Forthcoming in The Review of Economics and Statistics

Why Do More Polarized Countries Run More Pro-cyclical Fiscal Policy?*

Jaejoon Woo

Revised: January 2008

Economics Department
Kellstadt Graduate School of Business
DePaul University
1 East Jackson Boulevard
Chicago, IL 60604

Abstract

We study the cyclical behavior of fiscal policy to explain why some countries exhibit pro-cyclical fiscal policy stances—being expansionary in good times and contractionary in bad times. We develop a model that links the polarization of preferences over fiscal spending to the pro-cyclicality bias. We then present evidence that social polarization as measured by income inequality and educational inequality is consistently positively associated with fiscal pro-cyclicality, even after controlling for other determinants from existing theories. We also find a strong negative impact of fiscal pro-cyclicality on economic growth.

JEL Classification: E62, E63, H30, O11

Key Words: Pro-cyclical Fiscal Policy, Growth, Inequality, Social Polarization, Robust Estimation

*I thank Werner DeBondt, Hadi Esfahani, Animesh Ghoshal, Anand Goel, Steinar Holden, and participants in a seminar at University of Illinois at Urbana-Champaign, Academia Sinica, National Taiwan University, Yonsei University, Sogang University, National Assembly Budget Office of Korea, University of Oslo, CERGE-EI, and University of Economics in Prague, the American Economic Association Meeting at Chicago in 2007, the North American Econometric Society Summer Meeting at Minneapolis in 2006 for their helpful comments and discussions. I thank Dani Rodrik and two anonymous referees for their excellent comments. Maiju Perala at WIDER kindly provided me with data. The paper was financially supported by a grant from Kellstadt Graduate School of Business. Tim Sorensen provided excellent research assistance. The paper was previously circulated under the title, "The Behavior of Fiscal Policy: Pro-cyclicality, Volatility and Growth." Correspondence: Tel: (312)362-5585, Fax: (312)362-5452, Email: jwoo1@depaul.edu

1 Introduction

The traditional Keynesian model of business cycle calls for use of a counter-cyclical fiscal policy that is contractionary during boom and expansionary during recession to smooth out business cycle fluctuations in output.[1] Surprisingly, however, there is substantial evidence that fiscal policy is often pro-cyclical—being expansionary in good times (boom) and contractionary in bad times (recession)—in many countries. Gavin and Perotti (1997) first reported the phenomenon of fiscal pro-cyclicality in Latin America. Talvi and Vegh (2005) found that pro-cyclical fiscal policy stance is not limited to Latin America. In a large sample of 104 countries for 1960-2003, Kaminsky, Reinhart, and Vegh (2004) confirmed that many countries (especially in the developing world) exhibit pro-cyclical fiscal policy, while degrees of pro-cyclicality varying across countries.[2] The pro-cyclical policy stance contradicts the conventional wisdom that fiscal policy should be 'counter-cyclical', but also is at odds with the neoclassical model of tax-smoothing (Barro, 1979; Chari & Kehoe, 1999).

The main contribution of this paper is twofold. First, we present a new hypothesis that social polarization of preferences (arising from inequality) is a key to explaining the pro-cyclicality bias, along with strong supporting evidence through an extensive econometric analysis. Second, we go well beyond testing our key hypothesis to examine the magnitude of the potential negative impact on the economy of pro-cyclical fiscal policy. Although fiscal pro-cyclicality is typically presumed to be harmful to economic growth, there

[1] Throughout this paper, a counter-cyclical fiscal policy is defined to involve lower (higher) government spending and/or higher (lower) tax rates in good (bad) times, following Kaminsky, Reinhart, and Vegh (2004). Conversely, a pro-cyclical fiscal policy involves higher (lower) government spending and lower (higher) tax rates in good (bad) times.

[2] In addition, Arreaza, Sorensen, and Yosha (1999) and Sorensen, Wu, and Yosha (2001) investigate the cyclical behavior of fiscal policy in the OECD countries and US states, respectively. Calderon and Schmidt-Hebbel (2003) study the cyclical stance of fiscal policy in Latin America.

is little or no empirical evidence in the literature.

We first develop a simple model that links social polarization of preferences to the pro-cyclicality of fiscal policy and the magnitude of discretionary fiscal policy shocks. Intuitively, a high degree of polarization of preferences may make it hard for policymakers who may represent heterogeneous socio-economic groups to agree on ideal government policies.[3] In the presence of preference polarization, heterogeneous policymakers may have greater incentives to insist on their preferred policies and may end up choosing individually rational but collectively inefficient policies for the whole economy. Such incentives to put forward their preferred agenda may become particularly strong during good times when rising government revenues or newly available resources make their agenda seem more feasible, which produces pro-cyclical fiscal policies (especially when institutional constraints are insufficient or absent). At the same time, discretionary policy actions taken in such a manner are most likely to yield volatile fiscal outcomes over time. We formalize this intuition in a simple non-cooperative fiscal game model, and explicitly derive a theoretical result that the degree of pro-cyclicality of fiscal spending and the size of associated fiscal volatility both increase with the degree of polarization of preferences. The model yields a sharp prediction that countries with highly polarized societies are more likely to exhibit pro-cyclical fiscal stances.

We present strong econometric evidence in support of the theoretical prediction in a large sample for the period of 1960-2003. Social polarization as measured by inequality in income and education distribution across the population is robustly positively associated with pro-cyclicality of fiscal policy. Fiscal pro-cyclicality is in turn strongly negatively associated with

[3] In general, the heterogeneity of preferences is one factor that has not been well-recognized as critical to the coordination failure in collective action. In a related paper, Woo (2005) illustrates this point, and shows how social preference polarization can lead to fiscal deficits and growth collapse in a dynamic game model of fiscal policy embedded in an endogenous growth framework.

long-term economic growth. To our best knowledge, our paper is the first to provide empirical evidence on each of these two links. Thereby, we identify a new channel of fiscal policy pro-cyclicality for the important empirical finding that social polarization (inequality) is harmful to growth.[4] While there is substantial evidence on the negative relation between inequality and growth in reduced-form regressions, the research has not been able to identify the specific underlying mechanism(s) through which inequality slows growth. In particular, the empirical validity of a prominent fiscal policy channel of redistributive fiscal spending and taxes (Alesina & Rodrik, 1994; Persson & Tabellini, 1994) has recently been called into question.[5]

In the empirical analysis, we carefully address some issues of the robustness in terms of data, indicators of the cyclical stance of fiscal policy, estimation methods, outliers, and simultaneity (endogeneity) problem that often plague the standard OLS regression. Importantly, various estimation methods and robustness checks confirm our key findings and often yield stronger results.

Income inequality has long been recognized as a fundamental source of social polarization by political scientists (Powell, 1982). In a fascinating study, McCarty, Poole, and Rosenthal (2006) show in modern American history that income inequality and polarization among the public and in Congress have moved in tandem, and that income inequality is important in explaining political ideologies and voter preferences.[6] Also, it is well-

[4] See Easterly (2002), Drazen (2000), Rodrik (1999), Perotti (1996), Clarke (1995), Birdsall, Ross, and Sabot (1995) among others.

[5] The redistributive fiscal policy mechanism predicts that in democratic countries with unequal income distribution voters have a greater tendency to favor high redistributive fiscal spending that is accompanied with high taxes, which retards capital accumulation and growth. Perotti (1996) does not find any negative relation between tax variables and growth. In general, there seems to be little evidence that high inequality leads to more redistribution (see Glaeser 2005). Also, Mulligan, Gil, and Sala-i-Martin (2004) do not find more redistribution from rich to poor in democracies than non-democracies, which is inconsistent with the implication of the median voter hypothesis in the redistributive fiscal policy channel. In short, whether inequality actually increases redistribution is still an open question.

[6] Interestingly, they also find that income is important in subgroups of the population

understood that social polarization arising from struggles over income distribution can be a major impediment to successful economic performance. In a celebrated book, Easterly (2001, p.256) notes that "the fundamental difference between redistributionist and developmentalist governments is social polarization. Societies divided into factions fight over division of the spoils; societies united by a common culture and a strong middle class creates a consensus for growth." Indeed, income inequality has been mentioned as a key explanation for poor macroeconomic performance in Latin America and sub-Saharan Africa in the past decades.[7] However, there are no theoretical or empirical studies on the role of social polarization (or inequality) in explaining pro-cyclicality of fiscal policy. In this paper, we fill this void in the literature.

There exist a few explanations for pro-cyclical fiscal policy in the literature: credit constraints or incomplete capital markets of Gavin and Perotti (1997) and Riascos and Vegh (2003), political competition over the government resource of Tornell and Lane (1998, 1999), and other political distortion of Alesina and Tabellini (2005) and Talvi and Vegh (2005) among others. However, systematic empirical work that firmly supports these theories is scant. The most common explanation is that a country facing credit constraints (or incomplete international capital markets) may not borrow in bad times and may be even "forced to pay" in bad times, resulting in a contractionary fiscal policy. This explanation is largely based on anecdotes (especially during crises), not econometric evidence. Moreover, procyclical fiscal stances may be outcomes of conscious policy choices, rather than simply forced by external financing conditions, which was the case in many episodes of high fiscal deficits (Easterly, Rodriguez, & Schmidt-Hebbel, 1994). Tornell and Lane (1998, 1999) emphasize political competition for a share in fiscal revenues among multiple power blocs, using a common

that are frequently treated as homogeneous voting blocs based on race or moral values.

[7] See Sachs (1989), Kauffman and Stallings (1991), Birdsall, Ross, and Sabot (1995), and Rodrik (1999) among others.

pool framework: "voracity effect". Their key prediction is that political systems in which power is diffused among a number of agents will lead to greater fiscal pro-cyclicality. Lane (2003) reports some mixed evidence for various fiscal spending components in the OECD country sample using a measure of institutional constraints (POLCON) as an index of power dispersion, although it is widely used in the growth literature as an indicator of institutional quality (see Glaeser, LaPorta, Lopez de Silanes, & Shleifer, 2004 for more details).[8] Alesina and Tabellini (2005) build a political economy model in which voters prefer lower taxes during good times rather than leaving rising resources with the "less-than-benevolent" government. They provide cross-country evidence mainly in relation to corruption. Talvi and Vegh (2005) make a similar point, but simply assume that political pressures for spending rise when budget surplus rises in good times. Unable to resist the spending pressures, the government may find it optimal to lower tax rates and increase spending. Its implication is that the larger the variability of the tax base, the more pro-cyclical is the fiscal policy. Talvi and Vegh (2005), Akitoby, Clements, Gupta, and Inchauste (2004), and Lane (2003) find some evidence for this prediction. Although a comprehensive empirical evaluation of these theories against ours is beyond our scope, we test some of their key predictions and find that evidence tends to favor our explanation.

The plan of the paper is as follows. Section 2 presents a simple theory of pro-cyclicality and volatility of fiscal policy, and briefly discusses its main implications. Section 3 discusses the data and regression results for fiscal cyclicality and volatility. Section 4 examines the impact on long-term growth of pro-cyclicality and volatility of fiscal policy. Concluding remarks are in Section 5. Appendices follow.

[8] In general, empirical studies in the common pool literature focus on the number of decision makers such as the cabinet size or index of power dispersion (Perotti & Kontopoulos, 2002; Lane, 2003). However, the theoretical relationship between the number of players and the fiscal outcomes (size of fiscal deficits or degree of fiscal pro-cyclicality) is actually ambiguous because it depends on the utility functional shape.

2 A Simple Theory of Fiscal Pro-cyclicality and Volatility

To study the theoretical relationship among fiscal pro-cyclicality, volatility and social polarization, we consider a simple two-period model.[9] There are two policymakers, $i = 1, 2$, who jointly constitute the fiscal authority and represent different socio-economic groups. The two groups can be right-wing and left-wing parties, capitalists and labor workers, or the rich and the poor. The fiscal policy consists of government spending for two different types of public goods $\{g_t, f_t\}_{t=1}^2$ and taxes $\{T_t\}_{t=1}^2$. They both have access to tax revenue—that is, they face the same government budget constraint. For simplicity, we assume a fixed tax rate τ and a fixed output $\overline{Y}$ for each period, so that tax revenue $T_t = \tau\overline{Y}$. However, our result does not rely on any particular level of tax revenue, which becomes clear later. Policymaker 1 decides how much she wants to spend for provision of public good g_t and policymaker 2 decides on f_t. They may differ in their preferences for the two public goods and hence may disagree on the ideal public good composition. Specifically, policymaker 1 maximizes her objective function subject to the government budget constraint by choosing $\{g_t\}_{t=1}^2$, for any possible $\{f_t\}_{t=1}^2$ policymaker 2 chooses. The problem is similar for policymaker 2. Each policymaker, $i = 1, 2$, solves the following optimization problem:

$$Max \;\; J^i = \sum_{t=1}^{2} \delta^{t-1}[\alpha_i v(g_t) + (1-\alpha_i)v(f_t)], \tag{1}$$

subject to

$$b_t - b_{t-1} = rb_{t-1} + g_t + f_t - T, \text{ for } \forall\ t = 1, 2, \tag{2}$$

where $0 < \delta < 1$ is the subject discount rate of the policymakers; b is

[9] This is adapted from Woo (2005) that develops a dynamic model of fiscal policy embedded in an endogenous growth framework in which social preference polarization plays a central role in the evolution of fiscal deficits and growth collapse.

the government debt; and $v(\cdot)$ is a concave function satisfying the Inada condition. Each policymaker's preference for the public goods is reflected by α_i. We assume that $0 \leq \alpha_i \leq 1$, for $i = 1, 2$ and $\alpha_2 \leq 1/2 \leq \alpha_1$. This implies that policymaker 1 is assumed to derive utility from g at least as much as from f. Similarly, policymaker 2 likes f at least as much as g. We define $\theta = \alpha_1 - \alpha_2 \in [0, 1]$ and interpret it as the degree of difference in their preferences for the two public goods. We can think of θ as a degree of preference polarization. While $\theta = 1$ implies the complete disagreement on the composition of two public goods between the two groups, $\theta = 0$ implies the total agreement. This polarization index θ is intended to capture the notion that social preferences between socio-economic groups would be more divergent in a more unequal society (Birdsall, Ross, & Sabot, 1995; McCarty, Poole, & Rosenthal, 2006). Now we study how polarization θ affects the cyclicality of fiscal spending policy and volatility of fiscal outcomes.

