FISCAL DECENTRALIZATION, MACROSTABILITY AND GROWTH

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ABSTRACT

This paper examines how fiscal decentralization may influence economic growth. Previous research on this question has primarily focused on the direct relationship between decentralization and growth. In this paper, we also incorporate the potential indirect influence of decentralization on growth through its impact on macroeconomic stability. We build an augmented neoclassical model of economic growth that allows for both the direct and indirect effects of fiscal decentralization on economic growth. Using panel data, we find that decentralization appears to reduce the rate of inflation in the sample countries, does not appear to directly influence economic growth, and has an indirect, positive effect on growth through its positive influence on macroeconomic stability. An important contribution of the paper is to identify the role of the indirect effects of fiscal decentralization on economic growth.

Keywords: Fiscal Decentralization, Economic Growth, Macroeconomic Stability.

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1. INTRODUCTION

Given the current drive among developing and transitional countries to decentralize expenditures and revenues to subnational governments, it is important to ask not only whether fiscal decentralization influences economic growth, but also *how* fiscal decentralization may influence economic growth. What evidence exists on the direct relationship between fiscal decentralization and economic growth is conflicting at best and lacks, for the most part, a convincing argument in either direction on the direct effect of fiscal decentralization (Martínez-Vázquez and McNab, 2002). The same may be said for the theoretical development and empirical evidence on the relationship between fiscal decentralization and macroeconomic stability and the indirect effect of fiscal decentralization on economic growth through the macroeconomic stability channel.

In this paper we review the current state of knowledge in the economics literature on the relationship between fiscal decentralization and economic growth; examine empirically the extent of such a relationship; and analyze whether fiscal decentralization also indirectly influences economic growth through its impact on macroeconomic stability. As decentralization moves to the forefront of policy options being considered by developing and transitional countries and figures prominently among the prescriptions offered by international donor organizations, an examination of the relationship between decentralization, macroeconomic stability, and economic growth is quite timely. If fiscal decentralization negatively influences economic growth directly or indirectly though the macroeconomic stability channel, then policymakers need to be aware of these relationships when formulating and implementing decentralization policy. On the other hand, if decentralization enhances, or at a minimum does not present obstacles to achieving macroeconomic stability, or directly enhances economic growth, then the case for fiscal decentralization is strengthened and policymakers need to focus their attention on the other potential influences of fiscal decentralization.

The rest of the paper is organized as follows. First, we review the literature on the relationship between fiscal decentralization, macroeconomic stability, and economic growth. Second, we develop an augmented neoclassical model of economic growth that incorporates both the potential indirect effect of fiscal decentralization on economic growth through macroeconomic stability and the direct effect of fiscal decentralization on economic growth. Third, using panel data, we estimate the impact of fiscal decentralization on macroeconomic stability and economic growth. The last section summarizes and reviews the policy implications from our current knowledge of the issues.

2. REVIEW OF THE LITERATURE

While the direct relationship between decentralization and growth is not one of the conventionally addressed issues in the theory of fiscal federalism, it has received a significant amount of attention in the empirical literature in recent years. Whether or not a direct relationship exists between fiscal decentralization and economic growth, however, remains, an unanswered question.[1] Most authors, nevertheless, arguing for and against using fiscal decentralization as a policy option in developing and transitional economies, have implicitly recognized the potential influence of fiscal decentralization on macroeconomic stability.[2] But, as with the influence of fiscal decentralization on economic growth, whether decentralization significantly influences macroeconomic stability largely remains an unanswered question. In this section, we summarize the arguments for and against both types of potential impacts of decentralization.

Fiscal Decentralization and Economic Growth

Should we expect, *a priori*, a direct linkage between fiscal decentralization and economic growth? The static proposition that fiscal decentralization enhances economic efficiency may have a corresponding effect in the dynamic setting of economic growth (Oates, 1993). The direct effect, if it exists, suggests that subnational governments may have an advantage in making public expenditures more efficient (by better satisfying the needs and preferences of local taxpayers based on better knowledge of these preferences), and that this "static" advantage may also be present in a "dynamic" sense by having subnational government expenditures be more growth enhancing. Subnational expenditures for infrastructure and social sector programs that are responsive to variations in needs and preferences may be more effective, as this argument goes, in enhancing economic growth than central policies which ignore these regional (or local) variations.[3] The question that remains, however, is why $1 million spent on roads

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[1] See, for example, Davoodi, Xie and Zou (1995), Zhang and Zou (1997, 1998), Davoodi and Zou (1998), and Woller and Phillips (1998) for empirical analyses of the relationship between between fiscal decentralization and economic growth. Martinez-Vazquez and McNab (2002) critically review this literature.

[2] See, for example, Prud'homme (1995), McLure (1995), Tanzi (1996, 2000), Sewell (1996), Spahn (1997), Shah (1999), and Treisman (2000).

[3] Of course, the direct linkage between decentralization and growth can be derailed if fiscal decentralization does not function effectively. The same is true for the greater efficiency of decentralization in a static sense. Bahl and Linn (1992), Oates (1993), Prud'homme (1995), Tanzi (1996), and Bahl (1999b), among others, have questioned whether or not voting mechanisms, mobility, or competition, for example, function well enough in developing and transitional economies to allow the realization of efficiency gains associated with decentralization.

or education by subnational governments should be more growth enhancing than the same amount of money spent by the central government. It would appear that this argument, while appealing, requires further development.

