levels, respectively. The t and z-statistics are in parentheses.

[16] The U-shaped relationship holds for two other definitions of inequality: the income share of the lowest quintile, and the income share of the middle quintile. The former measure of inequality captures the income of the poor, whereas the latter focuses on that of the middle class. However, unlike the Gini coefficient, these variables lose significance when demographics is controlled for.

C. Testing the Capital Market Imperfection Hypothesis

The findings reported above support the two hypotheses put forward by Bénabou (2000); namely, that more inequality is associated with less redistributive spending and that the association between the two variables is nonlinear. The channel through which these results obtain in the theoretical model developed by Bénabou (2000) is capital market imperfections.

Inequality depends on whether people have access to insurance instruments, as discussed above. This provides a good candidate for an instrument in the otherwise reduced-form equations used for estimating the association between inequality and redistribution. The endogeneity of the inequality variable had not been addressed in the literature on the grounds that it is difficult to find adequate instruments for income distribution in inequality/growth equations (Perotti, 1998).

The results of the two-stage least squares estimation of equations (1) and (3) are reported in Table 6. Conventional proxies for capital deepening are used as the instruments for capital

Table 6. Inequality and Redistribution: 2SLS[1]
(Dependent variable: As indicated in percent of GDP)

	Government Transfers		Social Security and Welfare	
	(1)	(2)	(3)	(4)
Constant	78.23 ***	68.72 ***	41.77 *	50.09 **
	(6.02)	(4.27)	(1.82)	(2.05)
GDP per capita	0.0003	0.0006	0.0001	0.00007
	(1.13)	(1.72) *	(0.21)	(0.16)
Gini coefficient	-3.89 ***	-3.26 ***	-2.09 **	-2.52 **
	(-5.99)	(-4.01)	(-2.11)	(-2.34)
(Gini coefficient)^2	0.04 ***	0.03 ***	0.02 **	0.03 ***
	(5.67)	(3.65)	(2.24)	(2.47)
Population over 65 years of age	0.81 ***	0.81 ***	0.81 *	0.71
	(2.86)	(2.58)	(1.70)	(1.15)
Democracy index		-0.82		0.51
		(-1.03)		-0.35
Democracy index*Gini coefficient		0.01		-0.01
		(0.87)		(-0.38)
F statistics	35.14	19.43	21.92	14.18
P-value	0.00	0.00	0.00	0.00
Adjusted R-squared	0.82	0.79	0.66	0.66
First-stage adjusted R-squared	0.72	0.75	0.58	0.59
N	30	29	44	40

[1]Variables are defined as averages over the period 1970-80 for the Gini coefficient and GDP per capita, and 1970-98 for the rest. (***), (**), and (*) denote significance at the 1, 5, and 10 percent levels, respectively. The t-statistics are in parentheses and are White-consistent. The instruments used in the 2SLS regressions are measures of financial development: credit provided by banks to the domestic sector, credit provided to the private sector, and M2 in percent of GDP. Dummies for Latin America and the Carribean and East Asia and the Pacific were added, as well as interaction dummies.

market imperfection, including credit to the domestic economy and to the private sector, as well as the share of broad money (M2) in GDP. Parameter estimates are negatively signed and statistically significant, as above, and greater in magnitude than those estimated by OLS. The results hold when the quadratic term and the share of the population aged 65 and over are included in the regressions. The turning points implied by the parameter estimates vary between a Gini coefficient of approximately between 49 (Model 1) and 52 (Model 3).

Because there is no prior in the literature as to which variables best measure financial deepening and, by extension, capital market imperfections, we experimented with different proxies, including the black-market premium and the interest-rate spread, for a much smaller sample of countries. The results for both transfers and welfare spending hold when credit to the domestic market is used as an instrument, together with the black-market premium, instead of the M2/GDP ratio. Bourguignon and Morrisson (1998) use an indicator of economic dualism, constructed as the ratio of labor productivity in the nonagricultural sector and in the agricultural sector, as a determinant of inequality. We also experimented with this indicator, constructed using WDI data, but it was not found to be statistically significant at classical levels of significance when the proxies for capital market development are included in the estimating equation. Perotti (1996) suggests the inclusion of the urbanization rate in the inequality regressions because urban areas tend to have higher levels of inequality. Because of the high correlation between urbanization and income (0.73 in our sample), the urbanization rate was found not to be statistically significant.

D. Further Sensitivity Analysis

Given the limitations of the data, additional robustness checks were performed. We experimented with including an index of democracy as an additional control variable and as an interaction with the inequality indicator to test the median-voter hypothesis, as in Perotti (1996). The democracy index proxies for political participation and, therefore the likelihood that the preferences of the median voter will be taken into account in the political process. The interaction term takes into account the fact that political representation may be dominated by a decisive voter who is significantly richer than the median voter in polarized societies, as discussed above. Data are drawn from La Porta and others (1999). The democracy index covers the period 1970–94 and is scaled from 0–10, with lower values indicating a less democratic environment. The parameter estimates of the inequality coefficient, reported in Table 7, remains correctly signed and statistically significant. The democracy index was nevertheless found to be statistically insignificant in all model specifications. The 2SLS regressions including the democracy variable are reported in Table 6 (Models 2 and 4).