2.1 Pro-cyclicality and Volatility of Fiscal Outcomes

We solve the game by backward induction. For simplicity, assume that in the second period, each policymaker gets an equal share of the remaining government resources (after government debt is paid off), and let $b_0 = 0$. Policymaker 1 maximizes her objective function by choosing g_1 and g_2, taking policymaker 2's actions f_1 and f_2 as given:

$$\underset{\{g_1, g_2\}}{Max} [\alpha_1 v(g_1) + (1 - \alpha_1) v(f_1)] + \delta[\alpha_1 v(g_2) + (1 - \alpha_1) v(f_2)] \tag{3}$$

subject to

$$b_1 = g_1 + f_1 - T, \text{ and } g_2 = f_2 = \frac{T - (1 + r) b_1}{2}. \tag{4}$$

In the subgame consisting of the second period, each policymaker gets an equal share of the remaining government resources. Thus, the Nash equi-

librium of the reduced first-period game that incorporates this is a subgame-perfect equilibrium. So the optimization problem is as follows:

$$\underset{\{g_1\}}{Max}[\alpha_1 v(g_1) + (1-\alpha_1)v(f_1)] + \delta v(\frac{1}{2}[(2+r)T - (1+r)(g_1+f_1)]). \quad (5)$$

The first–order condition (assuming an interior solution) is

$$\alpha_1 v'(g_1) - \frac{1+r}{2}\delta v'(g_2) = 0. \quad (6)$$

Similarly, the first order condition for policymaker 2's optimization problem is given by $(1-\alpha_2)v'(f_1) - ((1+r)/2)\delta v'(f_2) = 0$. In the case of an iso-elastic utility functional form, $v(g) = \ln(g)$, we can solve the first order conditions to show that the subgame-perfect equilibrium spending for the two public goods in period 1 is

$$g_1^\star = \frac{\alpha_1(2+r)}{(1+r)[\delta+(1+\theta)]}T, \text{ and } f_1^\star = \frac{(1-\alpha_2)(2+r)}{(1+r)[\delta+(1+\theta)]}T. \quad (7)$$

Total government spending in period 1 is therefore[10]

$$G_1 = g_1^\star + \ f_1^\star = \frac{(1+\theta)(2+r)}{(1+r)[\delta+(1+\theta)]}T. \quad (8)$$

Now we establish that a higher degree of polarization leads to both greater fiscal pro-cyclicality and greater fluctuations in fiscal spending over time. For now, we assume $\delta = 1/(1+r)$. From equation (8), we can show

$$\frac{dG_1}{dT} = \frac{dG_1}{d(\tau\overline{Y})} = \frac{(1+\theta)(2+r)}{[1+(1+r)(1+\theta)]} = \overset{+}{l}(\theta, r) \geq 1, \quad (9)$$

where the equality holds when $\theta = 0$. An increase in income and hence tax revenue can be translated into a more than proportional increase in spending

[10] Total fiscal spending in period 2 is given by

$$G_2 = g_2^\star + f_2^\star = \frac{\delta(2+r)}{(\delta+1+\theta)}T.$$

if the degree of polarization is positive ($\theta > 0$).[11] This result can explain the fiscal pro-cyclicality observed in a number of countries. In the presence of polarization, fiscal spending rises (falls) more than tax revenue does during a boom (recession). Moreover, the higher the polarization, the greater the increase in fiscal spending for a given increase in revenue (i.e., $\partial l(\cdot)/\partial\theta > 0$).[12] This in turn leads to a sharper reduction in subsequent spending because the increase in tax revenue is dissipated more quickly, which makes the fiscal spending path more volatile over time. Figure 1 graphically illustrates the pro-cyclical behavior and the magnitude of spending fluctuations of fiscal spending in the presence of polarization ($\theta > 0$), compared to the stable spending path under no polarization ($\theta = 0$), which is equivalent to social planner's solution.

Social polarization (say, due to income inequality) is often thought to be associated with political instability (Drazen, 2000). High levels of political unrest may not only make the downfall of the present government more likely, but may substantially shorten the horizons of politicians. With a shortened expected tenure in office, the government may engage in short-term policies at the expense of macroeconomic stability. In fact, polarization and political uncertainty play distinct roles in generating pro-cyclical fiscal outcomes. A simple way to incorporate the political uncertainty is to consider the discount factor δ. Let us assume that policymakers face a constant positive probability of being removed from office, which amounts to lowering

[11] In fact, this result corresponds to a permanent tax revenue change. It is straightforward to extend the model to the case of a temporary tax revenue change. See Appendix.

[12] The intuition is as follows: given that two policymakers equally share the remaining government resources in period 2, whatever resources one does not exploit today may or may not be left, depending on the other's behavior. When they do not agree on the spending composition, each has an incentive to overexploit the government resources *today*, and such an incentive to overexploit rises with the size of disagreements measured by preference polarization θ. As either $|\alpha_1 - (1/2)|$ or $|(1-\alpha_2) - (1/2)|$ becomes larger, the optimal $g_1^\star$ or $f_1^\star$ becomes bigger, causing a larger government spending in period 1. That is, the bigger the degree of polarization ($\theta = \alpha_1 - \alpha_2$), the larger the fiscal spending. This dynamic negative externality operates in generating the pro-cyclical spending in response to a shock to tax revenue (or equivalently to output).

δ (i.e., discounting the future relatively heavily so that $\delta \leq 1/(1+r)$). Then, the absolute size of a spending increase in response to a positive shock to tax revenue in period 1 can be shown to be an increasing function of polarization θ and political uncertainty (which is inversely related to δ).

$$\frac{dG_1}{dT} = \frac{dG_1}{d(\tau \overline{Y})} = \frac{(1+\theta)(2+r)}{(1+r)[\delta + (1+\theta)]} = h(\overset{+}{\theta}, \overset{-}{\delta}, r) \geq 1, \tag{10}$$

where the equality holds when $\theta = 0$ and $\delta = 1/(1+r)$. Note that $\partial h(\cdot)/\partial \delta < 0$ and $\partial h(\cdot)/\partial \theta > 0$.

Also, the volatility of fiscal spending over time rises with polarization θ and political uncertainty. To show this, we can derive the fiscal volatility function that measures the *dispersion* of fiscal spending *over time* around the spending path under the social planner's solution (see appendix about the social planner's solution).

$$\text{Volatility}(G) = \frac{[1+\theta-(1+r)\delta]^2 \cdot [1+(1+r)^2]}{[(1+r)(1+\theta+\delta)]^2} T^2. \tag{11}$$

Note that fiscal volatility is an increasing function of polarization and political uncertainty: $\partial \text{Volatility}(G)/\partial \theta \geq 0$ and $\partial \text{Volatility}(G)/\partial \delta \leq 0$. Conversely, the fiscal spending path is as smooth as social planner's fiscal path only when there is neither polarization nor political uncertainty. That is, Volatility(G) is zero when $\theta = 0$ and $\delta = 1/(1+r)$.[13] We can summarize the results in the following proposition.

Proposition 1 *(i) The higher the polarization, the more pro-cyclical and the more volatile the fiscal spending. (ii) The less patient the policymak-*

[13] One can check:

$$\frac{\partial \text{Volatility}\,(G)}{\partial \theta} = \frac{(1+(1+r)^2)T^2}{(1+r)^2} \left\{ \frac{2[1+\theta-(1+r)\delta][\delta+(1+r)\delta]}{(1+\theta+\delta)^3} \right\} \geq 0;$$

$$\frac{\partial \text{Volatility}\,(G)}{\partial \delta} = \frac{(1+(1+r)^2)T^2}{(1+r)^2} \left\{ \frac{-2(1+r)(1+\theta)[1+\theta-(1+r)\delta]}{(1+\theta+\delta)^3} \right\} \leq 0,$$

where the equality holds when $\theta = 0$ and $\delta = 1/(1+r)$.

ers, the more pro-cyclical and the more volatile the fiscal spending. (iii) When there is polarization (or policymakers relatively heavily discount future events), the fluctuations in fiscal outcomes are always greater than the social optimum.

This model yields a sharp prediction that fiscal spending tends to be pro-cyclical and volatile in countries with highly polarized societies. Next we test these key implications using a large cross-country data set.

3 Econometric Evidence

We begin by quantifying the empirical relationship between fiscal cyclicality and a range of economic variables. We then broaden our scope by examining socio-political and institutional variables. Based on annual panel data for 96 countries over the period of 1960-2003, we exploit both time-series for each country and cross-country variations.[14] Our main data are from World Development Indicators of the World Bank and Penn-World Table 6.1. Refer to the data appendix for details.

3.1 Cyclicality of Fiscal Policy

In our paper, we consider government spending as an indicator of the fiscal policy—that is, a policy instrument rather than fiscal outcomes such as primary balance, tax revenue and other fiscal variables that are endogenous and whose cyclical behavior is ambiguous. Tax rates could be an alternative fiscal policy indicator, but there is no systematic data on tax rates available for a large number of countries. In a careful study, Kaminsky, Reinhart, and Vegh (2004) conclude that government spending and tax rates would

[14] The sample of countries is dictated by the availability of data. Ninety six is the largest number of countries for which we have at least twenty-five years of data so that we can run a meaningful time-series regression to obtain the measure of fiscal cyclicality in the paper.

be the only indicators that unambiguously discriminate among the counter-cyclicality, pro-cyclicality and acyclicality. By contrast, the cyclical behavior of fiscal balance as a percent of GDP will never provide an unambiguous reading of the cyclical stance of fiscal policy, although it has been studied by earlier studies (Gavin & Perotti, 1997; Calderon & Schmidt-Hebbel, 2003; Alesina & Tabellini, 2005 among others).[15] To obtain a measure of the cyclicality of fiscal policy, we estimate the following time-series regression for each country i for the period of 1960-2003:

$$\Delta \log G_{it} = \alpha_i + \beta_i \Delta \log RGDP_{it} + \varepsilon_{it}, \tag{12}$$

where i and t denote a country and a year, α_i is a constant term, and ε_{it} is an error term. We correct for the first-order auto-correlation in the residuals by using a standard two-step Prais-Winsten procedure. The term G_{it} is real general government spending, and $RGDP_{it}$ is real GDP. The coefficient β_i is our preferred measure of cyclicality of fiscal policy in country i. A positive value of β_i indicates pro-cyclicality of fiscal policy, whereas a negative value implies counter-cyclical behavior. Accordingly, a high positive value implies a high degree of fiscal pro-cyclicality.

It should be noted that there is no consensus on how to measure the cyclicality of fiscal policy. As an alternative to our regression-based measure of cyclicality, some studies have used the correlation of cyclical components of government spending and output that are first filtered by the Hodrick-Prescott method (Kaminsky, Reinhart, & Vegh, 2004; Talvi & Vegh, 2005). As Forbes and Rigobon (2002) point out, however, the unadjusted correlation coefficient can be misleading if samples have different levels of volatility. Thus, we use the regression to obtain the cyclicality measure. Arreaza, Sorensen, and Yosha (1999), Sorensen, Wu, and Yosha (2001), Lane (2003),

[15] Similarly, the cyclical behavior of the ratio government spending to GDP and of the ratio tax revenue to GDP is ambiguous. Thus, we focus on the real general government spending itself.

and Alesina and Tabellini (2005) also adopt the regression-based measures to examine the cyclical behavior of fiscal variables. However, we obtain the same conclusion even if we use alternative measures of fiscal cyclicality based on either correlation or different fiscal variables other than government spending, as we will show later.

Table 1 shows the summary statistics on the estimated $\widehat{\beta}$ for various groups of countries. High-income, developed countries such as the OECD country group tend to exhibit lower pro-cyclicality than developing countries on average. This is consistent with Kaminsky, Reinhart, and Vegh's (2004) finding that developing countries tend to exhibit stronger fiscal pro-cyclicality. Among the developing countries, Latin America shows greater pro-cyclicality than other regions, with its average of the estimated $\widehat{\beta}$'s being greater than 1. Yet this simple comparison of regional averages can be misleading because there is substantial variation across countries within each group.

To study the link between pro-cyclicality of fiscal policy and social polarization, we now explore the cross-country dimension of our data. Our baseline regression specification is as follows:

$$\begin{aligned} \widehat{\beta}_i &= \alpha_0 + \alpha_1 \ln(\text{initial income per capita})_i + \alpha_2(\text{government size})_i \\ &\quad + \alpha_3(\text{social polarization})_i + \phi X_i + \varepsilon_i, \end{aligned} \tag{13}$$

where i denotes a country, and ε is an unobserved error term. The log of initial real GDP per capita in 1960 (LRGDPCH) is included to control for potential effects of economic backwardness on fiscal policy. Poor countries may have relatively inefficient tax and spending systems and hence be more prone to poor fiscal outcomes such as pro-cyclical spending. Also, LRGDPCH may capture some socio-political effects on fiscal outcomes if social conflicts are greater in poor countries. Government size (GEXP),

which is general government expenditures as a percent of GDP (averaged over the period of 1960-2003), is introduced to control for the stabilizing effects of government size on output (see Gali, 1994; Fatas & Mihov, 2001). That is, one can associate the size of government with the strength of the automatic stabilizer. Fiscal policy functioning as an automatic stabilizer would be counter-cyclical, and hence GEXP is expected to enter the regression with a negative (–) sign. Our key indicators of social polarization are income inequality and educational inequality in the population. Finally, X_i represents other variables such as trade openness, political instability, cabinet size, sovereign debt default risk, output volatility, and institutional constraints, which we discuss later. Because heteroskedasticity may be more important in a cross-country sample, the reported standard errors of the coefficients are based on the White heteroskedasticity-consistent covariance matrix, which reduces the sensitivity of inference and hypothesis test using the OLS estimator to a general form of heteroskedasticity.

Figure 2 shows a scatter plot between fiscal cyclicality ($\widehat{\beta}$) and income inequality (GINI) which is the average of all available Gini coefficients for the 1970s in the Deininger and Squire (1996) data.[16] A positive correlation between them is quite evident. The regressions on fiscal cyclicality $\widehat{\beta}$ shown in Table 2 confirm the visual association between pro-cyclicality and inequality. It is remarkable that GINI enters the OLS regression with posi-

[16] The income inequality data during the 1960s are not available for many more developing countries and of poorer quality. To maintain a reasonably large sample, we use the average of all the available Gini coefficients in the 1970s. We also tried other measures of income inequality: GINIHI and AGINIHI from Deininger and Squire (1996). The indicator GINIHI is high-quality data of Gini coefficients measured as close to 1970 as possible. The indicator AGINIHI is the decade average of all high-quality data of Gini coefficients. The results are similar to those reported in the paper. The main advantage of using GINI over the other income inequality measures is a larger number of observations available. Therefore, we report regression results, primarily using GINI to maintain the largest number of observations possible. However, it should be noted that these indicators are highly correlated, and that income inequality measured by Gini coefficients is very persistent over time.

As a further robustness check, we also use educational inequality in 1960, which is found to be consistently correlated with income inequality (De Gregorio & Lee, 2002).

tive coefficients that are all significant at the 1-5% level (see columns 1–3). Countries with highly polarized societies, as measured by inequality, tend to exhibit greater tendency of fiscal pro-cyclicality. The OLS coefficients suggest that a 10 point increase in Gini coefficient is associated with an increase in fiscal pro-cyclicality of 0.19-0.21.

Columns 4–6 in Table 2 use educational inequality (EDINEQ) as an alternative measure of social polarization. The educational inequality is the dispersion of educational attainment in the population in 1960, which is obtained as the standard deviation of schooling using data from Barro and Lee (2000). The literature stresses education as one of the major factors that affect income distribution. The human capital model of income distribution including the work of Schultz, Becker and Mincer implies that the distribution of earnings (or income) is determined by the distribution and the level of schooling across the population, and predicts positive association between educational inequality and income inequality. Recently, De Gregorio and Lee (2002) confirm this positive association in a panel data for about 100 countries in 1960–90. The indicator EDINEQ has some advantages over GINI. First, it has more data points available than GINI. Secondly, one can view the educational distribution in 1960 as pre-determined (by the income distribution and other factors in the preceding decades). It is striking that the coefficients of EDINEQ are all significant at 5 %, and of the correct sign (+).