More recently, some have argued that decentralization may also serve to preserve and promote the development of markets (Weingast, 1995 and 2000; McKinnon, 1997). This "market preserving" literature suggests that appropriately structured intergovernmental fiscal arrangements may create sufficient incentives for subnational governments to foster markets. If the central government is a source of policy inefficiency, decentralization may improve resource allocation, foster market development, and, in turn, promote economic growth. A problem, however, is that this argument may be susceptible to Prud'homme's (1995) contention that subnational governments in developing and transitional economies lack sufficient capacity relative to the central government. If true, this line of reasoning suggests that subnational governments in these economies lack the capacity and resources to respond to the incentives generated by the new fiscal arrangements. Even if we explicitly assume that subnational governments operate on the same production frontier as central governments, whether internal markets free of internal barriers actually exist in developing and transitional countries is an unanswered question.[4]

Only recently have researchers examined the theoretical aspects of the direct relationship between fiscal decentralization and economic growth. We can classify these studies in two general categories: the first set of studies used a representative agent model to examine the question of whether fiscal decentralization directly influences economic growth; while the second set used a modified Solow (1956) growth-modeling approach. Using a representative agent modeling approach, Davoodi, Xie, and Zou (1995), Davoodi and Zou (1998), and Zhang and Zou (1997, 1998) argued that the long-run growth rate of per capita output is a function of fiscal decentralization measured by shares of spending by different levels of government, the average tax rate, and the expenditure shares of various public expenditures undertaken by different levels of government.[5] These studies, however, suffered from a common fault, the use of

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[4] See Rodden and Rose-Ackerman (1997) for a critique of the market-preserving federalism literature.

[5] The empirical findings are mixed. Zhang and Zou (1997) found that different measures of fiscal decentralization seem to have a positive and sometimes significant effect on regional economic growth in India. Similarly, Lin and Liu (2000) concluded that fiscal decentralization positively and significantly influences economic growth in China. This contrasts with the opposite general finding that fiscal decentralization is associated with slower growth for the case of China by Zhang and Zou (1998), for the United States by Davoodi, Xie, and Zou (1995), and for a full sample of both developing and developed countries by Davoodi and Zou (1998). Woller and Phillips (1998) fail to detect a statistically significant, robust, and direct relationship between fiscal decentralization and economic growth for a panel of developing countries.

a representative agent model that belies any advantage that may arise from fiscal decentralization.

A representative agent model assumes that the preferences of a single individual (the representative agent) proxy for the aggregated preferences of all agents in the economy. In a representative agent model, one makes a policy change and then examines the new equilibrium for the representative agent. However, the use of a representative agent approach may be flawed from a policy perspective (Kirman 1992). The representative agent approach explicitly assumes that the choice of the representative agent still coincides with the aggregate choice of all the agents in the economy after the policy change. In some instances, the use of a representative agent model can lead to misleading conclusions, especially when policy affects only a subset of individuals in the economy (Kupiec and Sharpe, 1991). More importantly, with respect to fiscal decentralization, the use of a representative agent model explicitly assumes away the most powerful argument for fiscal decentralization, the potential gains in allocative efficiency resulting from the adjustment of tax-expenditure packages by subnational governments to more closely match the heterogeneous preferences of subnational jurisdictions.

Lin and Liu (2000), on the other hand, used a modified Solow (1956) neoclassical growth modeling approach to examine the question of the influence of fiscal decentralization on growth in per capita income. Examining the case of China, they argued that economic growth is directly affected by fiscal decentralization and other factors, including fiscal capacity and physical capital investment. They concluded that decentralization positively and significantly influences economic growth for China.

Even though there has been little theoretical research on the role of decentralization on economic growth, interestingly, there has been extensive empirical analysis of the reverse question: to what extent is the level of decentralization a function of the level of economic development (Oates 1972, 1993; Bahl and Nath 1986; Panizza 1999, among others). It is well documented that most measures of fiscal decentralization across countries, such as share of expenditures or revenues of subnational governments in the general government budget, are positively correlated with the level of economic development, generally measured by per capita income (Oates 1972; Pommerehne 1977; Kee 1977; Bahl and Nath 1986; Wasylenko 1987; and Panizza 1999). There is less agreement in the literature about how to interpret the fact that decentralization is a more common and deeper phenomenon in industrialized countries. One possible explanation is that decentralization is like a superior good (Bahl and Linn, 1992). This correlation between economic development and the depth of decentralization may also be due to the fact that many developing countries inherited highly centralized systems at the time of their independence

from their colonial powers.[6] At the very least, this literature raises the question of whether fiscal decentralization and economic growth are simultaneously determined processes.

Fiscal Decentralization and Macroeconomic Stability

The theory of design of fiscal decentralization suggests a number of tradeoffs between efficiency and other objectives such as balanced distribution of resources across regions or macroeconomic stability. The issue is whether or not changes in, for example, macroeconomic stability resulting from fiscal decentralization will also have an indirect but measurable impact on economic growth. In this subsection, we briefly discuss the rationale for an indirect relationship between fiscal decentralization and economic growth through decentralization's influence on macroeconomic stability. We also review the empirical findings on the relationship between fiscal decentralization and macroeconomic stability.

The classical view of this issue dates back to Musgrave (1959, 1983) and Oates (1972) who contended that macroeconomic policy should solely be the responsibility of the central government and not at all the responsibility of subnational governments. There is little argument to be made on the issue of monetary policy. With respect to fiscal policy, the argument to keep the responsibility at the central government level is that subnational governments have highly 'open' economies; that is, they export and import large shares of goods that they produce and consume. Such openness calls into question the ability of subnational governments to employ countercyclical fiscal since the policy stimulus would tend to leak out of the jurisdiction. Furthermore, subnational governments' ability to borrow is generally far more limited than that of the central government.

