Measurement of Fiscal Performance in Inflated Economies

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A measure of fiscal performance is introduced which addresses the economic structure common to LDCs experiencing persistent inflation. In particular, the index recognizes the degree to which the budget is endogenous with respect to inflation. It is an inflationary analog to the full employment budget. Argentine fiscal data is used to demonstrate that the new measure provides the correct assessment of discretionary fiscal behavior in inflated economies.

I. Introduction

The question as to what constitutes a deficit is increasingly important. Recently, international monetary authorities have placed fiscal performance at the center of the conditions necessary for newly independent Eastern European countries to enter the international financial community. This is hardly surprising given that in the past decade the IMF and other multilaterals have made adjustment loans in Latin America contingent on balanced budgets. Assessment of a country's fiscal behavior is sensitive to the way in which a country's deficit is measured. The choice of an appropriate deficit index is difficult because many developing economies have structures that are very different from the countries for which conventional indices of fiscal performance were designed.

It is well-known that there are simultaneous effects of government budgets; the macroeconomy both influences and is influenced by the budget. For example, the size of deficits are altered by cyclical fluctuations in output. When the economy experiences a downturn in the

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business cycle, tax revenues decrease, and the deficit automatically increases. Recognizing this, OECD nations typically measure their deficits in ways which account for the effects of output gaps. For example, Brown (1956) devised the full-employment budget to account for the impact on the budget when the current level of output deviates from its potential level. The German cyclically neutral budget and the Dutch budget impulse provide similar indices. As summary measures they filter out the endogenous movement of the deficit in order to identify that portion determined by discretionary action. The discretionary component is then used to assess the fiscal responsibility of the government.

It has been recognized for some time that budget endogeneity is not limited to the effects of output on the deficit. In their paper on output-based measures of fiscal and monetary policy, Blinder and Goldfeld (1976) point out the lack of more comprehensive measures of fiscal stance based on alternative sources of endogeneity. For example, the rate of inflation is a potentially serious distortion requiring an adjustment in many assessments of fiscal performance. Indeed, Barro (1987) has argued that an inflation-adjusted real deficit is more appropriate measure of fiscal performance than the simple real (or nominal) deficit. This is particularly true for countries where the economic distortions affecting budget measurement are primarily due to severe inflation, rather than output fluctuations. Examples of these countries include Austria, Hungary, Poland, and Germany, during the 1920's, Argentina, Brazil, and Peru, during the 1980's, and the present situation in many member republics of the Commonwealth of Independent States. Moreover, Bresser-Pereira (1987) and Canavese-Heymann (1992) argue that purging inflation endogeneity from the budget is a necessary condition for gauging the stabilization requirements in chronically inflated economies.

In this paper we provide a new and more approriate method for the measurement of discretionary fiscal actions in inflated economies. This index, called the zero inflation budget, is in many ways is an inflationary analog to the full employment budget. It provides a method for accounting for the inflationary effects that distort the measurement of government expenditure and revenue in economies with high rates of inflation. For example, it adjusts deficit figures for the inflationary deterioration of real tax revenues. Moreover, the zero inflation budget eliminates inflationary bias occurring in periods of deflation, a property absent from all other inflationary indices. As a summary measure of discretionary fiscal policy, the index gives an improved picture of the magnitude of fiscal austerity needed for stabilization, and the degree

to which the conditions of this austerity have been met.

The useful properties of the zero inflation index are illustrated with an application incorporating fiscal data from Argentina. Argentina makes an excellent test case because it has experienced very high levels of inflation, most of its revenue base is not indexed, and has a large foreign debt; conditions common in Latin America and the Commonwealth of Independent States. Two important results specific to the Argentina case arise. First, Argentine fiscal stance has been much tighter than previously thought. Second, efforts at fiscal contraction undertaken in Argentina during the 1980's are minimal when one correct the deficit for inflationary sources of budget eodngeneity.

II. Current Approaches to Inflation Adjustment

Although debates exist about the direction of causation between deficits and inflation, we are concerned only with the way inflation affects the measurement of the deficit. This section provides a brief review of the most common methods used to adjust deficits for inflationary effects. Our review begins with a financial hybrid of the deficit known as the (conventional) borrowing requirement, which is independent of nominal movements in revenue and expenditure. We show that this index is distorted by the inflationary component of interest payments. The real or operational deficit corrects for this effect, and is the short-run index of fiscal stance most often employed in inflated economies.