Surprisingly, however, the OLS coefficients of LRGDPCH are insignificant except for column 6 and of the wrong sign (+). A simple scatter plot in Figure 3 also shows a lack of any discernible relationship between the tendency of pro-cyclicality and the degree of economic development. The coefficients of GEXP are all significant at the 5% level and of the correct sign (–). According to the OLS estimates, a 10 percent increase in GEXP is associated with an increase in fiscal counter-cyclicality of 0.34-0.5. Trade openness (TRADE) is also included in our baseline specification, which is

the sum of exports and imports as a percentage of GDP, averaged over the period of 1960-2003. In a well-known paper, Rodrik (1998) argues that as long as the government attempts to facilitate consumption smoothing by conducting a counter-cyclical policy, more open economies tend to have larger governments because trade openness exposes a country to external shocks. If trade openness induces the government to implement a counter-cyclical fiscal policy in reaction to an external shock, TRADE is expected to enter the regression with a minus (–) sign. The coefficients of TRADE are not statistically different from zero however.

According to our theory, political uncertainty may also lead to pro-cyclical behavior of fiscal spending by shortening policymakers' expected tenure in office and providing incentives to engage in short-term policies. However, political uncertainty is a multidimensional phenomenon that cannot be captured by a single variable. To capture this multidimensional aspect, we construct a composite index PINSTAB by applying the principal components analysis to five variables, COUPS (coups d'etat), REVOLS (revolutions), GOVCRIS (government crises), CONSTCHG (constitutional changes), and ASSASSIN (political assassinations), which are from Banks (2003).[17] Columns 3 and 6 show somewhat mixed results. The coefficients of PINSTAB are of the expected sign (+) but significant at 5% only in column 6. The OLS estimates in columns 3 and 6 imply that one standard deviation increase in PINSTAB raises fiscal pro-cyclicality by 0.2–0.25.[18] Some previous studies found that income inequality increases political instability (Drazen, 2000). If so, some of the variation in fiscal pro-cyclicality cap-

[17] More precisely, PINSTAB = 0.0390*GOVCRIS + 0.2384*REVOLS + 0.4363*COUPS + 0.3296*CONSTCHG + 0.0688*ASSASSIN. The principal components analysis is a statistical technique that helps us to reduce the number of variables by describing linear combinations of the variables that contain most of the information (i.e., linear combinations with the greatest variance). All the variables that are included in PINSTAB are standardized so that they have a mean of zero and standard deviation of one at the outset.

[18] We also tried each of the five variables individually. They are positively associated with the fiscal cyclicality, but their coefficients tend to be statistically insignificant (not reported).

tured by political instability measures merely reflects the effects of income inequality. Interestingly, however, the size and statistical significance of the coefficients of GINI and EDINEQ remain much the same even if we include PINSTAB.[19]

Next, we check the robustness of our results in terms of observations by using a robust estimation method. The OLS estimates tend to be sensitive to outliers, either observations with unusually large errors or influential observations with unusual values of explanatory variables (called leverage points). In a recent study on growth regression, Easterly (2005) argues that some of the large effects of a policy variable(s) on growth are often caused by outliers that represent "extremely bad" policies. One of the most common ways to deal with outliers is to drop observations one at a time or to use single-case diagnostics such as Cook's distance or DFIT. But this is often inadequate because it may miss a group of outliers due to the masking effect.

To obtain estimates that are not sensitive to outliers and to characterize the most coherent part of the data, we employ a robust estimation based on the least median of squares (LMS), which is given by

$$\underset{\widehat{\beta}}{Minimize} \;\; \underset{i}{median} \;\; \widehat{\varepsilon}_i^2, \tag{14}$$

where $\widehat{\varepsilon}_i$ is the residual of the ith observation with respect to the LMS fit. This LMS estimator, typically computed by approximate algorithms, can resist the effect of nearly 50% of contamination in the data. A disadvantage of the LMS method is its lack of efficiency because of its unusually slow convergence, making it unsuitable for inference. To deal with this problem, we use the LMS to identify outliers, and then carry out a simple reweighted least squares (RWLS) procedure by assigning zero weight to outliers and full

[19] There is not much correlation between inequality (GINI and EDINEQ) and PINSTAB. In a simple regression of PINSTAB on LRGDPCH and GINI (or EDINEQ), the coefficients of GINI and EDINEQ are completely insignificant, which is consistent with Campos and Nugent (2002) that find the linkage between inequality and political instability to be much weaker than previously reported.

weight to the rest of the observations, as recommended by Rousseeuw and Leroy (1987).[20]

Columns 7–12 in Table 2 display the robust estimation results. They are quite similar to the OLS results, although the robust estimation tends to improve the goodness of fit. Importantly, the coefficients of inequality indicators remain highly significant at the 1-5% level, and tend to get bigger. Figures 4 and 5 show scatter plots of pro-cyclicality against GINI and EDINEQ, based on the samples that exclude outliers identified by the LMS, which correspond to columns 7 and 10, respectively. They exhibit much stronger positive correlation than in the full sample.

In Table 3, we examine other potential determinants of fiscal cyclicality such as size of the cabinet, terms of trade, sovereign debt default risk, capital flow volatility, and output volatility. The common-pool literature on fiscal problems such as Velasco (1999) and Tornell and Lane (1998) views fiscal deficits or overspending as arising from the common-pool problem, and typically associates the severity of the common pool problem with the number of participants. That is, under this approach, a deficit can arise because individual policymakers fail to internalize the full cost of their own spending financed through common tax revenues. This lack of coordination may be greater when there are more participants in the decision process (size fragmentation), which may result in greater pro-cyclicality by causing greater budget deficits in reaction to an increase in government revenue. Columns 1, 6, 11, and 16 examine this hypothesis using a measure of size fragmentation, CABSIZE (number of ministers in the cabinet).[21] The OLS

[20] A weight w_i is assigned for each observation as follows:

$$\begin{aligned} w_i &= 1 \text{ if } \widehat{\varepsilon_i}^2 \leq (2.5\widehat{\sigma})^2 \\ &= 0 \text{ otherwise,} \end{aligned}$$

where the robust standard error, $\widehat{\sigma}$, is give (after running the LMS) by $\widehat{\sigma} = 1.4826[1 + 5/(n-k)]\sqrt{\text{median}_i\ \widehat{\varepsilon_i^2}}$; $\widehat{\varepsilon}_i$ is the residual of the ith observation with respect to the LMS result; $n =$ is number of observations; and $k =$ number of explanatory variables.

[21] Perotti and Kontopoulos (2002) and Woo (2003) report that the cabinet size is strongly

coefficients of CABSIZE are insignificant, whereas those from robust estimation are significant at the 1-10% level. In all cases, however, they are of the wrong sign (–).

Next, we consider three variables in relation to the popular view that a pro-cyclical fiscal stance is due to cutoffs from the international capital market in bad times, either because of credit constraints or incomplete international capital markets (Gavin & Perotti, 1997; Riascos & Vegh, 2003): growth rate of terms of trade (GRTOT), sovereign debt default risk (PDEFAULT), capital flow volatility (CAPFLVOL).[22] However, it should be noted that it is hard to find an ideal measure of credit constraints or capital market incompleteness. Let us begin with GRTOT. The improvement in the terms of trade may relax fiscal budget constraints through rising revenue or improved access to international capital markets, and vice versa (for example, consider a commodity boom and bust). Using GRTOT has an advantage in that it can be viewed as exogenous. GRTOT is expected to enter the regression with a minus sign (–). As columns 2, 7, 12, and 17 show, however, the coefficients of GRTOT are all insignificant at the conventional level, and even change their sign.

Second, a government's access to international capital markets can be crucially related to default risk on sovereign debt. High default risk may result in a very limited access to foreign capital or a cutoff from the international markets. Thus, high default risk may be associated with pro-cyclical fiscal stances. Our measure of sovereign debt default risk is PDEFAULT (a ratio of number of years in default to total number of years since independence) that is from Reinhart, Rogoff, and Savastano (2003). It can be interpreted as a historical probability of default on sovereign debt. Reinhart,

positively associated with fiscal deficits.

[22] Related to this, fiscal sustainability issues can also explain pro-cyclicality. As the debt accumulation becomes unsustainable, fiscal consolidation may become necessary, reducing the scope for counter-cyclical response. We tried SURP (fiscal balance exclusive of grants as a percent of GDP). The coefficients of SURP are all insignificant in both OLS and robust estimation (not reported).

Rogoff, and Savastano (2003) stress that the "safe" external debt thresholds depend heavily on a country's default history. PDEFAULT is expected to enter the regression with a positive sign (+). However, the OLS coefficients of PDEFAULT are insignificant and even change their sign (see columns 3 and 8). The robust estimation results in columns 13 and 18 are not encouraging either. Although the coefficient of PDEFAULT is significant at 1% in column 13, it is of the wrong sign (–). Yet the simple correlation between fiscal cyclicality measure $\widehat{\beta}$ and PDEFAULT is 0.22. We also tried the number of years in default instead, but it did not change the results (not reported).

Third, we consider the volatility of capital flows (CAPFLVOL) as a proxy for capital market incompleteness. It is measured as the standard deviation of annual percent changes in gross capital flows in 1960-2003. The access to foreign capital can manifest itself in the actual capital inflows and outflows. So volatile capital flows may indicate unstable access to the international capital markets, and hence be associated with fiscal pro-cyclicality. Despite the possible endogeneity problem with using CAPFLVOL, we want to check whether our previous results on inequality and pro-cyclicality change once we include CAPFLVOL. Columns 4, 9, 14, and 19 of Table 3 show the results. The OLS and robust regression coefficients of CAPFLVOL are all insignificant at the conventional level, although they are of the expected sign (+).

Finally, we consider output volatility (GDPVOL). According to Talvi and Vegh (2005), the greater the tax base variability (proxied by output or consumption volatility), the higher the degree of pro-cyclicality. Lane (2003) uses output volatility and reports some empirical support for this view in the OECD country sample. We measure output volatility as the standard deviation of annual percent changes in real GDP during the sample period. The regression results are reported in columns 5, 10, 15, and 20 in Table 3. The coefficients of GDPVOL are all insignificant—except for the robust

regression in column 20 where it becomes significant at 5% and the coefficient of EDINEQ is significant at the 1% level. In the robust regression in column 15, the coefficient of GINI is significant at 1%, whereas that of GDPVOL is insignificant and of the wrong sign (–).[23]

In sum, we do not find any significant evidence in support of the credit constraint argument (or incomplete international capital markets). Similarly, the evidence on the tax variability argument of Talvi and Vegh (2005) is weak. In sharp contrast, the inequality measures (GINI and EDINEQ) remain consistently significant at various levels and positive-signed—the exceptions being only two regressions in columns 8 and 16 out of twenty regression results in which the coefficient of EDINEQ becomes insignificant. In particular, the coefficients of GINI of the robust regressions in columns 11–15 are all significant at 1%. Interestingly, the coefficients of GEXP also remain mostly significant, and PINSTAB often enters the regression with a significant coefficient.

In Table 4, we consider a measure of institutional quality for a couple of reasons. First, institutions of quality functioning as a checks and balances mechanism may help avoid the coordination failure among policymakers that we highlighted in our model. Second, high-quality institutions can make a difference for public finance: a more efficient tax-collection system and better monitoring on disbursement should strengthen the fiscal position of the government and the effectiveness of fiscal policy as an aggregate demand management tool (say, counter-cyclical fiscal spending policy). Third, when institutions of conflict management are well-established and work well enough to suppress conflicts of interest among different groups, the social polarization effect we found earlier may be less important in determining the

[23] However, there is a potential problem of endogeneity or reversed causation with using GDPVOL. It is not only because GDPVOL and the beta $\widehat{\beta}$ are measured over the same time period, but also, as we will show shortly, fiscal pro-cyclicality and volatility are strongly positively correlated with each other. Fatas and Mihov (2003) find that fiscal volatility leads to output volatility. Thus, it is highly plausible that fiscal pro-cyclicality (and volatility) may contribute to output volatility, rather than the other way around.

fiscal outcomes. We use a measure of institutional constraints facing policymakers as a proxy for institutional quality, such as XCONST and POLCON. The indicator XCONST refers to the extent of institutionalized constraints on the decision-making power of chief executives, which is from Polity IV data of Marshall and Jaggers (2005). The indicator, POLCON, which is obtained from Henisz (2002), similarly captures the extent to which the executives face political constraints in implementing his or her policy. Yet it improves upon XCONST by incorporating the number of institutionally embedded veto players among various branches of government, so we report regression results mainly using POLCON.[24] Persson, Roland, and Tabellini (1997) show that separation of powers with appropriate checks and balances can lead to significant improvement in equilibrium outcomes by reducing the rents extracted by politicians. Thus, one can argue that better checks and balances may lead to more sound fiscal policy by reducing the harmful polarization effects on fiscal behavior.[25] In contrast, common measures of institutions used in the empirical growth literature are mostly based on subjective assessments of risk for international investors along such dimensions as law and order, bureaucratic quality, corruption, risk of expropriation by the government, and risk of government contract repudiation, which tend to rise with per capita income, rather than reflect durable institutional constraints on government. Thus, a measure of constraints on the executives is probably the best of the measures available, although even these seem to be based on political outcomes (see Glaeser, LaPorta, Lopez de Silanes, & Shleifer, 2004 for more).

Columns 1 and 2 in Table 4 are taken from Table 2 to facilitate a com-

[24] The regression result on XCONST turns out to be weak. The coefficients of XCONST are not significant at all (not reported). Thus, using POLCON is a stronger test on the effect of inequality on the fiscal cyclicality.

[25] However, a larger number of veto powers may not result in better fiscal outcomes. Tsebelis (1995) argues that regime instability is associated with a larger number of veto players that lack ideological cohesion. According to this hypothesis, one can expect more veto players to be associated with fiscal instability and larger fiscal deficits.

parison. Columns 3–6 show that the coefficients of POLCON are of the expected sign (–) and significant at the 1-5% level, except for column 6 where it is insignificant. Interestingly, the OLS coefficients of GINI and EDINEQ get slightly smaller, and those of EDINEQ become insignificant, once we control for POLCON, which one can expect because the checks and balances mechanism may reduce harmful effects on fiscal behavior of social polarization. Robust regression results shown in columns 7–10 are largely similar to the OLS's, but the coefficients of GINI become significant at 1% and actually get bigger.