More recently, a counter-argument has emerged in the literature that devolving at least some measure of macroeconomic policy to subnational governments promotes, not hinders, macroeconomic stability (Gramlich 1993; McLure 1995; Sewell 1996; Spahn 1997; and Shah 1999). First, the conclusion that macroeconomic policy is solely the responsibility of the central government is based upon the assumption that economic shocks are symmetrically distribu-

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[6] Conyers' (1990) conjecture would suggest that, other things equal, the level of decentralization across developing countries should vary directly with the time period they have been independent and with some proxy of how centralized the colonial administration systems were. Other variables that have been found to be positively related to the level of decentralization across countries include: population size (Oates 1972; Pommerehne 1977; Bahl and Nath 1986); a federalist constitution (Oates 1972; Kee 1977; Bahl and Nath 1986; and Wasylenko 1987); more urbanized population (Kee 1977 and Bahl and Nath 1986); less open economies (Kee 1977 and Wasylenko 1987); more equal distribution of income (Pommerehne 1977); greater geographical sectionalism (Oates 1972), and greater ethnic fractionalization (Panizza 1999).

ted. In many cases, macroeconomic shocks are asymmetrically distributed and subnational governments may be better positioned to respond to asymmetrical shocks than the central government. Second, the alleged superiority of central governments to pursue macroeconomic stabilization policies rests on the assumptions of the Keynesian demand management model, one of which is the assumption of a closed economy. In an open economy, any national fiscal stimulus would be offset by a change in the exchange rate if exchange rates were sufficiently flexible. Furthermore, if there were an appropriate subnational fiscal stimulus to the asymmetrically distributed economic shocks, then if the shocks summed to zero, these policies could stimulate employment but at the same time be neutral with respect to the exchange rate (Gramlich 1987, 1993). Third, the argument for a centralized macroeconomic policy implicitly assumes segmented capital markets in which subnational governments face higher borrowing costs relative to the central government. Capital markets may actually be more open than closed and risk premiums are not typically based on the level of government but on the capacity of the government to service its debt. Finally, the case for centralizing macroeconomic policy, or the high risk associated with decentralization, rests upon the assumption of non-cooperative behavior on the part of subnational governments.

On the negative side, subnational governments have, in some cases, overborrowed relative to their debt-servicing capacity, a practice which has lead to increased macroeconomic instability as central governments assumed the servicing of the subnational debt. Some have argued that this experience suggests that fiscal decentralization *per se* aggravates macroeconomic instability or at least presents another obstacle to resolving chronic fiscal imbalances (Prud'homme 1991, 1995; Tanzi 1996). However, where macroeconomic instability predated decentralization, for example, in Argentina and Brazil, decentralization has made the solutions more complicated in general but not impossible (Dillinger and Webb, 1998 and Dillinger, Perry, and Webb, 2001).[7] Others have argued that the types of problems encountered in Argentina and Brazil can be controlled through appropriate fiscal arrangements, to include suitable assignment of revenues and expenditures and a well-conceived system of intergovernmental transfers (McLure, 1995; Sewell, 1996; Spahn, 1997; and Ter-Minassian, 1997). However, in many countries, including Russia and China, the presence of a soft-budget constraint at the local level of government remains a threat to macroeconomic stability.[8] In these cases, fiscal decentralization could

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[7] Easterly (2000) finds that, in general, economic and fiscal policies improved during the late 1980s and early 1990s for Latin American countries and that economic shocks, not poor policies, were to blame for the debt crises and recessions of this period.

[8] See Boex and Martinez-Vazquez (2001) for a review of budgeting and fiscal management issues in transitional countries. See also Bahl (1999a) for a discussion of China's public finances.

lead to less growth because there is some evidence that macroeconomic instability retards growth (Fischer, 1993).

The empirical evidence on the relationship between fiscal decentralization and macroeconomic stability is sparse and does not provide any definitive conclusion on the direction or significance of the relationship. Fornasari, Webb, and Zou (1999), using a panel data set of 32 countries, noted that there is an almost 1-to-1 correspondence between increases in subnational deficits and central government expenditures and deficits in the subsequent period. This result appears to imply that the transitional path to a decentralized system may cause problems for macroeconomic stability if higher deficits are monetized. Treisman (2000), on the other hand, found that no clear relationship appears to exist between decentralization and the level of inflation. Using a panel of 87 countries, he noted that decentralization appeared to reduce the volatility of inflation rates over time. Decentralization not only appears to "lock in" a country's inflation rate but it also appears to inhibit institutional change; that is, decentralization also appears to "lock in" the current rules for intergovernmental finance and the level of independence enjoyed by the central bank.

While there are few studies that have examined the relationship between fiscal decentralization and inflation, no one has examined whether decentralization indirectly influences economic growth through its influence on inflation. Since there is some evidence that macroeconomic instability retards growth (Fischer 1993), fiscal decentralization may slow down growth if it causes macroeconomic instability. The converse would also be true. If fiscal decentralization leads to a more stable macroeconomic environment, then fiscal decentralization would enhance economic growth.

3. A MODEL OF DECENTRALIZATION, MACROECONOMIC STABILITY AND GROWTH

In this section, we develop a theoretical model to examine the influence of fiscal decentralization on inflation and economic growth. Our objectives are first to account for the direct relationship between fiscal decentralization and economic growth to examine the proposition that the static efficiency effects of fiscal decentralization have a corresponding dynamic effect in the arena of economic growth; and second, to incorporate the potential influence of fiscal decentralization on macroeconomic stability into the aggregate production function; and therefore examine the indirect influence of decentralization on growth through its impact on macroeconomic stability. While the direct relationship between fiscal decentralization and economic growth has been previously examined in the literature, the indirect influence of fiscal decentralization

on growth through the macroeconomic stability has not been previously studied.

Following Mankiw, Romer, and Weil (1992), we develop an augmented Solow (1956) neoclassical model of economic growth, which includes, among other variables, the accumulation of human and physical capital, to examine the influence of fiscal decentralization. We extend the model by assuming that the standard term for technological progress can be disaggregated into exogenous technical progress, the direct effect of fiscal decentralization on economic growth, and the effect of decentralization on macroeconomic stability. By augmenting the model, we can explicitly examine how decentralization may indirectly influence economic growth through its impact on macroeconomic stability. We note that the disaggregation of the exogenous technical progress term is consistent with the literature and adheres to the conditional convergence hypothesis (Barro, 1991 and Barro and Sala-I-Martin, 1995).

We assume a Cobb-Douglas production function for the entire economy[9] so that production at time t is given by

$$Y_t = V_t K_t^{\alpha} H_t^{\beta} G_t^{\varphi} L_t^{\theta} \qquad [1]$$

where $\alpha, \beta, \varphi, \theta > 0$ and $\alpha + \beta + \varphi + \theta \geq 1$. Y_t is output, V_t the level of technology and other institutional factors, L_t is labor, and K_t, H_t, and G_t are the stocks of private, human, and public capital at time t, respectively.