The net financial injection of the deficit into the economy, often called the public sector borrowing requirement (PSBR), is calculated by recognizing that the deficit must be financed through either domestic debt issues, external debt issues, or money creation. The borrowing requirement, BR, in given in equation (1):

(1) $$BR = D + \eta B + iE = \dot{M} + \dot{B} + \dot{E}$$

where:
$D = G-R$: the primary deficit.
G is current noninterest government expenditure.
R is current government revenue.
η is the nominal domestic interest rate.
B is domestic debt.
i is the nominal international interest rate.
E is external/foreign debt.

M is (high powered) money creation.

a dot denotes time derivative.

To make the deficit independent of nominal movements in revenue and expenditure, monetary aggregates are divided by nominal GDP for the relevant period (or some other deflator). The result is the *conventional measure* of the deficit, br_c:

(2) $br_c = d + \eta b + ie = \dot{m} + \dot{b} + \dot{e}$

Lower case letters denote a variable expressed as a proportion of GDP. Dividing by nominal GDP also relates each budget category to the current level of economic activity.

In his presentation on ''real'' budget deficits, Eisner (1986) utilizes the Fisher equation to adjust nominal interest payments for the reduction in the real value of outstanding debt due to inflation. Let $\eta = r + \pi^e$, where r is thr real rate of interest, and π^e is the expected rate of inflation. The product $\pi^e (b + e)$ is the component of interest payments that fluctuates nominally with the rate of inflation. This factor is subtracted from the deficit. (Obviously, any debt denominated in foreign currency needs to be adjusted for exchange rate variation as well.) Otherwise, br_c is biased because it includes the inflationary component of interest payments on the national debt as an expense, and excludes the inflation-induced depreciation of the real value of the government's debt as a source of revenue. That is, it does not recognize that inflation simultaneously increases the nominal component of interest payments and reduces the real value of the nominally denominated debt stock.

When the conventional deficit is adjusted for the inflationary component of interest payments the modification is called the *real* or *operational deficit*. Thus, we have two indices of fiscal performance — the conventional deficit (br_c), and the real/operational deficit (br_c):

(3) $br_c = d + \eta b + ie = \dot{m} + \dot{b} + \dot{e}$

(4a) $br_o = d + (\eta - \pi^e)\ b + (i - \pi^e)\ e = \dot{m} + \dot{b} + \dot{e} - \pi^e\ (b + e)$

i.e.

(4b) $br_o = br_c - \pi^e\ (b + e)$

The utility of br_c versus br_o depends upon how the deficit is to be

interpreted. For the purposes of determining financing requirements, it is the conventional deficit which matters — the nominal value of debt must be financed. Alternatively, the operational deficit is the appropriate index for gauging discretionary fiscal action on the part of the government. The conventional deficit is endogenous with respect to inflation because it fluctuates with the inflationary component of interest payments. The inflationary component of interest payments grows and shrinks with the magnitude of the inflation rate and this produces budget endogeneity. No such fluctuation occurs with br_o because it includes real payments on the real debt stock, rather than nominal payments on the real debt stock. For this reason br_o is preferred to br_c as an indicator of discretionary behavior.

This is important because when inflation is high the inflationary component of interest payments often dominates deficit calculations. As a consequence the deficit is drastically overstated. In such a case austerity recommendations based on br_c may be unnecessarily extreme, and difficult to maintain. This bias present in the conventional deficit became unpleasantly apparent during the orthodox stabilization fiascos in Brazil during the early 1980's (Baer, 1987). By contrast, the operational deficit recognizes that as an economy stabilizes, the inflationary component of interest payments self-corrects as lower expected inflation decreases nominal interest payments. As an indicator of discretionary behavior, the operational deficit provides an approximation as to what the deficit would be if the economy stabilized with respect to inflation.