Now we try to address the potential endogeneity of income inequality and institutional constraints using the instrumental-variable (IV) method in a parsimonious specification because it is not easy to find some good instrumental variables. Our instruments for GINI are the percentage of population with primary schooling completed in 1960 (PRIMCOMP1960) from Barro and Lee (2000) and natural resource endowments (NRRICH) from Auty (2001). As mentioned earlier, the human capital model of income distribution implies that the distribution of income is determined by the distribution and the level of schooling across the population. Also, several influential studies such as Leamer, Maul, Rodriquez, and Schott (1999), Auty (2001) and Sokoloff and Engerman (2000) have shown how the initial natural resource endowment can influence income distribution and development of institutions in a nation. Indicator NRRICH is a dummy variable that is 1 if a country is rich in natural resources and 0 otherwise. POLCON is instrumented by the initial level of POLCON in 1960.[26]

[26] We tried various alternative instruments for POLCON such as averages of XCONST in 1950-60, POLCON in 1960-65 or log of settler mortality rates in the European colonies in the 17-19th centuries from Acemoglu, Johnson, and Robinson (2001). The results are very similar to that reported in Table 5. Yet using these alternative variables only reduces the number of observations and F-statistic on the joint significance of excluded instruments in the first-stage regressions, which reduces statistical validity of these variables as instruments.

On the other hand, it is even harder to find a good instrument for the size of government (GEXP). If we run the IV regression including GEXP and using the value of GEXP in

We employ the two-step feasible efficient GMM method as an IV regression, which produces a consistent and efficient estimator in the presence of heteroskedasticity that is more likely in a cross-country study. The conventional IV coefficient estimates are still consistent, whereas its estimates of the standard errors are inconsistent. The latter can be partially addressed by using heteroskedasticity-consistent Huber-White standard errors, yet this conventional IV estimator is still inefficient when there is heteroskedasticity.

Table 5 presents the IV regression result. It is largely consistent with OLS regression results (except that the coefficient of POLCON becomes insignificant), and strongly suggests that greater income inequality leads to greater tendency of pro-cyclical fiscal spending policy, rather than the other way around. Our instrumental variables satisfy two requirements: they must be correlated with the included endogenous variable(s), and orthogonal to the error process. Table 5 shows F-test statistics from the first-stage regressions, a test of joint significance of the (excluded) instruments. The F-test results indicate that our instruments are significantly correlated with the endogenous variables. The Hansen J-test statistic (over-identification test), which is consistent in the presence of general form of heteroskedasticity, is employed to test whether the instrument(s) is uncorrelated with the error term. The Hansen J-statistic shows that our instruments satisfy the orthogonality condition.

Lastly, we check the robustness of our results by using four alternative measures of fiscal cyclicality from the literature. Kaminsky, Reinhart, and Vegh (2004) present an indicator based on the correlation of cyclical components of central government spending and real GDP (CYCRCGOVEXP) in a sample of 104 countries for 1960-2003, not a regression-based indicator that we use. Also, they construct a composite index of fiscal cyclicality (Index of Fiscal Cyclicality) based on the correlation of cyclical components of

1960 as its instrument, we still obtain the main result that greater inequality seems to cause greater pro-cyclicality of fiscal policy.

government expenditure and real GDP, correlation of cyclical components of inflation tax and real GDP, and the amplitude of real government spending cycles. In contrast, Alesina and Tabellini (2005) consider fiscal variables such as budget surplus as a percent of GDP and government spending as a percent of GDP during a varying time period for each country in a sample of 87 nations, and adopt regression-based measures of cyclicality as we do. As Kaminsky, Reinhart, and Vegh (2004) show clearly, however, the cyclicality based on such fiscal variables as a proportion of GDP does not provide an unambiguous measure of fiscal policy stance. Nonetheless, we consider two such measures, BETASURPLUS and BETAEXP, from Alesina and Tabellini (2005) to check the robustness of our conclusion.

Table 6 shows both OLS and robust regression results. They confirm our earlier findings. All of the coefficients of income inequality GINI are consistently statistically significant for the four different measures of fiscal cyclicality. They are all significant at the 1-5% level, except for columns 9 and 11 where they are significant at the 10% level. On the other hand, the relations between fiscal cyclicality and other variables, GEXP, LRGDPCH, TRADE, POLCON, and PINSTAB tend to be weak in general and only occasionally significant.

3.2 Volatility of Fiscal Policy

We briefly turn to the issue of fiscal volatility. Our theory predicts that fiscal volatility will also be greater in a country with highly polarized society. Since our main focus is on fiscal pro-cyclicality, we present only a few regression results to stress that social polarization (measured by inequality) is important in explaining both fiscal pro-cyclicality and volatility of fiscal outcomes. Figure 6 shows how closely fiscal cyclicality and volatility are correlated to each other. This fact that countries with highly pro-cyclical fiscal stance tend to exhibit highly volatile fiscal outcomes has not been recognized in the literature. Our measure of fiscal volatility (FISCALVOL)

is the log of standard deviation of annual growth rates of fiscal spending over the sample period.[27]

Figure 7 presents a scatter plot of FISCALVOL against GINI. Again, a strong positive correlation is evident. The OLS and robust regressions shown in columns 1–6 of Table 7 confirm this positive correlation. The coefficients of GINI are all significant at the 1% level. Its impact on the fiscal volatility is quite substantial. The robust estimation in column 4 suggests that an increase in inequality by 10 points in Gini coefficient is associated with an increase in fiscal volatility by 26%.

Here we control for other variables such as LRGDPCH, GEXP, TRADE, PINSTAB and POLCON. Poor countries may be more prone to poor fiscal outcomes such as pro-cyclical spending or frequent uses of discretionary policy. Then, initial income per capita (LRGDPCH) is expected to enter the regression with a negative sign. To the extent that government size (GEXP) indicates the strength of the automatic stabilizer which may reduce needs for fiscal discretionary policy, GEXP is expected to enter the regression with a negative sign. By contrast, countries that are more open to trade may experience greater external shocks, which may require offsetting fiscal adjustments. The coefficient of TRADE is then expected to be positive. Political instability (PINSTAB) may be associated with greater fiscal volatility because political upheavals may lead to drastic changes in fiscal policy. Similarly, a lack of institutional constraints can induce more active policy discretions, resulting in greater fiscal volatility. So the coefficient of POLCON is expected to be of a negative sign.

Interestingly, the robust estimation yields stronger results (see columns 4–6 of Table 7). For example, column 6 shows that all of the variables except PINSTAB enter the regression with statistically significant and correctly-

[27] We also tried a measure of fiscal policy volatility that reflects aggressiveness in using discretionary fiscal spending which is not used for smoothing out the output fluctuations over the business cycle as in Fatas and Mihov (2003). The results are similar. Available upon request.

signed coefficients. The adjusted R^2 is pretty high as well.

If we substitute EDINEQ for GINI, the OLS regression results tend to be weak (columns 7–9). Yet, the robust regression coefficient of EDINEQ is significant at the 5% level in columns 10 and 11. As it was in the case of cyclicality, however, the robust estimate of EDINEQ loses statistical significance, once we control for POLCON in column 12.[28]

4 Growth, Fiscal Pro-cyclicality, and Volatility

Up to this point, we have examined the cyclical behavior of fiscal policy and fiscal volatility, and have shown that both fiscal pro-cyclicality and volatility are consistently and positively associated with social polarization as measured by income inequality and educational inequality. Now we explore how much of cross-country variation in economic growth is explained by the way fiscal policy responds to economic conditions as measured by fiscal cyclicality or by fiscal volatility. We posit the following chain through which social polarization is negatively linked to growth.

Social polarization (inequality in income/education)

$\Downarrow$

Fiscal policy behavior: pro-cyclicality and volatility

$\Downarrow$

Slow economic growth

So far we have shown evidence for the first link between social polariza-

[28] Also, we ran an IV regression on fiscal volatility using the same set of instruments as in the IV regression for fiscal cyclicality. Again, the result is similar to those of OLS and robust regressions. The coefficient of GINI remains statistically significant at 1% and of the correct sign (+). Not reported to save space.

tion and fiscal behavior. In this section, we focus on the second link between fiscal policy behavior and economic growth. Let us begin by looking at Figure 8 for a scatter plot of growth rate of real GDP per capita in 1960-2003 against the measure of fiscal cyclicality ($\widehat{\beta}$), which shows a strong negative correlation between them.

Here we consider a small core set of growth determinants which have been shown to be most consistently associated with growth, initial income per capita (LRGDPCH) and initial human capital (educational attainment) as measured by log of average years of secondary schooling of the population over age 15 in 1960 (LSYR1560) from Barro and Lee (2000).[29] Columns 1–3 of Table 8 show the growth regression results using fiscal cyclicality ($\widehat{\beta}$). The coefficients of LRGDPCH and LSYR1560 are significant at various levels in the OLS and robust regressions—except for that of LRGDPCH in column 3. These results confirm the now-standard observation of conditional convergence as well as the positive effect on subsequent economic growth of initial level of education. Importantly, the beta ($\widehat{\beta}$) enters the growth regression with highly significant negative coefficients. This remains the same even if we consider a smaller sample in which data points on GINI are available (see column 1). The robust regression confirms that our results are not driven by outliers.

In the next columns 4–8, we add three economic variables to check whether the results are sensitive to inclusion of other variables (even at the risk of running into the endogeneity problem): government size (GEXP),

[29] As the empirical growth literature has explosively grown, some shortcomings of growth regressions have become apparent (see Durlauf, Johnson, & Temple, 2005 for a critical survey). A dominant concern has been the robustness. Many growth studies have regressed output growth on a vast array of potential determinants. But this approach has been called into question, largely because the resulting parameter estimates are often sensitive to other conditional variables. Some economists suggest that we focus on a core set of explanatory variables that have been shown to be consistently associated with growth and evaluate the importance of other variables conditional on inclusion of the core set. The other concern is the endogeneity problem. This is why we want to focus on a small core set of growth determinants which are mostly initial conditions.

trade openness (TRADE), and output volatility (GDPVOL). While these variables are often found to be significantly associated with economic growth in the literature, one may be concerned with the quantitative importance of fiscal pro-cyclicality in growth. For example, a country may have a high level of fiscal pro-cyclicality, yet if it has a small government and hence any pro-cyclical change in spending during boom and recession will be small relative to the economy, then the fiscal pro-cyclicality itself may not matter for growth. Similarly, if there is a lower level of output volatility (smoother business cycle), then the resulting change in fiscal spending due to the nature of being pro-cyclical would be smaller, and again the fiscal pro-cyclicality itself may not matter for growth.[30] Also, trade openness can be positively associated with the government size and output volatility as a country more open to trade is more vulnerable to external shocks. So we try to control for GEXP, GDPVOL and TRADE. However, including these variables does not change our key results—in particular, the coefficients of the beta ($\widehat{\beta}$) remain significant at the 1% level, and the size of the coefficients does not change appreciably.

Similarly, columns 9–16 show the results for fiscal volatility (FISCALVOL), which are quite comparable to those for fiscal pro-cyclicality. FISCALVOL is strongly negatively associated with economic growth. It is interesting to note that GDPVOL loses statistical significance once we control for FISCALVOL.

Since the real GDP per capita growth and the fiscal cyclicality indicator are both measured during the same period of 1960-2003, we may have to worry about the endogeneity problem in estimating the relationship between beta ($\widehat{\beta}$) and growth. Again, we use the two-step feasible efficient GMM in which the beta is instrumented by natural resource endowments (NRRICH), and log of settler mortality in European colonies in the 17-19th centuries (LSETMORT) from Acemoglu, Johnson, and Robinson (2001).

[30] I thank an anonymous referee for this point.

Earlier, we saw that income inequality as measured by GINI and institutional constraints as measured by POLCON are strongly positively and negatively associated with the beta ($\widehat{\beta}$), respectively. As deeper parameters for GINI and POLCON, we use NRRICH and LSETMORT, respectively. For the latter, Acemoglu, Johnson, and Robinson (2001) demonstrate that the mortality rates suffered by European settlers are a strong predictor of institutional quality in subsequent years.

Table 9 presents the IV regression result. It is consistent with the OLS and robust regression results shown in Table 8, and strongly suggests that greater fiscal pro-cyclicality leads to slower economic growth in subsequent years, rather than the other way around. The coefficient of beta is negative and significant at the 1% level (column 1). The instrumental variables we employ satisfy two requirements of good instruments, as indicated by F-test statistics and over-identification test. Similarly, we also find a strong negative impact on growth from fiscal volatility in the IV regression (column 2). In sum, econometric results provide strong evidence in support of our main argument that a high level of social polarization leads to pro-cyclical and volatile behavior of fiscal policy, which in turn retards economic growth.

5 Concluding remarks

We studied the behavior of fiscal policy theoretically and empirically in a large sample of countries over the period of 1960-2003. As our theory suggests, social polarization of preferences seems to lie behind the fiscal problems of highly pro-cyclical fiscal policy and excessive volatility of fiscal policy, which tend to reduce economic growth. Income inequality and educational inequality as proxies for social polarization are strongly positively associated with both the degree of fiscal pro-cyclicality and the size of fiscal volatility. We also find that pro-cyclical and volatile fiscal policy is harmful to growth. Thereby, we provide a new fiscal channel for the negative link

between inequality and growth, which is distinct from the prominent fiscal redistribution channel that seems to lack empirical support.

Our findings suggest that to enhance long-term growth, it is important to limit the scope for pro-cyclical fiscal responses in reaction to business cycles or windfall gains like commodity booms. Institutionalized checks and balances in the public decision-making process matter for the fiscal behavior and its outcomes. In particular, countries with highly polarized societies may improve upon fiscal policy decisions by imposing more stringent constraints on policymakers. Also, tackling social polarization directly can be conducive to achieving fiscal discipline and fiscal soundness. A recent literature on social cohesion/trust also emphasizes beneficial effects of social cohesion to the economy. In principle, tackling social polarization may take different forms of provision of public education, building effective institutions of conflict management or even redistribution. However, there still remain important questions regarding what most effective ways to overcome social polarization and achieve social cohesion are. This will be an interesting future research topic.

6 Model Appendix

A. Temporary Change in Tax Revenue.

In this section, we consider a temporary change in tax revenue. Without loss of generality, let us assume that there is a one-time positive shock to the output in the first period, and then the output returns to the natural level, $\overline{Y}$ in the second period. So $Y_1 = \overline{Y} + \xi$ and $Y_2 = \overline{Y}$. The total government spending in equilibrium is then

$$G_1 = g_1^\star + \ f_1^\star = \frac{(1+\theta)[(1+r)T_1 + T_2]}{(1+r)[\delta + (1+\theta)]}. \tag{A1}$$

Thus, the absolute size of the spending change resulting from a shock to tax

revenue is

$$\frac{dG_1}{dT_1} = \frac{dG_1}{d(\tau\xi)} = \frac{(1+\theta)}{[\delta+(1+\theta)]} = k(\overset{+}{\theta}, \overset{-}{\delta}) > 0. \tag{A2}$$

The magnitude of the fiscal spending increase in response to a positive shock to the output rises with the degree of polarization θ and falls with the discount factor δ.