Table 7. Inequality and Redistribution: The Role of Political Participation [1]
(Dependent variable: As indicated in percent of GDP)

	Government Transfers		Social Security and Welfare	
	(1)	(2)	(3)	(4)
Constant	25.40	27.03	16.91	20.36
	(1.48)	(1.54)	(1.33)	(1.38)
GDP per capita	0.0009	0.001 *	0.0003	0.0007
	(1.56)	(1.68)	(0.78)	(1.05)
Gini coefficient	-1.35 *	-1.72 **	-0.97 *	-1.56 **
	(-1.76)	(-2.00)	(-1.77)	(-2.15)
(Gini coefficient)^2	0.01 *	0.02 **	0.01 **	0.02 **
	(1.80)	(2.02)	(1.93)	(2.26)
Population over 65 years of age	0.93 ***	1.20 ***	0.93 ***	1.31 ***
	(2.87)	(3.75)	(3.13)	(3.96)
Democracy index	-0.14	-0.53	0.28	0.03
	(-0.10)	(-0.35)	(0.34)	(0.02)
Democracy index*Gini coefficient	-0.00	0.007	-0.009	-0.004
	(-0.00)	(0.23)	(-0.52)	(-0.15)
F statistic	16.69		30.02	
P-value	0.00		0.00	
Adjusted R-squared	0.70	0.68	0.76	-115.01
Log likelihood		-106.32		0.74
N	40	40	54	52
Estimation Method	OLS	Tobit	OLS	Tobit

[1]Variables are defined as averages over the period 1970-80 for the Gini coefficient and GDP per capita, and 1970-98 for the rest. (***), (**), and (*) denote significance at the 1, 5, and 10 percent levels, respectively. The t and z-statistics are in parentheses.

V. Conclusions and Policy Implications

The main findings reported in this paper are disturbing. In general, the countries where redistributive public spending is more needed—countries with low per capita income and high inequality—were found less likely to redistribute income through public policies. Rather than testing the median voter or the decisive-voter hypotheses put forward in the political

economy literature, we focused on capital market imperfections as a channel through which inequality is associated with redistributive public spending. Conventional wisdom is that inequality is perpetuated over time when people, particularly the poor, do not have access to capital markets to insure themselves against adverse economic shocks or to make the long-term investment needed to improve their future earnings capacity.

A lack of consistent data remains an important limitation to more detailed hypothesis testing in this line of research. Nevertheless, the parameter estimates reported in this paper are fairly robust to different model specifications, definitions of the relevant variables, data sources, and estimation techniques. While most of the empirical literature uses OLS as the estimation technique for the spending share equations, we also use the Tobit estimator, to take into account the truncation in the spending share variable. A statistical regularity reported in the empirical literature is that demographics has a stronger direct impact on government spending on redistributive programs than does income distribution. We show that inequality indicators remain statistically significant when a proxy for demographics is included in the estimating equation, as long as the nonlinearities in the relationship between inequality and redistributive spending are taken into account.

Despite the caveats of the methodology and the data limitations discussed above, important policy implications can be derived from the empirical findings. First, emphasis on government spending to redistribute income depends on the country's level of inequality, as governments in more unequal societies are less likely to spend on redistributive programs. Second, redistributive spending may be inefficient as an instrument to reduce poverty and to improve income distribution because the benefits of public spending may be captured by the nonpoor. When redistributive spending is not well targeted, income distribution indicators may not be responsive to increases in public outlays on redistributive programs.

More importantly, because capital market imperfection plays a role in the association between redistributive spending and inequality, government policies could focus on microfinance as an instrument for reducing poverty and improving income distribution. Microfinance enhances the access of the poor to some types of financial intermediation and allows them to smooth consumption and to finance housing acquisition and upgrading, trade, small manufacturing, service activities, and agriculture, as well as investment in existing, often small enterprise.[17]

[17] See Khandker (1998), Ledgerwood (1998), and Zaman (1999) for more information.

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Appendix Table 1. Countries in the GFS and SNA Samples[1]

GFS Sample	SNA Sample
Australia	Australia
Bahamas, The	Bahamas
Bangladesh	Belgium
Belgium	Brazil
Brazil	Bulgaria
Bulgaria	Canada
Canada	Chile
Chile	Colombia
China	Costa Rica
Colombia	Denmark
Costa Rica	El Salvador
Denmark	Fiji
Dominican Republic	Finland
Egypt, Arab Rep.	France
El Salvador	Greece
Fiji	India
Finland	Iran (Islamic Rep. of)
France	Ireland
Greece	Israel
Guatemala	Italy
Hungary	Jamaica
India	Japan
Indonesia	Jordan
Iran, Islamic Rep.	Korea, Republic Of
Ireland	Mauritius
Israel	Netherlands
Italy	Norway
Japan	Panama
Jordan	Peru
Korea, Rep.	Philippines
Malaysia	Poland
Mauritius	Portugal
Mexico	Spain
Nepal	Sri Lanka
Netherlands	Sweden
New Zealand	Thailand
Norway	Trinidad and Tobago
Pakistan	Tunisia
Panama	United Kingdom
Peru	United States
Philippines	Venezuela
Poland	
Portugal	
Seychelles	
Singapore	
Spain	
Sri Lanka	
Sweden	
Thailand	
Trinidad and Tobago	
Tunisia	
Turkey	
United Kingdom	
United States	
Venezuela	
Zambia	

Source: See text.

[1]Countries for which baseline regressions data are available.