We define V_t as the product of the level of technology and other institutional factors at time t or

$$V_t = A_t D_t P_t \qquad [2]$$

where A_t is the level of technology, D_t the level of fiscal decentralization, and P_t measures inflation or the level of macroeconomic stability.[10] Note that D_t is synonymous with the direct effect of fiscal decentralization on output. If fiscal decentralization indirectly influences output through its impact on inflation, *certius paribus*, then it will indirectly influence economic output through P_t. While the primary focus of this paper is the indirect influence of fiscal decentralization on economic growth through macroeconomic stability, we also note that this specification allows for fiscal decentralization to have a series of indirect effects through the physical inputs in the production function. That is, decentralization may also, in our specification, indirectly influence economic output through its influence on human, public, and private capital.

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[9] Here we follow many previous papers in the economic growth literature. See, for example, Romer (1986); Barro (1990); Mankiw, Romer, and Weil (1992); and Islam (1995).

[10] Decentralization is typically measured by the ratio of total subnational government expenditures (revenues) to total government expenditures (revenues).

We further assume that L and A grow exogenously at rates n and g,[11] respectively, and that the price level is a function of, among other things, fiscal decentralization or

$$P_t = g(D_t, X_t^1) \qquad [3]$$

where X_t^1 is a vector of other exogenous variables explaining the behavior of macrostability over time, including the money supply. At this time, for theoretical simplicity, we assume that D_t is uncorrelated with X_t^1.[12]

Following Mankiw, Romer, and Weil (1992), we assume that physical capital and human capital are subject to decreasing returns to scale. This implies that the economy, over the long-run, will tend to constant private capital-labor, human capital-labor, and public capital-labor ratios.[13] Once steady state output is achieved, additional increases in per capita output can only be achieved through increases in capital productivity or increases in the level of decentralization (assuming that the overall effect of decentralization on economic growth is positive).[14] From this perspective that interests us in this paper, fiscal decentralization may affect output through two channels, a potential direct effect on output, and a series of potential indirect effects, one of which is macrostability.[15]

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[11] Following Mankiw, Romer, and Weil (1992), we assume that the rate of depreciation is uniform across all types of reproducible capital for theoretical simplicity. See Lucas (1988) and Tondl (1999) for alternative approaches to the question of depreciation.

[12] If decentralization, macrostability, and output were endogenously related, then we would have to modify our analysis to incorporate the potential correlation between D and X^1. The empirical evidence to date, however, does not appear to support the argument for an endogenous relationship between decentralization and inflation or deflation and economic growth (Treisman, 2000).

[13] The growth model specified in Equation 1 can be either a Solow-augmented neoclassical growth model with constant returns to scale for all production factors ($\alpha + \beta + \varphi + \theta = 1$), or an endogenous growth model with increasing returns to scale for all production factors ($\alpha + \beta + \varphi + \theta \geq 1$). Also, if any combination of the capital inputs exhibits constant returns to scale ($\alpha + \beta = 1$, $\beta + \varphi = 1$, $\alpha + \varphi = 1$) then Equation (1) would similarly be characterized as an endogenous growth model. Senhadji (1999) noted that a large part of the empirical growth literature supports the assumption of decreasing returns to capital.

[14] While changes in resource endowments (the discovery of new resources or a cure for AIDS) may affect short-term capital-labor ratios, these changes would not necessarily affect the steady state capital-labor ratio unless these changes influenced capital productivity.

[15] As noted by Gerson (1998), policies that lead to a permanent increase in the steady state capital-labor ratio cannot lead to long-run per capita growth, unless A is steadily increasing. He argued, however, that since the convergence to the new steady state may take years to occur, fiscal policy can still lead to higher output growth rates for a significant period of time, even though the neoclassical model might imply that these policies would affect only the level of output and not its long-run growth rate.

To determine the influence of fiscal decentralization on economic growth, we must first determine the steady state levels of the physical inputs in the production function. Following Mankiw, Romer, and Weil (1992), we assume that the same production function applies to all forms of reproducible capital and consumption so that one unit of capital can be costlessly transformed into one unit of consumption and vice versa. Assuming decreasing marginal returns to all forms of reproducible capital; that no combination of capital inputs exhibits constant marginal returns; expanding V_t and taking the natural logarithm yields from (1) and (2) the steady state level of per unit of labor or

$$\ln y_t^* = \ln A_t + \ln D_t + \ln P_t + \frac{\alpha}{1-\alpha-\beta-\varphi}\ln i_k + \frac{\beta}{1-\alpha-\beta-\varphi}\ln i_h$$
$$+ \frac{\varphi}{1-\alpha-\beta-\varphi}\ln i_g - \frac{\alpha+\beta+\varphi}{1-\alpha-\beta-\varphi}\ln(n+g+\delta) \qquad [4]$$

Thus, the steady state output is dependent upon the accumulation of reproducible capital, the stock of technology, the direct effect of decentralization on output, and the indirect effect of decentralization through the macrostability channel.

We can calculate the speed of convergence to steady state per capita output using

$$\frac{d\ln y_t}{dt} = \lambda(\ln y_t^* - \ln y_t) \qquad [5]$$

where $\lambda = (n + g + \delta)(1 - \alpha - \beta - \varphi)$. Defining y_0 as the initial level of per capita output, the evolution of per capita output over time is given by

$$\dot{y} = (1-e^{-\lambda t})[\ln D_t + \ln P_t + \frac{\alpha}{1-\alpha-\beta-\varphi}\ln i_k + \frac{\beta}{1-\alpha-\beta-\varphi}\ln i_h$$
$$+ \frac{\varphi}{1-\alpha-\beta-\varphi}\ln i_g - \frac{\alpha+\beta+\varphi}{1-\alpha-\beta-\varphi}\ln(n+g+\delta) - \ln y_0 \qquad [6]$$
$$- e^{-\lambda t}\ln A(0) - e^{-\lambda t}\ln D(0) - e^{-\lambda t}P(0)]$$

An advantage of our theoretical specification over the models used in previous papers is our explicit examination of the out-of-steady-state dynamics. In addition, we also make explicit the difference between the bounded institutional factors in the production function and the physical inputs in the production function. The bounded institutional factors directly influence economic growth while the physical inputs are weighted by the ratio of their output share to labor's share of output. Finally, following Islam (1995), we explicitly capture the unobservable initial conditions in the theoretical model; providing support for our error components estimation approach.