B. Fiscal Spending Path under Social Planner's Solution

A social planner is assumed to choose g_t^* and f_t^* to maximize the weighted average of the two policymakers' utility functions. The social planner's problem is to then maximize the following objective function W, with respect to g_t^* and f_t^*, subject to the government budget:

$$W = [\widehat{\alpha}\log g_1 + (1-\widehat{\alpha})\log f_1\} + \delta\{\widehat{\alpha}\log g_2 + (1-\widehat{\alpha})\log f_2\}, \tag{B1}$$

where $\widehat{\alpha} = (\alpha_1+\alpha_2)/2$. The social planner's optimization problem can be computed in a way similar to each policymaker's maximization problem.

$$\underset{\{g_1,\, f_1\}}{Max}\, W = [\widehat{\alpha}\log g_1 + (1-\widehat{\alpha})\log f_1\} + \delta\{\log[\frac{1}{2}(2+r)T - (1+r)(g_1+f_1)]\}. \tag{B2}$$

The social planner's solution is

$$g_1^* = \frac{(2+r)\widehat{\alpha}}{(1+\delta)(1+r)}T \text{ and } f_1^* = \frac{(2+r)(1-\widehat{\alpha})}{(1+\delta)(1+r)}T. \tag{B3}$$

The equilibrium total government spending is then

$$G_{1\text{ social planner}}^* = \frac{(2+r)}{(1+r)(1+\delta)}T. \tag{B4}$$

Thus, the absolute size of spending change resulting from a shock to tax revenue is

$$\frac{dG_1}{dT}_{\text{ social planner}} = \frac{dG_1}{d(\tau\overline{Y})} = \frac{(2+r)}{(1+r)(1+\delta)}, \tag{B5}$$

where it becomes 1 if $\delta = 1/(1+r)$. One can easily show that the absolute size of fiscal spending change in response to a shock to output of the same size is always smaller under the social planner's solution than that under the

non-cooperative solution of the polarized policymakers (compare equations B5 and 10), except when $\alpha_1 = \alpha_2 = 1/2$ (i.e., no polarization, $\theta = 0$). Only when there is no polarization does the non-cooperative solution coincide with that of the social planner.

Since $\alpha_1 \geq \alpha_2$ and hence $\widehat{\alpha} \leq \alpha_1$ (similarly, $(1 - \widehat{\alpha}) \leq (1 - \alpha_2)$), it is straightforward to see that $G^*_{1 \text{ social planner}} \leq G^\star_{1 \text{ non-cooperative solution}}$. Thus, the social planner's optimal spending level (in the first period) is always lower than the non-cooperative solution of the polarized policymakers, again except when $\theta = 0$. Similarly, the social planner's optimal size of budget deficit (in the first period) is lower than the non-cooperative solution.

References

[1] Acemoglu, Daron, Simon Johnson, and James Robinson, "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review* 91:5 (2001), 1369–1401.

[2] Akitoby, Bernardin, Benedict Clements, Sanjeev Gupta, and Gabriela Inchauste, "The Cyclical and Long-Term Behavior of Government Expenditures in Developing Countries," IMF Working Paper 04/202 (2004).

[3] Alesina, Alberto and Dani Rodrik, "Distributive Politics and Economic Growth," *Quarterly Journal of Economics* 109:2 (1994), 465–490.

[4] Alesina, Alberto and Guido Tabellini, "Why Is Fiscal Policy Often Procyclical?" Harvard University, unpublished manuscript (2005).

[5] Arreaza, Adriana, Bent Sorensen, and Oved Yosha, "Consumption Smoothing Through Fiscal Policy in OECD and EU Countries," in James Porterba and Jürgen von Hagen (Eds.), *Fiscal Institutions and Fiscal Performance* (Chicago: University of Chicago Press, 1999).

[6] Auty, Richard, *Resource Abundance and Economic Development* (New York: Oxford University Press, 2001).

[7] Banks, Arthur S., Cross-National Time Series Data Archives, Center for Social Analysis at State University of New York at Binghamton (2003).

[8] Barro, Robert, "On the Determination of Public Debt," *Journal of Political Economy* 87:5 (1979), 940-971.

[9] Barro, Robert, and Jong-wha Lee, "International Data on Educational Attainment, Updates and Implications," Center for International Development Working Paper 42, Harvard University (2000).

[10] Birdsall, Nancy, David Ross, and Richard Sabot, "Inequality and Growth Reconsidered: Lessons from East Asia," *World Bank Economic Review* 9:9 (1995), 477-508.

[11] Calderon, Cesar, and Klaus Schmidt-Hebbel, "Macroeconomic Policies and Performance in Latin America," *Journal of International Money and Finance* 22:7 (2003), 895–923.

[12] Campos, Nauro, and Jeffrey Nugent, "Who Is Afraid of Political Instability?" *Journal of Development Economics* 67:1 (2002), 157-172.

[13] Chari, V.V., and Patrick Kehoe, "Optimal Fiscal and Monetary Policy," in John B. Taylor and Michael Woodford (Eds.), *Handbook of Macroeconomics* (Amsterdam: North-Holland, 1999).

[14] Clarke, George, "More Evidence on Income Distribution and Growth," *Journal of Development Economics* 47:2 (1995), 403-427.

[15] De Gregorio, Jose, and Jong-wha Lee, "Education and Income Inequality: New Evidence From Country Data," *Review of Income and Wealth* 48:3 (2002), 395-416.

[16] Deininger, Klaus, and Lyn Squire, "A New Data Set Measuring Income Inequality," *World Bank Economic Review* 10:3 (1996), 565-591.

[17] Drazen, Allan, *Political Economy in Macroeconomics* (Princeton: Princeton University Press, 2000).

[18] Durlauf, Steven, Paul Johnson, and Jonathan Temple, "Growth Econometrics," in Philippe Aghion and Steven Durlauf (Eds.), *Handbook of Economic Growth* (Amsterdam: North-Holland, 2005).

[19] Easterly, William, *The Elusive Quest for Growth* (Cambridge: The MIT Press, 2001).

[20] _____, "Inequality Does Cause Underdevelopment," Center for Global Development working paper 1 (2002).

[21] _____, "National Policies and Economic Growth: A Reappraisal," in Philippe Aghion and Steven Durlauf (Eds.), *Handbook of Economic Growth* (Amsterdam: North-Holland, 2005).

[22] Easterly, William, Carlos Rodriguez, and Klaus Schmidt-Hebbel, *Public Sector Deficits and Macroeconomic Performance* (New York: Oxford University Press, 1994).

[23] Fatas, Antonio, and Ilian Mihov, "Government Size and Automatic Stabilizers: International and Intranational Evidence", *Journal of International Economics* 55:1 (2001), 3-28.

[24] _____, "The Case for Restricting Fiscal Policy Discretion," *Quarterly Journal of Economics* 118 (2003), 1419-1448.

[25] Forbes, Kristin, and Roberto Rigobon, "No Contagion, Only Interdependence: Measuring Stock Market Co-movements," *Journal of Finance* 57:5 (2002), 2223-2261.

[26] Gali, Jordi, "Government Size and Macroeconomic Stability," *European Economic Review* 38:1 (1994), 117-132.

[27] Gavin, Michael, and Roberto Perotti, "Fiscal Policy in Latin America," in Ben Bernanke and Julio Rotemberg (Eds.), *NBER Macroeconomics Annual* (Cambridge: The MIT Press, 1997).

[28] Glaeser, Edward, "Inequality," Harvard Institute of Economic Research Discussion Paper 2078 (2005).

[29] Glaeser, Edward, Rafael LaPorta, Florencio Lopez de Silanes, and Andrei Shleifer, "Do Institutions Cause Growth?" *Journal of Economic Growth* 9:2 (2004), 271–303.

[30] Henisz, Witold, "The Institutional Environment for Infrastructure Investment," *Industrial and Corporate Change* 11:2 (2002, update 2005), 355-89.

[31] Heston, Alan, Robert Summers, and Bettina Aten, Penn World Table Version 6.1, Center for International Comparisons at the University of Pennsylvania, CICUP (October, 2002).

[32] Kaminsky, Graciela, Carmen Reinhart, and Carlos Vegh, "When It Rains, It Pours: pro-cyclical Capital Flows and Macroeconomic Policies," in Mark Gertler and Kenneth Rogoff (Eds.), *NBER Macroeconomics Annual* (Cambridge: The MIT Press, 2004).

[33] Kauffman, Robert, and Barbara Stallings, "The Political Economy of Latin American Populism," in Rudiger Dornbusch and Sebastian Edwards (Eds.), *The Macroeconomics of Populism in Latin America* (Chicago: The University of Chicago Press, 1991).

[34] Lane, Philip, "The Cyclical Behavior of Fiscal Policy: Evidence from the OECD," *Journal of Public Economics* 87:12 (2003), 2661-2675.

[35] Leamer, Edward, Hugo Maul, Sergio Rodriquez, and Peter Schott, "Does natural resource abundance increase Latin American income inequality?" *Journal of Development Economics* 59:1 (1999), 3-42.

[36] Marshall, Monty, and Keith Jaggers, Polity IV Project: Political Regime Characteristics and Transitions, 1800-2004, Center for International Development and Conflict Management, University of Maryland (2005).

[37] McCarty, Nolan, Keith Poole, and Howard Rosenthal, *Polarized America: The Dance of Ideology and Unequal Riches* (Cambridge: The MIT Press, 2006).

[38] Mulligan, Casey, Richard Gil, and Xavier Sala-i-Martin, "Do Democracies Have Different Public Policies Than Nondemocracies?" *Journal of Economic Perspectives* 18:1 (2004), 51-74.

[39] Perotti, Roberto, "Growth, Income Distribution, and Democracy: What the Data Say," *Journal of Economic Growth* 1:2 (1996), 149-187.

[40] Perotti, Roberto, and Yianos Kontopoulos, "Fragmented Fiscal Policy," *Journal of Public Economics* 82:2 (2002), 191-222.

[41] Persson, Torsten, Gerard Roland, and Guido Tabellini, "Separation of Powers and Political Accountability," *Quarterly Journal of Economics* 112:4 (1997), 1163-1202.

[42] Persson, Torsten, and Guido Tabellini, "Is Inequality Harmful for Growth?" *American Economic Review* 84:3 (1994), 600-621.

[43] Powell, Bingham G., *Contemporary Democracies: Participation, Stability, and Violence* (Cambridge: Harvard University Press, 1982).

[44] Reinhart, Carmen, Kenneth Rogoff, and Miguel Savastano, "Debt Intolerance," *Brookings Papers on Economic Activity* 2003:1 (2003), 1-74.

[45] Riascos, Alvaro, and Carlos Vegh, "Procyclical Government Spending in Developing Countries: The Role of Capital Market Imperfection," UCLA, unpublished manuscript (2003).

[46] Rodrik, Dani, "Why Do More Open Economies Have Bigger Governments," *Journal of Political Economy* 106:5 (1998), 997-1032.

[47] _____, "Where Did All the Growth Go? External Shocks, Social Conflict, and Growth Collapses," *Journal of Economic Growth* 4:4 (1999), 385-412.

[48] Rousseeuw, Peter, and Annick Leroy, *Robust Regression and Outlier Detection* (New York: John Wiley & Sons, 1987).

[49] Sachs, Jeffrey, "Social Conflicts and Populist Policies in Latin America," NBER Working Paper 2897 (1989).

[50] Sokoloff, Kenneth, and Stanley Engerman, "History Lessons: Institutions, Factor Endowments, and Paths of Development in the New World," *Journal of Economic Perspectives* 14:3 (2000), 217-232.

[51] Sorensen, Bent, Lisa Wu, and Oved Yosha, "Output Fluctuations and Fiscal Policy: U.S. state and Local Governments 1978-1994," *European Economic Review* 45:7 (2001), 1271-1310.

[52] Talvi, Ernesto, and Carlos Vegh, "Tax Base Variability and Pro-cyclical Fiscal Policy," *Journal of Development Economics* 78:1 (2005), 156-190.

[53] Tornell, Aaron, and Philip Lane, "Are Windfalls a Curse? A Non-representative Agent Model of the Current Account and Fiscal Policy," *Journal of International Economics* 44 (1998), 83-112.

[54] _____, "The Voracity Effect," *American Economic Review* 89:1 (1999), 22-46.

[55] Tsebelis, George, "Decision Making in Political Systems: Veto Players in Presidentialism, Parliamentarism, Multicameralism and Multipartyism," *British Journal of Political Science* 25:3 (1995), 289-325.

[56] Velasco, Andres, "A Model of Endogenous Fiscal Deficits and Delayed Fiscal Reforms," in James Porterba and Jürgen von Hagen (Eds.), *Fiscal Institutions and Fiscal Performance* (Chicago: University of Chicago Press, 1999).

[57] Woo, Jaejoon, "Economic, Political and Institutional Determinants of Public Deficits," *Journal of Public Economics* 87:3-4 (2003), 387-426.

[58] ———, "Social Polarization, Fiscal Instability, and Growth," *European Economic Review* 49:6 (2005), 1451-1477.

[59] World Bank, World Development Indicators CD-ROM, (Washington DC: World Bank, 2005 and 2007).

Table 1

Fiscal Cyclicality in 1960-2003: Estimated $\hat{\beta}$

	Mean	s.t.d.	minimum	maximum
OECD Countries	**0.176**	**0.383**	**-0.434**	**0.896**
Developing Countries	**0.818**	**0.593**	**-1.143**	**2.951**
East Asian Countries	**0.435**	**0.663**	**-0.229**	**1.543**
Latin American Countries	**1.043**	**0.522**	**-0.116**	**2.102**
Sub-Saharan African Countries	**0.680**	**0.558**	**-1.143**	**1.776**
Entire sample (96 countries)	**0.654**	**0.610**	**-1.143**	**2.951**

Note: the country group classification follows that of World Bank.

Table 2. Cross-Country Regression of Fiscal Cyclicality in 1960-2003

Dependent variable: Cyclicality $\hat{\beta}$

Variables	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) OLS	(7) Robust Estimation[a]	(8) Robust Estimation	(9) Robust Estimation	(10) Robust Estimation	(11) Robust Estimation	(12) Robust Estimation
LRGDPCH	0.058	0.052	0.135	0.071	0.060	0.204***	-0.049	-0.12	-0.065	0.005	-0.027	0.294*
	(0.127)	(0.129)	(0.131)	(0.099)	(0.102)	(0.116)	(0.089)	(0.086)	(0.092)	(0.076)	(0.074)	(0.11)
GEXP	-0.050**	-0.048**	-0.042**	-0.043**	-0.041**	-0.034**	-0.02	-0.009	-0.042**	-0.029***	-0.025***	-0.089*
	(0.022)	(0.022)	(0.021)	(0.018)	(0.018)	(0.017)	(0.016)	(0.014)	(0.019)	(0.015)	(0.015)	(0.018)
GINI	0.020*	0.021*	0.019**				0.028*	0.024*	0.026*			
	(0.008)	(0.008)	(0.008)				(0.006)	(0.006)	(0.006)			
EDINEQ				0.020**	0.019**	0.019**				0.017**	0.017**	0.022**
				(0.009)	(0.009)	(0.009)				(0.007)	(0.008)	(0.008)
TRADE		-0.001	0.000		-0.001	0.001		-0.001	0.005**		0.001	0.005**
		(0.001)	(0.002)		(0.001)	(0.002)		(0.001)	(0.002)		(0.002)	(0.002)
PINSTAB			0.222			0.278**			-0.067			0.225**
			(0.134)			(0.109)			(0.094)			(0.104)
No. of Outliers							5	7	6	3	6	5
Adj. R^2	0.20	0.19	0.24	0.14	0.14	0.21	0.34	0.34	0.40	0.12	0.12	0.37
No. of Obs.	68	68	67	85	85	84	63	61	61	82	79	79

Note: White heteroskedasticity-consistent standard errors are reported in parentheses. Levels of significance are indicated by asterisks:
* 1 percent, ** 5 percent, *** 10 percent. See data appendix for definitions and sources. An intercept term is included in each regression.

a. A reweighted least squares (RWLS) procedure was used to obtain the robust estimates. The least median of squares (LMS) was first used to detect outliers, and then weighted least squares (WLS) was performed, as described in the paper.