III. Revenue Bias

We argue that the operational deficit is an imperfect measure of fiscal performance. It reacts to changes in *expenditure* relative to the magnitude of the inflation rate, yet, there is no corresponding adjustment of *revenues*. Specifically, Olivera (1967) and Tanzi (1977) have shown that when collection lags are long, and/or the inflation rate is high, the combined effects can seriously diminish the real revenues received by the central government.

For example, define t(0) to be the theoretical proportion of real tax receipts collected under zero inflation (given the legal lag), and t(π) is the actual tax ratio collected when inflation is at rate π. The relation between t(0) and t(π) is as follows. Let n denote the number of days allowed in the legal collection lag for a 90 day period, γ is the quarterly (real) growth rate, and π is the quarterly inflation rate. This:

(5) $t(\pi) = t(0) / ((1 + \pi)(1 + \gamma))^{n/90}$

Undistorted recepts, $t(0)$, are discounted by the growth and inflation rates over the legal lag in order to arrive at the actual revenues received, $t(\pi)$. Cross-multiplying we have:

(6) $t(0) = t(\pi)((1 + \pi)(1 + \gamma))^{n/90}$

Equations (5) and (6) illustrate that tax receipts are endogenous with respect to inflation. When the rate of inflation is extremely high, $t(\pi)$ differs greatly from $t(0)$, and there is a loss in real revenue. As the inflation rate subsidies, so does this distortion. The inflationary erosion of real tax revenues is known as the *Olivera-Tanzi effect*, and can seriously bias deficit calculations. It is the inflation analogy to the sensitivity of tax revenues to the position of the economy in the business cycle.[1] For example, at high rates of inflation the deficit increases because inflation erodes lagged tax receipts: $t(\pi)$ $t(0)$. As inflation decreases, so does the Olivera-Tanzi effect, and $t(\pi)$ approaches $t(0)$.

The danger, then, is twofold. First, if the Olivera-Tanzi effect is not recognized, recommendations for fiscal contraction may be unnecessarily large. A plan for fiscal contraction must identify that portion of rvenues which is depressed due to the Olivera-Tanzi effect and will self-correct as inflation stabilizes. Second, as inflation decreases, the movement of $t(\pi)$ towards $t(0)$ can be interpreted as a discretionary increase in tax revenues, something which it is most definitely not. Yet evidence of a deflationary change in $t(\pi)$ being interpreted as a discretionary tax increse in widespread. Franco (1990) asserts that this mistake was made in interpreting the fiscal corrections observed to stabilize the hyperinflations in Austria, Hungary, Poland, and Germany during the 1920's. It also occurs in many Latin American economies and is likely in many Eastern European countries. An inflation netural index of fiscal stance must recognizes this effect. Such an index is given in the section below. In section V we show that the Olivera-Tanzi effect is a significant source of budget endogeneity in Argentina.

IV. A New Index

In this section we create a summary measure of fiscal stance by

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[1] It is well-recognized that inflation does not have analogous effects in reducing real (noninterest) expenditures (Goode, 1984). Expenditures usually exhibit some sort of formal or informal indexation.

combining the concepts of the operational deficit and Olivera-Tanzi effect. If the Olivera-Tanzi effect is not accounted for, the operational deficit is biased in its measurement of fiscal contraction. The bias occurs because br_o fails to identify the deterioration in lagged tax revenues under high rates of inflation, when $t(\pi)$ and $t(0)$ are significantly different. Yet as the economy stabilizes, $t(\pi)$ converges to $t(0)$, and this allows for sudden, but illusionary, improvements in br_o.

In order to account for the Olivera-Tanzi effect we need to adjust revenues as they appear in the primary deficit, d, where:

$$(7) \qquad d = g - r = g - (s + t)$$

Revenues arise from the provision of government services, s, and current tax revenues, t. Neutralizing the Olivera-Tanzi effect requires knowledge of the tax ratio if the economy were to stabilize at zero inflation. This quantity is the $t(0)$ term defined above: lagged revenues independent of inflation. By incorporating $t(0)$ in our calculation of the primary deficit, we define a zero inflation budget which eleminates budget endogeneity with respect to inflation. This index is denoted as br_z:

$$(8) \qquad br_z = d_z + (\pi - \pi^e)b + (i - \pi^e)\ e$$

where:

$$(9) \qquad d_z = g - (s + t(0))$$

This new index is a hybrid of the operational deficit in which tax revenues are adjusted for the Olivera-Tanzi effect. Service revenues, such as those generated by public enterpirses, are not adjusted. They have a different lag structure and are subject to different policy variables. Any change in their level or lag structure is generally regarded as discretionary with respect to the rate of inflation.