Two problems may arise with our derivation of the steady state production function and the equation for the convergence to the steady state output level.

First, if countries have permanent differences in technology, then these differences would enter as part of the error term and be positively correlated with initial per capita output. Permanent variations in technology could bias the estimated coefficient on initial per capita output toward zero. However, Mankiw, Romer, and Weil (1992) failed to find evidence to support the contention that countries have permanent differences in technology. Second, while countries may not have permanent variations in technology, they may have permanent variations in their institutional factors (colonial legacy, legal system, climate, geographical region) that would also enter as part of the error term. To control for these institutional factors, we will employ a two-way fixed error components model in our empirical estimations.

4. EMPIRICAL ESTIMATION: THE IMPACT OF FISCAL DECENTRALIZATION

We now turn to the task of determining whether empirical support exists for the hypotheses of the direct and indirect effects of fiscal decentralization on economic growth. As in the case of several more recent studies of the relationship between fiscal decentralization and economic growth, we employ a panel data set of developed and developing countries.[16] We first discuss the data sources and methodology before presenting the results of our empirical investigations.

The Measurement of Fiscal Decentralization

The most serious difficulty we face in the cross-country study of fiscal decentralization is how to properly measure the extent of decentralization. Ideally, we would be able to construct a panel data set of measures of fiscal decentralization that effectively quantified the activities of subnational governments resulting from autonomous or independent decisions of subnational governments. This would require classifying those revenues and expenditures that are under the effective control of the central government as central government activities, regardless of the level of government at which these revenues or expenditures occurred. Likewise, activities that were under the control of subnational governments, even if they were funded by the central government, would be classified as subnational government activities. Constructing such a panel data

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[16] See Davoodi and Zou (1998) and Woller and Phillips (1998), and Treisman (2000). See Hsiao (1986) and Baltagi (1995) for a discussion of the advantages and problems associated with the use of panel data.

set would require information on: (i) the nature of grants and transfers received by subnational governments (for example, lump-sum versus conditional); (ii) the structure of the tax system to determine whether and how revenues were shared; (iii) the discretion of subnational governments to levy and collect taxes and to change their bases and rates; (iv) the discretion granted to subnational governments to spend resources to meet the needs of their constituents; and (v) the overall level of political autonomy of subnational governments.

Unfortunately, we cannot readily address these issues with the available data. As with many other empirical studies of fiscal decentralization, we employ the International Monetary Fund's Government Finance Statistics Annual Yearbook (GFS) as the primary data source for revenues and expenditures of national and subnational governments.[17] We are, as Oates (1972) concluded, left with the standard, albeit imperfect, measures of fiscal decentralization based on revenue and expenditure data. We, as many of the other studies that have preceded us, thus define fiscal decentralization in one dimension, that is, as the share of subnational government revenues to general government revenues or the share of subnational government expenditures to general government expenditures.[18]

In our analysis, specifically, we use GFS data at the consolidated central government, regional and state government, and local government levels. For those countries that do not report consolidated central government data, we substitute data on the budgetary central government.[19] Of the 180-plus potential countries in the GFS data set, we selected those countries that reported revenues and expenditures for at least the central government and at least one level of subnational government.[20] This selection process resulted in an unbalan-

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[17] While the GFS system reports information on grants and transfers between the various levels of government, it does not contain information on whether the grants and transfers are under the control of the central or recipient level of government or if the grants are conditional, block, or lump-sum. The GFS system also does not report information on the nature of transfers. Cross-sectional and time-series data on the number and size of subnational governments is sketchy at best for developed countries and virtually non-existent for developing and transitional countries, except in those cases where technical assistance providers have conducted surveys of subnational governments. It is this lack of information that has led to the use of a measure of fiscal decentralization that is typically constructed as a ratio of subnational government expenditures (revenues) to general government expenditures (revenues).

[18] See Ebel and Yilmaz (2001) for a discussion of the pitfalls associated with the conventional measurement of fiscal decentralization.

[19] This is consistent with previous examinations of fiscal decentralization in the literature. See, for example, Davoodi and Zou (1998).

[20] We did not include those countries that stopped reporting revenue and expenditure information prior to 1990 and those countries whose reported data were mathematically inconsistent. We did include countries that reported zero or minimal expenditures or revenues for at least one subnational level of government.

ced base panel data set of 982 observations for 52 developed and developing countries with observations ranging from 1972 to 1997.

We then calculated two measures of fiscal decentralization: (1) the ratio of total subnational government revenues to general government revenues and (2) the ratio of total subnational government expenditures to general government expenditures. These two measures are the standard measures of fiscal decentralization that have been widely used in the previous studies of determinants and outcomes of fiscal decentralization.[21] When we combine the data extracted from the GFS with the data extracted from the other data sources, the size of the data set is reduced from 1,000 observations to 610 observations due to missing observations in the socio-economic data sets.[22] We note again that the panel data set is unbalanced; we do not create linear approximations of the missing data points; nor do we construct averages over periods of time to balance the data set.[23]

Our approach is to examine the potential impact of decentralization in the full sample of countries using a two-way fixed effects model.[24] We then split the sample into sub-samples of developing and developing and transitional countries to investigate whether the influence of decentralization is dependent upon the level of development. These estimations allow us to test the hypotheses presented in the theoretical model.