Table 3
Cross-Country Regression of Fiscal Cyclicality in 1960-2003 with Additional Explanatory Variables
Dependent variable: Cyclicality $\hat{\beta}$

Variables	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) OLS	(7) OLS	(8) OLS	(9) OLS	(10) OLS	(11) Robust[a]	(12) Robust	(13) Robust	(14) Robust	(15) Robust	(16) Robust	(17) Robust	(18) Robust	(19) Robust	(20) Robust
LRGDPCH	0.118	0.144	0.11	0.135	0.147	0.201***	0.204***	0.08	0.213***	0.239**	-0.145	0.076	-0.111	0.004	0.019	-0.134	0.040	0.712*	0.253**	0.092
	(0.142)	(0.138)	(0.129)	(0.133)	(0.131)	(0.120)	(0.122)	(0.168)	(0.118)	(0.114)	(0.089)	(0.081)	(0.090)	(0.084)	(0.084)	(0.111)	(0.090)	(0.163)	(0.116)	(0.081)
GEXP	-0.041***	-0.04***	-0.096**	-0.041***	-0.043**	-0.034***	-0.033***	-0.06***	-0.034***	-0.038**	-0.013	-0.072*	-0.110*	-0.097*	-0.082*	-0.015	-0.033***	-0.173*	-0.045**	-0.062*
	(0.021)	(0.022)	(0.031)	(0.021)	(0.02)	(0.017)	(0.018)	(0.034)	(0.017)	(0.016)	(0.015)	(0.016)	(0.019)	(0.018)	(0.016)	(0.013)	(0.017)	(0.026)	(0.018)	(0.017)
TRADE	-0.0002	-0.001	0.004***	-0.000	-0.0002	0.0005	0.0001	0.004	0.0005	0.0002	0.003	0.002	0.005*	0.005**	0.004**	0.003***	0.003	0.008*	0.005***	0.004***
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
PINSTAB	0.212	0.245***	0.079	0.202	0.199	0.275**	0.295*	0.31***	0.268**	0.237***	-0.069	-0.058	0.020	-0.159***	-0.094	0.283*	0.092	0.602*	0.271**	-0.045
	(0.141)	(0.133)	(0.161)	(0.134)	(0.134)	(0.113)	(0.107)	(0.152)	(0.119)	(0.121)	(0.082)	(0.088)	(0.113)	(0.081)	(0.080)	(0.099)	(0.089)	(0.066)	(0.116)	(0.09)
GINI	0.018**	0.021**	0.018**	0.017**	0.016***						0.022*	0.031*	0.025*	0.027*	0.031*					
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)						(0.006)	(0.005)	(0.004)	(0.006)	(0.006)					
EDINEQ						0.02**	0.018***	0.007	0.02**	0.016***						-0.005	0.016**	0.050*	0.018**	0.020*
						(0.009)	(0.009)	(0.016)	(0.009)	(0.009)						(0.01)	(0.008)	(0.013)	(0.008)	(0.006)
CABSIZE	-0.010					-0.003					-0.034*					-0.019***				
	(0.015)					(0.013)					(0.010)					(0.010)				
GRTOT		0.841					-0.578					3.443					1.075			
		(8.388)					(7.143)					(5.984)					(5.837)			
PDEFAULT			-0.003					0.0004					-0.01*					0.007		
			(0.006)					(0.006)					(0.003)					(0.005)		
CAPFLVOL				0.375					0.193					0.096					0.026	
				(0.335)					(0.293)					(0.264)					(0.322)	
GDPVOL					0.048					0.069					-0.042					0.083**
					(0.053)					(0.042)					(0.029)					(0.033)
No. of Outliers											9	7	8	9	8	12	5	11	3	8
Adj. R^2	0.23	0.27	0.36	0.24	0.23	0.19	0.22	0.28	0.19	0.21	0.47	0.51	0.74	0.52	0.53	0.33	0.13	0.80	0.20	0.29
No. of Obs.	67	66	33	67	67	84	83	35	83	84	58	59	25	58	59	72	78	24	80	76

Note: White heteroskedasticity-consistent standard errors are reported in parentheses. Levels of significance are indicated by asterisks: * 1 percent, ** 5 percent, *** 10 percent. See data appendix for definitions and sources. An intercept term is included in each regression.

a. A reweighted least squares (RWLS) procedure was used to obtain the robust estimates. The least median of squares (LMS) was first used to detect outliers, and then weighted least squares (WLS) was performed, as described in the paper.

Table 4
Cross-Country Regression of Fiscal Cyclicality in 1960-2003 with Measure of Institutional Constraints
Dependent variable: Cyclicality $\hat{\beta}$

Variables	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) OLS	(7) Robust[a]	(8) Robust	(9) Robust	(10) Robust
LRGDPCH	0.052	0.060	0.232***	0.253***	0.218***	0.268**	0.173***	0.085	0.094	0.168***
	(0.129)	(0.102)	(0.136)	(0.137)	(0.114)	(0.116)	(0.09)	(0.104)	(0.096)	(0.089)
GEXP	-0.048**	-0.041**	-0.043**	-0.040**	-0.035**	-0.032***	-0.022***	-0.076*	-0.021***	-0.022
	(0.022)	(0.018)	(0.018)	(0.018)	(0.016)	(0.017)	(0.012)	(0.017)	(0.012)	(0.014)
TRADE	-0.001	-0.001	-0.001	-0.0001	-0.001	0.0005	-0.001	0.005**	-0.002	-0.001
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)
GINI	0.021*		0.016**	0.016**			0.02*	0.027*		
	(0.008)		(0.008)	(0.008)			(0.006)	(0.006)		
EDINEQ		0.019**			0.014	0.016			-0.005	0.009
		(0.009)			(0.010)	(0.01)			(0.011)	(0.009)
POLCON			-0.978*	-0.775**	-0.828**	-0.479	-1.049*	-0.216	-1.031*	-0.776**
			(0.35)	(0.33)	(0.353)	(0.382)	(0.3)	(0.321)	(0.318)	(0.338)
PINSTAB				0.152		0.225***		-0.102		0.058
				(0.121)		(0.119)		(0.082)		(0.095)
No. of Outliers							4	8	5	4
Adj. R^2	0.19	0.14	0.26	0.27	0.18	0.21	0.43	0.50	0.22	0.19
No. of Obs.	68	85	68	67	85	84	64	59	80	80

Note: White heteroskedasticity-consistent standard errors are reported in parentheses. Levels of significance are indicated by asterisks: * 1 percent, ** 5 percent, *** 10 percent. See data appendix for definitions and sources. An intercept term is included in each regression.

a. A reweighted least squares (RWLS) procedure was used to obtain the robust estimates. The least median of squares (LMS) was first used to detect outliers, and then weighted least squares (WLS) was performed, as described in the paper.

Table 5 IV Regression of Cyclicality $\hat{\beta}$

Explanatory Variables	Panel A: GMM Estimation Dep. Var: Beta ($\hat{\beta}$)	
LRGDPCH	0.198	
	(0.192)	
GINI	0.058*	
	(0.021)	
POLCON	-1.069	
	(0.768)	
	Panel B: First-Stage Regressions[a]	
Excluded Instruments	**Dep. Var: GINI**	**Dep. Var: POLCON**
PRIMCOMP1960	-0.134**	0.002
	(0.058)	(0.001)
NRRICH	7.266*	-0.061
	(1.870)	(0.049)
POLCON1960	-1.736	0.423*
	(3.098)	(0.076)
F-test on joint significance of excluded instruments	F=10.70 (p=0.0000)	F=18.33 (p=0.0000)
Overidentification test (J statistic)	P=0.67759 (accept)	
No. of Obs.	47	

Note: Levels of significance are indicated by asterisks: * 1 percent, ** 5 percent, *** 10 percent. White heteroskedasticity-consistent standard errors are reported in parentheses. See data appendix for definitions and sources. An intercept term is included in each regression.

a. The first-stage regressions include others as explanatory variables, which are LRGDPCH and an intercept term, (in addition to the excluded instruments listed in the table, PRIMCOMP1960, NRRICH, POLCON1960). We employ PRIMCOMP1960 (percentage of "primary school complete" in the total population over age 25) and NRRICH (a dummy variable that indicates whether a nation is rich in natural resources) as instruments for GINI, and POLCON1960 (POLCON in 1960) for POLCON. A two-step efficient GMM estimation was employed to obtain the IV (instrumental variables) regression, which produces a consistent and also efficient estimator in the presence of heteroskedasticity that is more likely in a cross-country study. Refer to the paper for more details.

Table 6
Robustness Check: Alternative Measures of Fiscal Cyclicality from Kaminsky et al. (2004) and Alesina and Tabellini (2005)

Variables	(1) OLS	(2) OLS	(3) Robust	(4) OLS	(5) OLS	(6) Robust	(7) OLS	(8) OLS	(9) Robust	(10) OLS	(11) OLS	(12) Robust
	Dep. var: CYCRCGOVEXP [a]			Dep. var: Index of Fiscal Policy Cyclicality [a]			Dep. var: BETASURPLUS [b]			Dep. var: BETAEXP [b]		
LRGDPCH	-0.127**	-0.095	-0.139**	-0.086**	-0.051	-0.158*	0.007	-0.016	-0.047	-0.068	-0.043	-0.104
	(0.054)	(0.076)	(0.069)	(0.038)	(0.05)	(0.057)	(0.040)	(0.041)	(0.039)	(0.049)	(0.05)	(0.064)
GEXP	-0.010	-0.002	0.001	-0.014***	-0.009	-0.0004	0.021***	0.019	0.025**	-0.014	-0.011	-0.033*
	(0.013)	(0.012)	(0.011)	(0.008)	(0.008)	(0.007)	(0.012)	(0.013)	(0.011)	(0.014)	(0.014)	(0.01)
TRADE	0.002	0.002	0.003***	0.001	0.001	0.002	-0.001	-0.001	-0.004*	-0.000	0.0002	-0.001
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GINI	0.012**	0.013**	0.016*	0.009**	0.008**	0.016*	-0.013*	-0.012*	-0.005***	0.009**	0.008***	0.010**
	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.004)	(0.005)
POLCON		0.107	0.238		-0.049	0.167		0.088	0.279***		-0.010	0.34
		(0.273)	(0.256)		(0.180)	(0.179)		(0.213)	(0.155)		(0.218)	(0.229)
PINSTAB		0.147**	0.203*		0.076	0.055		-0.03	-0.019		0.080	-0.034
		(0.071)	(0.070)		(0.048)	(0.041)		(0.057)	(0.054)		(0.080)	(0.065)
No. of Outliers			3			9			4			7
Adj. R^2	0.28	0.30	0.43	0.38	0.42	0.61	0.30	0.29	0.38	0.20	0.19	0.41
No. of Obs.	58	58	55	58	58	49	57	57	53	51	51	44

Note: White heteroskedasticity-consistent standard errors are reported in parentheses. Levels of significance are indicated by asterisks: * 1 percent, ** 5 percent, *** 10 percent. See data appendix for definitions and sources. An intercept term is included in each regression.

a. CYCRCGOVEXP is the correlation between the cyclical components of real GDP and real central government expenditure (obtained using HP filter), and Index of Fiscal Policy Cyclicality is a composite index, both of which are obtained from Kaminsky, Reinhart, and Vegh (2004).

b. BETASURPLUS is the estimated coefficient of output gap in a regression of central government budget surplus as percent of GDP, and similarly, BETAEXP is the coefficient of output gap in a regression of government spending as a share of GDP. These measures are from Alesina and Tabellini (2005).

Table 7
Cross-Country Regression of Fiscal Policy Volatility in 1960-2003
Dependent variable: Log of standard deviation of government spending growth (FISCALVOL)

Variables	(1) OLS	(2) OLS	(3) OLS	(4) Robust[a]	(5) Robust	(6) Robust	(7) OLS	(8) OLS	(9) OLS	(10) Robust	(11) Robust	(12) Robust
LRGDPCH	-0.298*	-0.212**	-0.072	-0.319*	-0.302*	-0.148**	-0.420*	-0.295*	-0.180***	0.443*	-0.337*	-0.256*
	(0.082)	(0.093)	(0.102)	(0.067)	(0.065)	(0.063)	(0.075)	(0.095)	(0.098)	(0.061)	(0.073)	(0.068)
GEXP	-0.022	-0.016	-0.013	-0.028***	-0.058*	-0.035*	-0.013	-0.008	-0.005	-0.027**	-0.027**	0.007
	(0.019)	(0.017)	(0.016)	(0.015)	(0.015)	(0.012)	(0.014)	(0.013)	(0.012)	(0.011)	(0.013)	(0.010)
TRADE	-0.0002	0.001	0.001	-0.0002	0.004***	0.004**	-0.001	0.001	0.001	-0.001	0.004***	0.0001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
GINI	0.024*	0.022*	0.018*	0.026*	0.021*	0.025*						
	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.005)						
EDINEQ							0.009	0.008	0.003	0.011**	0.011**	-0.002
							(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.006)
PINSTAB		0.231***	0.148		-0.012	-0.022		0.241**	0.146***		0.141***	0.081
		(0.125)	(0.105)		(0.091)	(0.075)		(0.096)	(0.087)		(0.072)	(0.069)
POLCON			-0.925*			-0.915*			-0.863*			-1.118*
			(0.321)			(0.255)			(0.311)			(0.258)
No. of Outliers				4	6	6				5	4	4
Adj. R^2	0.45	0.50	0.56	0.63	0.69	0.75	0.44	0.49	0.54	0.61	0.60	0.68
No. of Obs.	68	67	67	64	61	61	85	84	84	80	80	80

Note: White heteroskedasticity-consistent standard errors are reported in parentheses. Levels of significance are indicated by asterisks: * 1 percent, ** 5 percent, *** 10 percent. See data appendix for definitions and sources. All regressions include an intercept term.

a. A reweighted least squares (RWLS) procedure was used to obtain the robust estimates. The least median of squares (LMS) was first used to detect outliers, and then weighted least squares (WLS) was performed, as described in the paper.