The evaluation of budgetary stance under br_z is as follows: given tax rules, entitlement rules, etc., if the government is running a surplus $(br_z > 0)$, the stance is contractionary. If there is a deficit $(br_z < 0)$, the stance is expansionary. This interpretation is not so different from the full-employment budget introduced by Brown (1956), except that instead of a evaluating the budget with reference to potential output, we assess the budget with reference to a zero rate of inflation. The full employment budget treats output gaps as the primary source of budget endogeneity, and full-employment output is the policy target. In con-

trast, br_z treats inflation as the primary source of endogeneity, and a zero rate of inflation is the policy goal.[2]

We summarize the utility of the zero inflation budget with the following diagram:

Diagram 1

Endogenous versus Discretionary Budget Movements
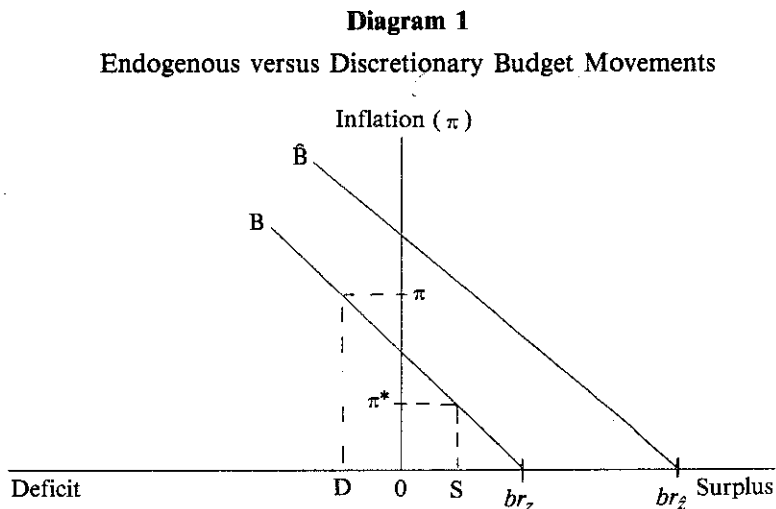
The budget has a negative slope with respect to inflation because of the Olivera-Tanzi effect and the inflationary component of nominal interest payments. If B represents the original unadjusted deficit, then $\hat{B}$ represents a (discretionary) fiscal contraction. The zero inflation level of B and $\hat{B}$ are br_z and $br_{\hat{z}}$ respectively. Suppose instead of a fiscal contraction, the government freezes prices and inflation drops from π to π^*. The value of budget B changes from deficit OD to surplus OS because as inflation decreases, the inflationary component of interest payments decreases, and the rverse Olivera-Tanzi effect causes actual revenues to increase toward their zero inflation level. This observed fiscal contraction has nothing to do with discretionary behavior on the part of the government! It is entirely an endogenous change in the budget with respect to inflation. By contrast, the zero inflation budget recognizes such endogeneity and registers no change — its value re-

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2 This goal is consistent with the heterodox stabilization policies attempted by various Latin American countries in the 1980's. For example, *"zero inflation was increasingly perceived by (Brazilian) President Sarney and his political advisors as the essence of the government's success,"* Baer & Beckerman (1989), p. 45.

mains at br_z. Discretionary changes in the budget are identified as movements along the horizontal axis.