Fiscal Decentralization and Macroeconomic Stability

Following Fischer (1993) and Fornasari, Webb, and Zou (1999), we hypothesize that the inflation rate is determined by the rate of economic growth, the

[21] While some studies of fiscal decentralization have attempted to construct measures of decentralization net of grants and transfers and net of certain types of expenditures, we do not construct such measures, as we are not able to ascertain, with any degree of certainty, whether these techniques reduce or enhance the bias already present in our measures of fiscal decentralization. See, for example, Woller and Phillips (1998) and Lin and Liu (2000).

[22] These sources include the World Bank's World Development Indicators 2000 (2000), the United States Census Bureau's International Data Base (2000), and Freedom House's Survey of Freedom (2000).

[23] A linear approximation, which may merely reflect the time-wise average of the series around the missing data points, is likely to obscure the variability in the series that may arise, in part, due to the influence of fiscal decentralization. Linear approximation may also introduce bias into the series depending upon which observations are used to create the approximations for the missing data points. It is entirely possible that the observations may reflect a period in time in which the structure of the economy is significantly different from other periods in time (during an oil or policy shock, for example). See Woller and Phillips (1998) for an example of linear approximation and Treisman (2000) an example of using five-year averages.

[24] For a discussion of the properties of the two-way fixed effects error component estimator, see Hsiao (1987) and Baltagi (1995).

growth of the money supply, and, among things, fiscal decentralization. We specify the base two-way fixed effects error components estimator for inflation as:

$$P_{it} = \beta_1 D_{it} + \beta_2 M_{it} + \beta_3 y_{it} + \delta' Z_{it} + u_{it} \qquad [7]$$

where P is the annual change in the consumer price index, D is the measure of fiscal decentralization discussed above, M is the measure of M2 as a percentage of GDP, y is GDP per capita, and the Z matrix includes several additional control regressors, including openness to international trade, tax revenues as a percentage of GDP, Gross Domestic Investment as percentage of GDP, and population.[25] All variables are expressed in logs. We note the presence of serial correlation in the error terms when the base estimation equation is estimated in levels and thus specify the equation in first differences.[26]

   Testing for the presence of endogeneity of fiscal decentralization in (7)[27], we fail to reject the null hypothesis of exogeneity for fiscal decentralization with respect to the inflation rate.[28] We do, however, reject the null hypothesis at the 1% level of significance for M2 as a percentage of GDP and for per capita GDP. Based on this result, we instrument for the first difference of M2 as a percentage of GDP with the two-period lagged level of M2 as a percentage of GDP and for the first difference of per capita GDP with the two-period lagged level of per capita GDP.[29] We then examine whether the random effects GLS estimator or fixed effects Within estimator is more appropriate for the estimation of (7). While we would prefer to use the random effects estimator to avoid the loss of degrees of freedom associated with the use of the Within estimator, we reject the null hypothesis that the regressors and effects are uncorrelated. As this result suggests that the random effects estimator is inconsistent, we use the fixed effects estimator for the estimation of the relationship between fiscal decentrali-

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[25] We would prefer to examine the potential impact of fiscal decentralization on macroeconomic stability as proxied by the misery index (inflation rate plus unemployment rate). Unfortunately, we lack sufficient data on unemployment across countries and time to construct a misery index variable for inclusion in the panel data set. Strum and de Hann (2001) use similar control variables in their investigations of the relationship between central bank independence and inflation.

[26] We reject the null hypothesis of no serial correlation at the 1% significance level using a Durbin-Watson test for serial correlation. Respecifying the model in first differences, we fail to reject the null hypothesis of no serial correlation.

[27] See Hausman (1978), Hausman and Taylor (1981), Hsiao (1986), and Baltagi (1995) for a discussion of testing for endogeneity in the presence of an unbalanced panel data set.

[28] We also fail to reject the null hypothesis of exogeneity for openness to international trade, tax revenues as a percentage of GDP, population growth, and Gross Domestic Savings as a percentage of GDP.

[29] We instrument for the endogenous regressors using the two-period lagged level of the regressor in question. See Baltagi (1995) for a discussion of these instrumental variables approach with panel data.

zation and inflation. Finally, we examine whether the fixed effects are jointly significant, that is, whether the time and country specific effects are significant. Using these results, we specify the estimable form of Equation (7) as a two-way fixed effects model.

From this paper's perspective, the most important result of the full sample estimations is the negative and statistically significant relationship between revenue decentralization and the rate of inflation. The estimated coefficient for revenue decentralization is statistically significant at the 1% level (Table 1). A 1% increase in revenue decentralization appears to induce, for the countries in the sample, an approximate 0.3% decrease in the growth of the consumer price index. The estimated coefficient for revenue decentralization also appears to be robust to the inclusion of other regressors, to include total population, defense expenditures, and urbanization. Note, however, that the estimated coefficient for expenditure decentralization is not statistically significant. Thus it appears that while the decentralization of expenditures does not affect inflation, countries with a more decentralized system of revenue assignments tend to experience more stable macroeconomic environments. Perhaps the ability of subnational governments to mobilize their own revenues puts less strain on the central government budget and ultimately on inflation.

Table 1

FISCAL DECENTRALIZATION AND INFLATION

	Full Sample	Full Sample	Developed Countries	Developed Countries	Developing Countries	Developing Countries
Expenditure Decentralization	-0.1623 (0.1025)		-0.1623 (0.1025)		-0.1041 (0.0965)	
Revenue Decentralization		-0.2566** (0.1089)		-0.4142+ (0.2637)		-0.1386+ (0.0808)
M2 (% of GDP)	1.3128 (1.0947)	1.2501 (1.0878)	1.3758 (1.2925)	1.2586 (1.2386)	-0.2122 (0.9248)	-0.2346 (0.9330)
GDP Per Capita	-2.8441** (1.4569)	-2.9351** (1.4601)	-1.4094 (1.4115)	-1.3045 (1.3419)	-1.0517 (1.4537)	-1.1320 (1.4675)
Openness to International Trade	0.0338 (0.2986)	-0.0299 (0.2957)	0.3400* (0.1750)	0.3358* (0.1664)	0.4337* (0.2668)	0.4281* (0.2663)
Tax Revenues (% of GDP)	-0.0188 (0.1655)	-0.0605 (0.1701)	0.1386 (0.1400)	-0.0167 (0.1597)	-0.0538 (0.2102)	-0.1021 (0.2070)
Gross Domestic Savings (% of GDP)	0.0642* (0.0306)	0.0665* (0.0287)	0.0973* (0.0417)	0.0869** (0.0365)	0.0980** (0.0310)	0.1002** (0.0288)
Degrees of Freedom	388	388	188	188	218	218
R^2	0.25	0.26	0.13	0.17	0.17	0.17

*, ** and + signify the 1%, 5% and 10% level of significance, respective. White heteroscedastically consistent standard errors are reported in the parentheses. All variables measured in first differences of logs.