Table 8 Cross-Country Growth Regression: Fiscal Pro-cyclicality and Volatility

Dependent variable: Growth rate of real GDP per capita (GRGDPC) in 1960-2003

Variables	(1) OLS (sample of GINI)	(2) OLS	(3) Robust[a]	(4) OLS	(5) OLS	(6) OLS	(7) OLS	(8) Robust	(9) OLS (sample of GINI)	(10) OLS	(11) Robust	(12) OLS	(13) OLS	(14) OLS	(15) OLS	(16) Robust
LRGDPCH	-0.008*	-0.005***	-0.001	-0.005	-0.003	-0.006**	-0.004	-0.002	-0.012*	-0.01*	-0.005***	-0.01*	-0.008*	-0.01*	-0.008**	-0.007*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
LSYR1560	0.006**	0.006*	0.004**	0.006*	0.005*	0.005*	0.004**	0.003**	0.005**	0.004**	0.002	0.004**	0.003***	0.004**	0.003***	0.002
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Beta ($\hat{\beta}$)	-0.01*	-0.01*	-0.007*	-0.01*	-0.009*	-0.009*	-0.008*	-0.006*								
	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)								
FISCALVOL									-0.014*	-0.018*	-0.017*	-0.018*	-0.017*	-0.019*	-0.018*	-0.021*
									(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)
GEXP[b]				-0.011			-0.011	-0.041				0.003			-0.014	-0.074*
				(0.044)			(0.041)	(0.03)				(0.042)			(0.038)	(0.028)
TRADE[b]					0.012*		0.013*	0.015*					0.013*		0.013*	0.013*
					(0.003)		(0.003)	(0.003)					(0.002)		(0.002)	(0.002)
GDPVOL						-0.002***	-0.002**	-0.002**						0.001	0.0002	0.0004
						(0.001)	(0.001)	(0.001)						(0.001)	(0.001)	(0.001)
No. of outliers			5					3			7					6
Adj. R^2	0.27	0.25	0.19	0.24	0.33	0.26	0.35	0.33	0.33	0.37	0.47	0.36	0.47	0.37	0.46	0.55
No. of Obs.	62	84	79	84	84	84	84	81	62	84	77	84	84	84	84	78

Note: White heteroskedasticity-consistent standard errors are reported in parentheses. Levels of significance are indicated by asterisks:
* 1 percent, ** 5 percent, *** 10 percent. See data appendix for definitions and sources. All regressions include an intercept term.

a. A reweighted least squares (RWLS) procedure was used to obtain the robust estimates. The least median of squares (LMS) was first used to detect outliers, and then weighted least squares (WLS) was performed, as described in the paper.
b. Here GEXP and TRADE are shares of GDP, rather than percent of GDP, to facilitate the display of their estimated regression coefficients.

Table 9 IV Regression of Growth: Fiscal Pro-cyclicality and Volatility

Dependent variable: Growth rate of real GDP per capita in 1960-2003

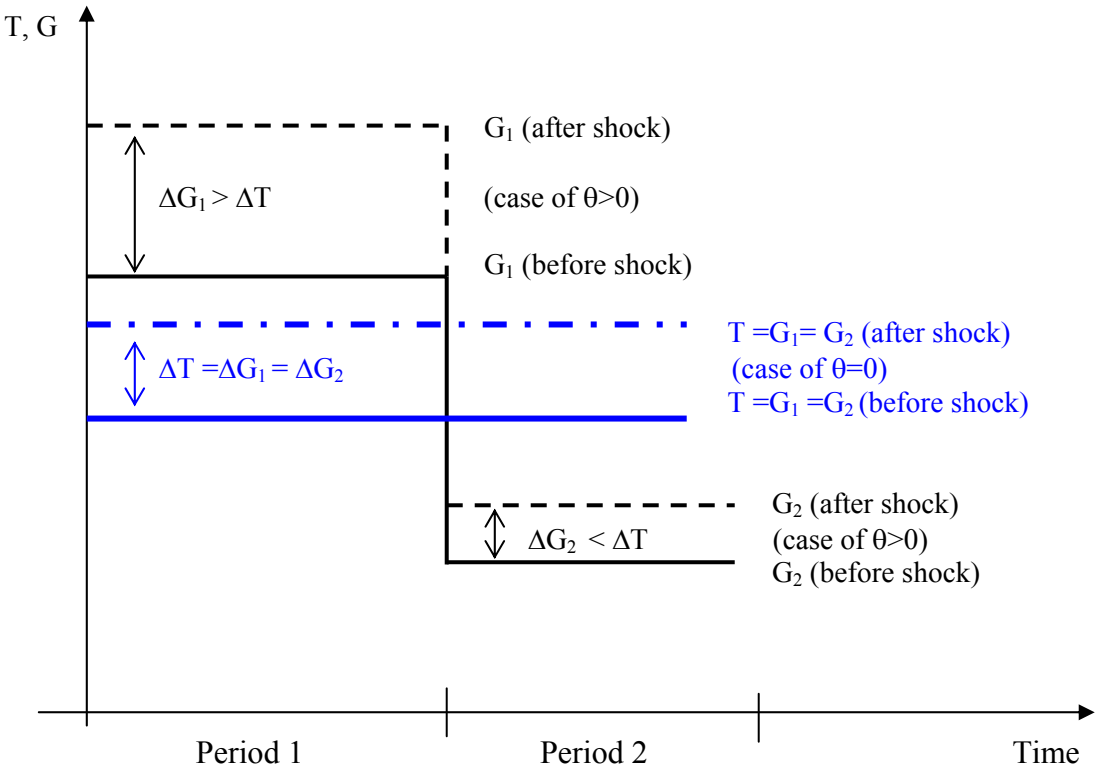
	(1)	(2)
Panel A: Second-Stage Regressions (GMM Estimation)		
LRGDPCH	-0.012*	-0.01**
	(0.004)	(0.004)
LSYR1560	0.007*	0.002
	(0.002)	(0.002)
Beta ($\hat{\beta}$)	-0.024*	
	(0.005)	
Fiscal Volatility		-0.027*
		(0.007)
Panel B: First-Stage Regressions[a]		
Excluded Instruments	**Dep. Var: Beta**	**Dep. Var: Fiscal Volatility**
NRRICH	0.478**	0.330**
	(0.200)	(0.137)
LSETMORT	0.289*	0.277*
	(0.096)	(0.088)
F-test on joint significance of excluded instruments	F=10.35 (p=0.0003)	F=12.00 (p=0.0001)
Overidentification test (J statistic)	P=0.183 (accept)	P=0.389 (accept)
No. of Obs.	43	43

Note: Levels of significance are indicated by asterisks: * 1 percent, ** 5 percent, *** 10 percent. White heteroskedasticity-consistent standard errors are reported in parentheses. See data appendix for definitions and sources. An intercept term is included in each regression.

a. The first-stage regressions include others as explanatory variables, which are LRGDPCH and LSYR1560 (in addition to the excluded instruments listed in the table, NRRICH and LSETMORT). We employ NRRICH (a dummy variable that indicates whether a nation is rich in natural resources) and LSETMORT (log settler mortality) to instrument Beta and Fiscal Volatility. A two-step efficient GMM estimation was employed to obtain the IV (instrumental variables) regressions, which produces a consistent and also efficient estimator in the presence of heteroskedasticity that is more likely in a cross-country study. Refer to the paper for more.

Figure 1

Social Polarization, Pro-cyclicality, and Magnitude of Fiscal Spending Fluctuations: The case of a permanent positive tax shock (ΔT in periods 1 and 2)

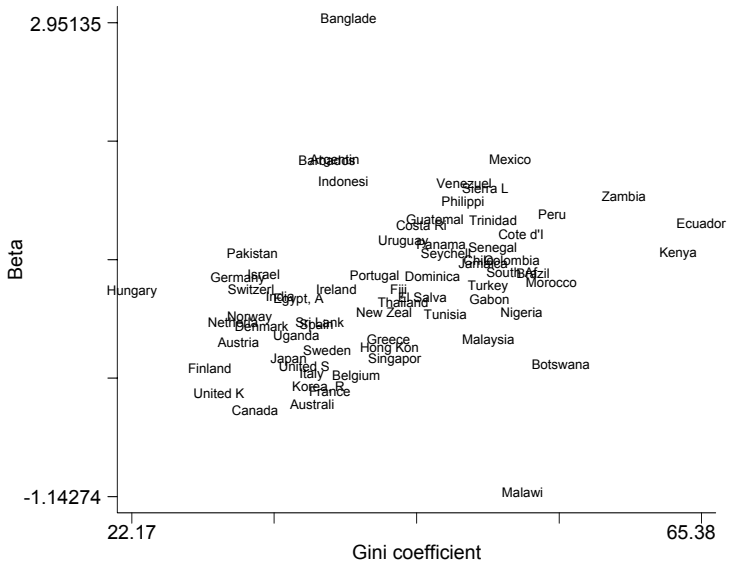


Note: ΔG_1 in the presence of polarization is equal to $\Delta G_1 = \frac{(1+\theta)(2+r)}{[1+(1+r)(1+\theta)]}\Delta T$ where $\frac{(1+\theta)(2+r)}{[1+(1+r)(1+\theta)]} \geq 1$ (with equality when θ=0).

On the other hand, $\Delta G_2 = \frac{(2+r)}{[1+(1+r)(1+\theta)]}\Delta T$ where $\frac{(2+r)}{[1+(1+r)(1+\theta)]} \leq 1$ (with equality when θ=0).

Figure 2

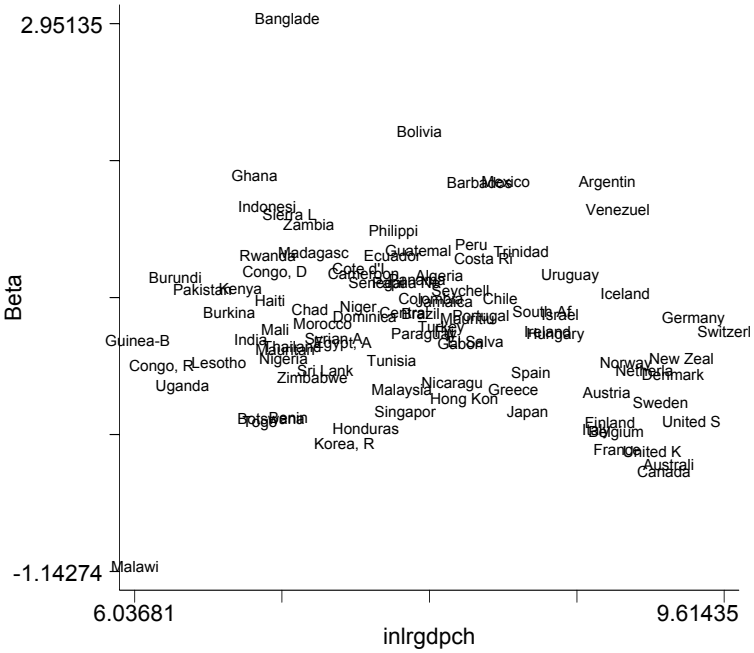
Cyclicality of Fiscal Policy and Income Inequality



Data Source: Refer to the Data Appendix.

Figure 3

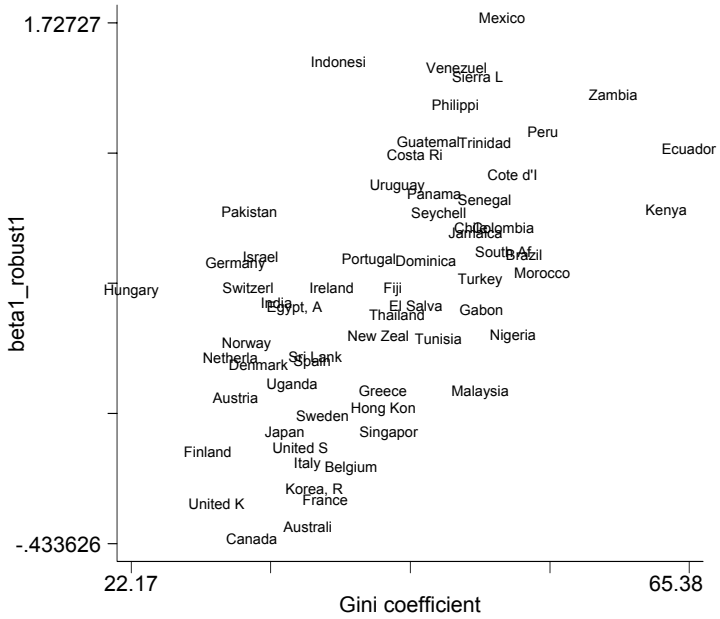
Cyclicality of Fiscal Policy and Initial Income per capita in 1960



Data Source: Refer to the Data Appendix.

Figure 4

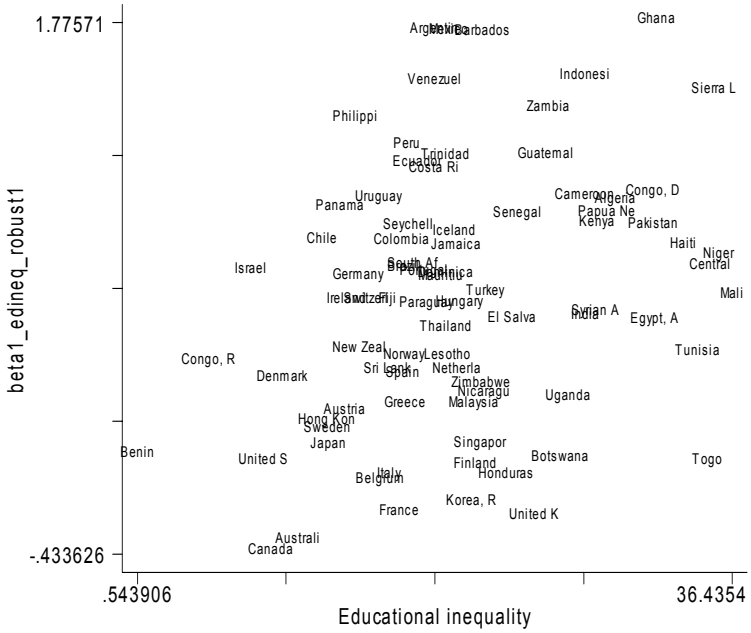
Cyclicality of Fiscal Policy and Income Inequality: Sample of Countries in the Robust Regression Estimation



Note: The scatter plot is based on the country sample in the robust regression (7) in Table 2.
Data Source: Refer to the Data Appendix.

Figure 5

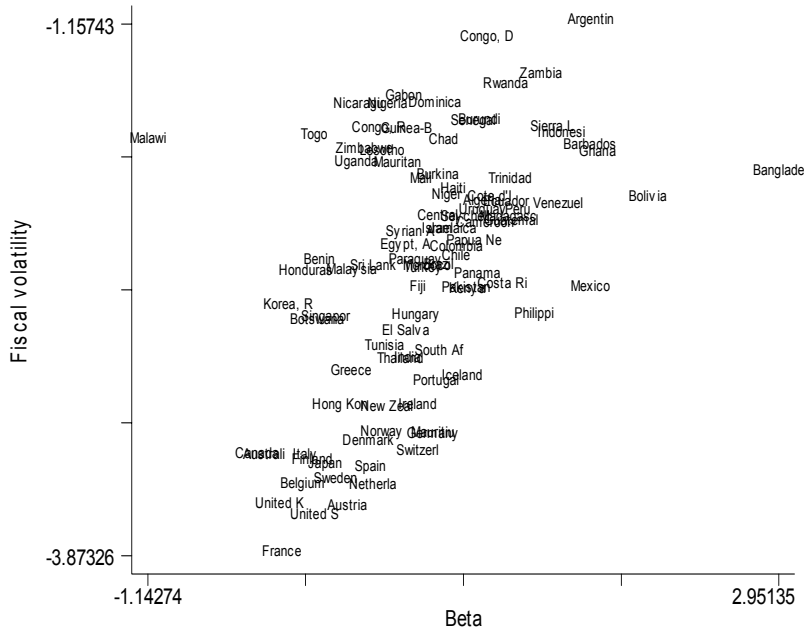
Cyclicality of Fiscal Policy and Educational Inequality: Sample of Countries in the Robust Regression Estimation



Note: The scatter plot is based on the country sample in the robust regression (10) in Table 2.
Data Source: Refer to the Data Appendix.