Turning to the sub-sample estimations, we again find that revenue decentralization appears to negatively influence the rate of inflation for the sub-samples of developed and developing and transitional countries.[30] For the sub-sample of developed countries, the estimated coefficient for revenue decentralization is statistically significant at the 10% level and suggests that a 1% increase in the level of revenue decentralization induces a 0.4% decrease in the inflation rate for the developed countries in the sample (Table 1). For the sub-sample of developing and transitional countries, the estimated coefficient for revenue decentralization is also statistically significant at the 10% level and appears to suggest that a 1% increase in the level of decentralization induces a 0.13% decrease in the rate of inflation. The estimated coefficient for expenditure decentralization is not statistically significant in either the developed or the developing country sub-samples.

The results of our analysis, even in light of the necessary cautionary notes, are quite striking. Revenue decentralization appears to promote, and not hinder, as has been often previously suggested by some in the literature, price stability among the sample countries. That this result is consistent, although at the lower order of magnitude, for the sub-sample of developing countries, suggests that our findings are not dependent upon the level of development.

Our empirical results support the *a priori* arguments of McLure (1995), Sewell (1996), and Spahn (1997) that fiscal decentralization may enhance price stability and contradict the *a priori* arguments of Prud'homme (1995), and Tanzi (1996) who caution that decentralization, at a minimum, presents an obstacle to achieving macroeconomic stability. With respect to the empirical literature, our findings contradict those of Treisman (2000) who suggests that decentralization "locks in" the current rate of inflation. We find that revenue decentralization may, in fact, lower the rate of inflation.

Decentralization, Macrostability, and Economic Growth

We now turn to the question of the effect of fiscal decentralization on economic growth. If Oates (1993) is correct, then the static proposition that fiscal decentralization is efficiency enhancing has a corresponding proposition in the dynamic setting of economic growth. The theoretical model suggests that a direct relationship between decentralization and economic growth is possible, yet the question remains whether the relationship can be empirically substantiated in a fully specified model that controls, among other things, for the indirect effect of fiscal decentralization on economic growth. We now examine whether

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[30] We fail to reject the null hypothesis that the time-specific effects are jointly equal to zero but are able to reject the null hypothesis for the country-specific effects and thus present the results for the one-way fixed country effects IV Within estimator in Table 2.

fiscal decentralization directly affects economic growth and also whether there is an indirect impact on economic growth through the inflation channel.

Drawing on the neoclassical economic growth literature[31], we specify the base estimation equation for growth in per capita GDP as:

$$y_{it} = \beta_1 D_{it} + \beta_2 K_{it} + \beta_3 H_{it} + \beta_4 G_{it} + \beta_5 P_{it} + \delta' Z_{it} + u_{it} \qquad [8]$$

where D and P are as previously discussed; K is private capital as proxied by gross domestic private fixed investment; H is human capital as proxied by infant mortality[32]; and G is public capital as proxied by gross domestic public investment. The Z matrix contains a number of control regressors, including openness to international trade, population, democratic governance, tax revenues as a percentage of GDP, and defense expenditures as a percentage of GDP. All variables are expressed in logs. As before, we note the presence of serial correlation in the error terms when the base estimation equation is estimated in levels and thus specify the base estimation equation in first differences.[33]

Following the methodology presented in the previous subsection, we first test for the endogeneity of the regressors. We fail to reject the null hypothesis of exogeneity for fiscal decentralization with respect to growth in per capita GDP, a result that supports the previous findings of Davoodi and Zou (1998) and Woller and Phillips (1998). We do, however, reject the null hypothesis of exogeneity for the inflation rate and gross domestic fixed private and public investment per capita. We again reject the null hypothesis that the regressors and effects are uncorrelated, suggesting that the fixed effects estimator is more appropriate for the task of estimating (8). As before, we instrument for these endogeneous regressors with the two-period lagged level of the regressor in question.

Among the most important empirical findings of this paper is the failure to detect, for the full sample of countries, a statistically significant direct relationship between fiscal decentralization and growth in per capita GDP. While the estimated coefficient for expenditure decentralization (Table 2) is positive, it does not approach any meaningful level of significance. The estimated coefficient for revenue decentralization is negative but insignificant. The inclusion of the control regressors, to include total population, defense expenditures as a percentage of GDP, openness to international trade, and democratic governance, does not improve the significance of either of the estimated coefficients for fiscal

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[31] See Barro (1990, 1991, 1999), Romer, Mankiw, and Weil (1992), among many others.

[32] We would prefer to measure human capital using schooling data; however, panel data on education levels are currently not of sufficient quantity to include in the panel data set. The use of infant mortality as a measure of human capital, however, is consistent with the economic growth literature.

[33] We reject the null hypothesis of no serial correlation at the 1% significance level. Re-specifying the model in first differences, we fail to reject the null hypothesis of no serial correlation.

decentralization. We also examined whether a non-monotonic relationship exists between decentralization and growth by including the square of decentralization as an additional variable. The estimated coefficients for the squared decentralization terms were also insignificant.[34] Our findings appear to support those of Woller and Phillips (1998) who also failed to detect a statistically significant *direct* relationship between decentralization and economic growth.