Figure 6

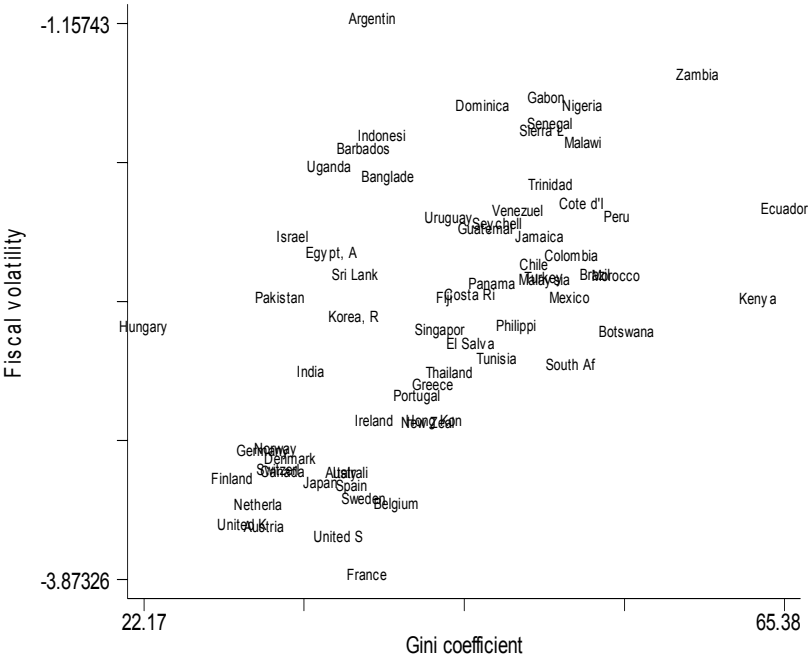
Cyclicality of Fiscal Policy and Fiscal Policy Volatility



Data Source: Refer to the Data Appendix.

Figure 7

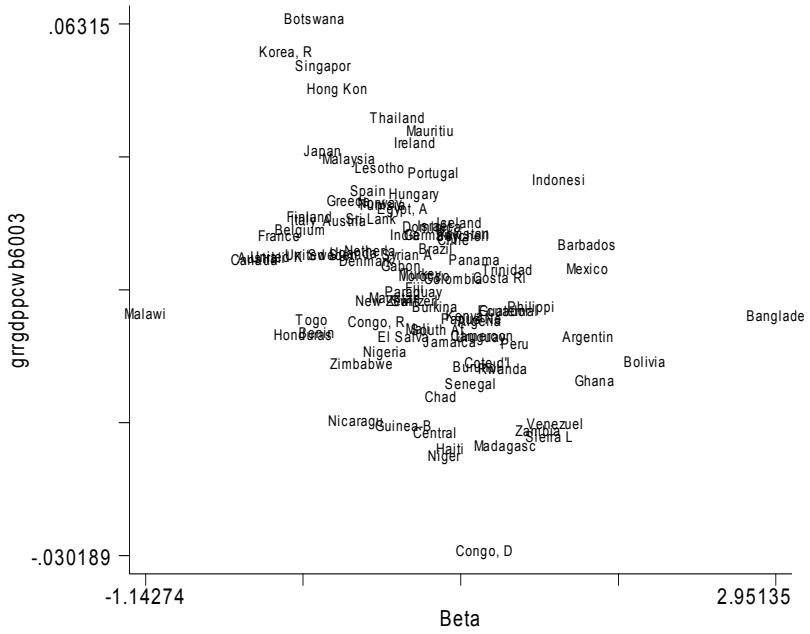
Fiscal Policy Volatility and Income Inequality



Data Source: Refer to the Data Appendix.

Figure 8

Real GDP per capita Growth and Pro-cyclicality of Fiscal Policy



Data Source: Refer to the Data Appendix.

Data Appendix

A Country List

We use annual data for ninety six countries in the period of 1960-2003. The sample of countries is dictated by the availability of data. Ninety six is the largest number of countries for which we have at least twenty-five years of data so that we can run a meaningful time-series regression to obtain the measures of fiscal cyclicality and volatility in the paper. For the six countries with an asterisk mark (*), there is no available measure of either income distribution or educational distribution.

Algeria	Germany	Nigeria
Argentina	Ghana	Norway
Australia	Greece	Pakistan
Austria	Guatemala	Panama
Bangladesh	Guinea-Bissau*	Papua New Guinea
Barbados	Haiti	Paraguay
Belgium	Honduras	Peru
Benin	Hong Kong, China	Philippines
Bolivia	Hungary	Portugal
Botswana	Iceland	Rwanda*
Brazil	India	Senegal
Burkina Faso*	Indonesia	Seychelles
Burundi*	Ireland	Sierra Leone
Cameroon	Israel	Singapore
Canada	Italy	South Africa
Central African Republic	Jamaica	Spain
Chad*	Japan	Sri Lanka
Chile	Kenya	Sweden
Colombia	Korea, Rep.	Switzerland
Congo, Dem. Rep.	Lesotho	Syrian Arab Republic
Congo, Rep.	Madagascar*	Thailand
Costa Rica	Malawi	Togo
Cote d'Ivoire	Malaysia	Trinidad and Tobago
Denmark	Mali	Tunisia
Dominican Republic	Mauritania*	Turkey
Ecuador	Mauritius	Uganda
Egypt, Arab Rep.	Mexico	United Kingdom
El Salvador	Morocco	United States
Fiji	Netherlands	Uruguay
Finland	New Zealand	Venezuela, RB
France	Nicaragua	Zambia
Gabon	Niger	Zimbabwe

Data Description and Source

Data Used in the Cross-Country Regressions

Variables	Description and Source
CABSIZE	Size of Cabinet: The number of ministers of "cabinet rank", excluding undersecretaries, parliamentary secretaries, ministerial alternates, etc. Includes president and vice-president under a presidential system, but not under a parliamentary system. Chief of state excluded, except under presidential system. Averaged over the period of 1960-2001. Source: Banks (2003).
CAPFLVOL	Standard deviation of annual percent change in gross private capital flows over the period of 1960-2003. Source: World Bank (2007)
EDINEQ	The dispersion of educational attainment in population in 1960, calculated as standard deviation of the shares of total population with no school, partial primary schooling, primary school completed, partial secondary schooling, secondary schooling completed, partial post-secondary schooling, and post-secondary schooling completed. Source: Barro and Lee (2000).
FISCALVOL	Log of standard deviation in annual percent change in general government final consumption expenditures as percent of GDP over the period of 1960-2003. Source: World Bank (2005).
GEXP	General government final consumption expenditures as percent of GDP, averaged over the period of 1960-2003. Source: World Bank (2005).
GINI	Decade average of Gini coefficients obtained using all the data points available for the 1970s. Source: Deininger and Squire (1996).
GRGDPC	Average compound growth rate of real GDP per capita in 1960-2003. Source: World Bank (2005).
GDPVOL	Standard deviation of annual percent change in real GDP over the period of 1960-2003. Source: World Bank (2007)
GRTOT	Growth Rate of Terms of trade. Average of annual growth rate of terms of trade in 1960-99. Source: Global Development Network Growth Database (2002). Original data source: Global Development Finance and World Development Indicators of World Bank.
LRGDPCH	Log of real GDP per capita in 1960. Source: Heston, Summers, and Aten (2002).
LSETMORT	Log of settler mortality in European colonies in the 17-19th centuries. Source: Acemoglu, Johnson, and Robinson (2001).
LSYR1560	Log of average years of secondary schooling in the population over age 15 in 1960. Source: Barro and Lee (2000).
NRRICH	Dummy variable for natural resource richness, taking 1 if a country is endowed with rich natural resources and 0 otherwise. Source: Auty (2001).
PDEFAULT	Probability of default on sovereign foreign currency debt. It is computed as a ratio of number of years in default to the total number of years since independence for each nation. Source: Reinhart, Rogoff, Savastano (2003).
PINSTAB	Political instability indicator, obtained by applying the principal component analysis to five indicators of political instability, government crises (GOVTCRIS), revolutions (REVOLS), military coups (COUPS), constitutional changes (CONSTCHG), politically motivated assassination (ASSASSIN), where each of these five variables are an average of annual observations over the period of 1960-2001. PINSTAB = 0.03903GOVTCRIS + 0.23836REVOLS + 0.43633COUPS + 0.32963CONSTCHG + 0.06876ASSASSIN. Averaged over the period of 1960-2001. Source: Banks (2003).
POLCON	It measures the extent to which the executives face political constraints in implementing his or her policy. It is based on the number of institutionally embedded veto players among various branches of government. A high value indicates greater political constraints. Averaged over the period of 1960-2000. Source: Henisz (2002, update 2005).

TRADE	The sum of exports and imports as a share of GDP, averaged over the period of 1960-2003. World Bank (2005).
XCONST	The extent of institutionalized constraints on the decision-making power of chief executives, whether individuals or collectivities. It ranges from 1 to 7. A high value indicates greater executive constraints. Averaged over the period of 1960-2000. Source: Marshall and Jaggers (2005).

Data Used in the Time-Series Regression for Each Country

Variables	Description and Source
Growth in real general government spending	Annual growth rate of real general government final consumption expenditure (general government spending in current local currency that is deflated by using GDP deflator) in 1960-2003, obtained from World Bank (2005). For Germany, Israel, and Panama for which data from World Bank (2005) are missing (until 1970) or showing irregularities, we use data from the International Financial Statistics of IMF (2006). Source: World Bank (2005) and IMF (2006).
Growth in real GDP	Annual growth rate of real GDP (GDP in current local currency that is deflated by using GDP deflator) in 1960-2003, obtained from World Bank (2005). For Germany for which data from World Bank (2005) are missing until 1970, we use data from the International Financial Statistics of IMF (2006). Source: World Bank (2005) and IMF (2006).
Inflation	Annual inflation rate measured by GDP deflator in 1960-2003. For Germany for which data from World Bank (2005) are missing until 1970, we use data from the International Financial Statistics of IMF (2006). Source: World Bank (2005) and IMF (2006).
Oil price	Logarithm of average crude price, dollar per barrel from the International Financial statistics of IMF (2006).

Summary Statistics
Variables Used in the Cross-Country Regression

Variable	Number of observations	Mean	Standard deviation	Minimum	Maximum
CABSIZE	95	19.649	5.178	8.35	35.975
CAPFLVOL	95	0.533	0.204	0.251	1.421
EDINEQ	85	20.372	7.725	0.544	36.435
FISCALVOL	96	-2.437	0.649	-3.873	-1.157
GEXP	96	14.575	5.001	5.905	31.007
GINI	68	42.140	8.975	22.17	65.38
GRGDPC	96	0.017	0.016	-0.030	0.063
GDPVOL	96	4.432	1.951	1.609	11.80
GRTOT	95	-0.4612	1.25	-4.237	5.803
LRGDPCH	96	7.802	0.901	6.037	9.614
LSETMORT	54	4.628	1.24	2.146	7.986
LSYR1560	84	-0.962	1.419	-6.908	1.505
NRRICH	83	0.590	0.495	0	1
PDEFAULT	36	22.657	14.898	2.128	65
PINSTAB	95	-7.84e-10	0.895	-1.015	2.948
POLCON	96	0.367	0.285	0	0.881
TRADE	96	64.3	42.09	15.56	329.23
XCONST	92	4.282	2.041	0.683	7

Pair-wise Correlation
Variables Used in the Cross-Country Regression on Fiscal Cyclicality and Volatility

	Beta ($\hat{\beta}$)	FISCALVOL	LRGDPCH	GEXP	TRADE	GINI	EDINEQ
Beta ($\hat{\beta}$)	1.0000						
FISCALVOL	0.4899	1.0000					
LRGDPCH	-0.1665	-0.6891	1.0000				
GEXP	-0.3553	-0.2997	0.3118	1.0000			
TRADE	-0.1821	-0.0871	0.0380	0.2052	1.0000		
GINI	0.3135	0.5436	-0.4801	-0.1836	0.0350	1.0000	
EDINEQ	0.2742	0.4440	-0.5418	-0.2422	-0.1258	0.2125	1.0000
PINSTAB	0.3453	0.6039	-0.6086	-0.4185	-0.2640	0.2939	0.3338
CABSIZE	-0.0590	-0.0551	-0.0380	0.0550	-0.1174	-0.0688	0.1195
GRTOT	-0.0163	-0.1488	0.2765	-0.1630	0.0421	-0.1648	-0.1717
POLCON	-0.3333	-0.7494	0.7626	0.3327	0.1258	-0.4652	-0.5519
NRRICH	0.4435	0.6939	-0.5145	-0.3516	-0.1823	0.6060	0.3876
PRIMCOMP1960	-0.3600	-0.6417	0.6678	0.3304	0.0526	-0.5316	-0.5298
LSETMORT	0.2432	0.7058	-0.6216	-0.2129	-0.1859	0.3515	0.5852
PDEFAULT	0.2190	0.2273	0.0900	-0.3272	-0.0268	0.5267	-0.2625
CAPFLVOL	0.1883	0.4333	-0.3882	-0.0902	-0.0645	0.2758	0.1758
GDPVOL	0.2022	0.7068	-0.5062	-0.0639	0.0446	0.5504	0.3949

	PINSTAB	CABSIZE	GRTOT	POLCON	NRRICH	PRIMCOMP1960	LSETMORT
PINSTAB	1.0000						
CABSIZE	-0.0603	1.0000					
GRTOT	-0.1960	-0.0882	1.0000				
POLCON	-0.6493	-0.0264	0.1623	1.0000			
NRRICH	0.4578	-0.1722	-0.2473	-0.5510	1.0000		
PRIMCOMP1960	-0.4731	-0.0721	0.2787	0.6018	-0.5305	1.0000	
LSETMORT	0.4373	-0.1139	-0.1464	-0.7127	0.4489	-0.5220	1.0000
PDEFAULT	0.2456	-0.3776	-0.0744	-0.0536	0.1779	0.0607	-0.0347
CAPFLVOL	0.3572	-0.0741	-0.1100	-0.3904	0.3670	-0.2885	0.2969
GDPVOL	0.4201	0.0006	-0.0524	-0.6308	0.5553	-0.4509	0.5382

	PDEFAULT	CAPFLVOL	GDPVOL
PDEFAULT	1.0000		
CAPFLVOL	-0.1301	1.0000	
GDPVOL	0.1743	0.3130	1.0000