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Table 2

FISCAL DECENTRALIZATION AND ECONOMIC GROWTH

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	Full Sample	Full Sample	Developed Countries	Developed Countries	Developing Countries	Developing Countries
Expenditure Decentralization	0.0660 (0.0506)		-0.2736** (0.1305)		0.0635 (0.0481)	
Revenue Decentralization		-0.0469 (0.0532)		-0.3141** (0.1159)		-0.0510 (0.0533)
Infant Mortality	-0.1527* (0.0771)	-0.1531* (0.0773)	0.0208 (0.0770)	0.0224 (0.0739)	-0.4324** (0.1775)	-0.4273** (0.1767)
Inflation (Annual % Change in CPI)	-0.0798* (0.0396)	-0.0802* (0.0392)	0.0130 (0.0842)	0.0199 (0.0930)	-0.0989+ (0.526)	-0.0974+ (0.0523)
Gross Domestic Private Investment (% of GDP)	0.6212** (0.1113)	0.6253** (0.1152)	0.5950** (0.1492)	0.5767** (0.1483)	0.6784** (0.1404)	0.6851** (0.1453)
Gross Domestic Public Investment (% of GDP)	0.2434** (0.1039)	0.2454** (0.1045)	0.4133** (0.1339)	0.4068** (0.1322)	0.1612 (0.1245)	0.1608 (0.1249)
Democratic Governance	0.0109** (0.0039)	0.0107** (0.0039)	-0.0353 (0.0612)	-0.0027 (0.0840)	0.0117** (0.0041)	0.0114** (0.0040)
Degrees of Freedom	438	438	218	218	208	208
R^2	0.43	0.43	0.66	0.67	0.40	0.40

*, ** and + signify the 1%, 5% and 10% level of significance, respective. White heteroscedastically consistent standard errors are reported in the parentheses. All variables measured in first differences of logs.

While we fail to observe evidence of a direct relationship between decentralization and growth, we find empirical support for an indirect relationship between decentralization and growth through the inflation channel. As noted in the previous section, revenue decentralization appears to reduce the rate of inflation in the sample countries. The results in this section verify that a negative

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[34] We examined whether a non-monotonic relationship existed between decentralization and growth for the full, developing, and developed country samples. In only one case, the one-way time fixed effects model for the developed country sample, was the estimated coefficient for the squared decentralization term statistically significant. The estimated coefficient, in this one case, became insignificant with the inclusion of the country specific fixed effects. This finding appears to contradict that of Theissen (2000) who appeared to find a non-monotonic relationship between decentralization and growth for a sample of high-income countries.

relationship exists between inflation and economic growth.[35] Thus, an increase in revenue decentralization, all else being equal, would appear to reduce the rate of inflation over time and, in turn, indirectly enhance economic growth. We believe that this first evidence on the indirect influence of decentralization on growth is intriguing as it supports the contention that decentralization has an indirect effect on economic growth through its impact on inflation.

For the sub-sample of developed countries, we fail to reject the null hypothesis that the country-specific effects are jointly equal to zero and thus use the one-way IV Within estimator. From the results in Table 2, we note that there appears to be a negative and statistically significant relationship between fiscal decentralization and growth in per capita GDP. The estimated coefficients for expenditure and revenue decentralization are statistically significant at the 1% level. While the estimated coefficients for revenue decentralization appear to be robust to the inclusion of the control regressors (total population, defense expenditures, M2 as a percentage of GDP), the estimated coefficients for expenditure decentralization appear to be fragile. For the developed countries sub-sample, increases in revenue decentralization lead directly to lower economic growth. On the other hand, the indirect effect of decentralization on growth through its impact on inflation is not present for the sub-sample of developed countries.

For the sub-sample of developing and transitional countries, we are able to reject the null hypothesis that the country and time-specific effects are singularly and jointly equal to zero and therefore use the two-way IV Within estimator. As with the full sample estimations, we fail to detect a statistically significant direct relationship between fiscal decentralization and growth in per capita GDP. The estimated coefficients for expenditure and revenue decentralization (Table 2) are positive and negative, respectively, but insignificant. As with the full sample of countries, we note that inflation appears to significantly and negatively influence growth in per capita GDP and that decentralization appears to negatively influence the rate of inflation. This result would appear to suggest that decentralization, for the developing countries in the sample, indirectly affects economic growth through the inflation channel. Unlike some of the arguments in the literature, fiscal decentralization does not appear to present an obstacle to achieving price stability in the sample developing and transitional countries.

5. SUMMARY AND CONCLUSIONS

In this paper we have examined the linkages between fiscal decentralization, inflation, and economic growth and have found support for the hypothesis that

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[35] See, for example, Fischer (1993).

decentralization, at a minimum, does not present a threat to price stability in a large sample of developed and developing countries. Our findings suggest that fiscal decentralization *per se* does not create conditions that undermine efforts to achieve price stability. While it is quite clear that poorly designed or implemented fiscal decentralization policies may create incentives for subnational governments to overborrow relative to their debt-servicing capacity and potentially lead to macroeconomic instability, it appears that, by allowing governments at different levels to mobilize their own revenues, decentralization ultimately leads to more stable prices. The mechanism by which this takes place is not well established and it should be investigated in the future. However, an appealing conjecture is that by mobilizing their own tax revenues, local governments put less pressure on the central government budgeting, thus lowering the chances for larger central government deficits and ultimately increases in the money supply and inflation.

The other significant finding of this paper is that there does not appear to exist a direct role for fiscal decentralization in economic growth. However, fiscal decentralization appears to have a positive indirect effect on economic growth through its beneficial impact on price stability.

Although more work remains to be done,[36] from a policy standpoint clearly there is no reason for developing and transitional countries to avoid decentralization efforts, or for international finance organizations to recommend against it, for fear of the impact that decentralization may have on macroeconomic stability.

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[36] Refining the measures of fiscal decentralization and macroeconomic stability to include measures of unemployment and other dimensions should be the next step of future work.

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