V. An Application: Argentina

In this section we provide an example of the zero inflation budget using Argentine data. Argentina serves as an excellent test case for the following three reasons. First, the volatility of inflation in the past decade almost certainly implies that inflation is the primary source of endogeneity in the budget, rather than some other economic effect such as output gaps. Second, Argentina, like many LDCs, relies heavily on sales and excise taxes as the principal component of its tax base. As a result, lags in revenue collection are fairly long when compared to countries which rely on (withholding) income taxes. This property of the tax system facilitates an evaluation of our argument that the operational deficit has been biased by its omission of Olivera-Tanzi calculations. Third, indexation has not permeated Argentine tax structure to the degree it has in other high inflation countries such as Brazil. Cross-sectional differences and imperfections in indexation would complicate the calculation of the Olivera-Tanzi effect.
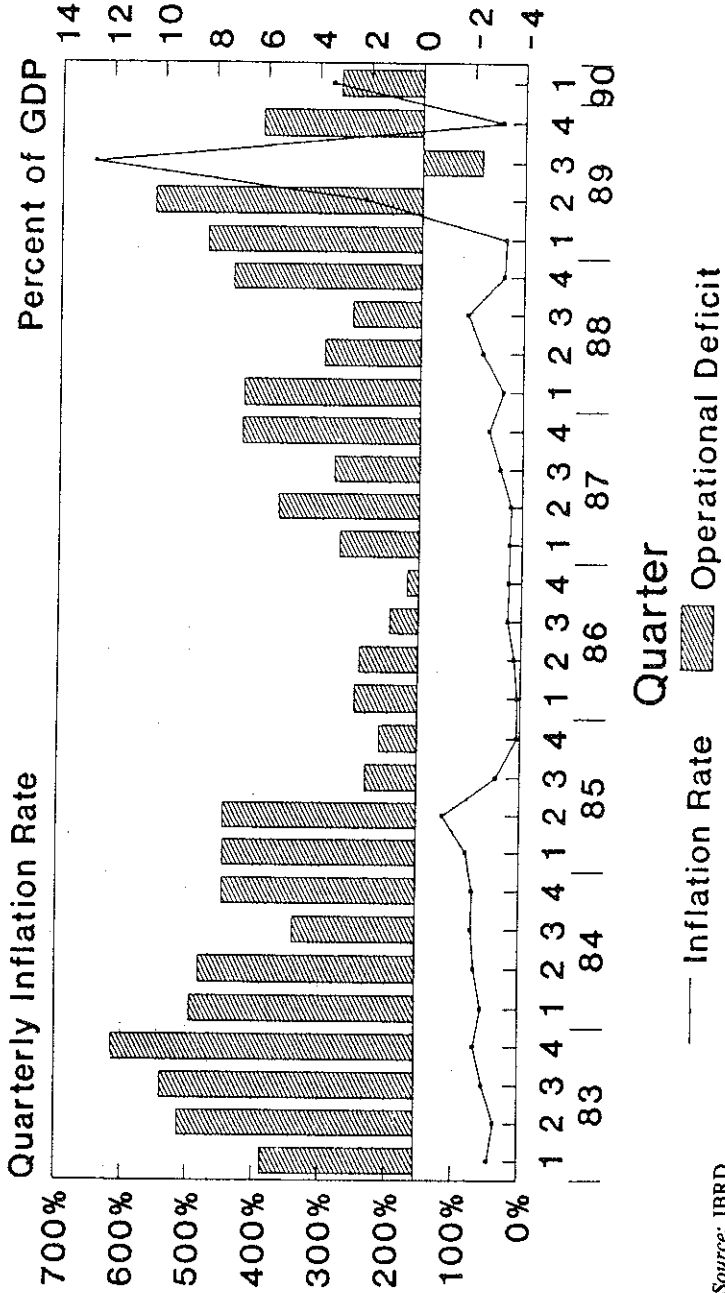
We present the operational deficit in Figure 1. Conventional deficit figures are not widely available because simultaneous knowledge of the conventional and real/operational deficits would reveal proprietary information about the Argentine debt structure. It is understandable that this information is generally unavailable to the public. As a result, we cannot give the degree to which the inflationary component of interest payments distorts the conventional deficit.[3] However, a comparison of the operational and zero inflation indices allows us to evaluate whether Olivera-Tanzi adjustments are warranted.

Figures 2 and 3 illustrate our calculation of the quarterly Olivera-Tanzi effect for Argentina during the period 1983-1990. Because of the prevalance of Olivera-Tanzi simulations in the literature, we stress that these figures have been calculated using the actual Argentine inflation rates and tax structure.[4] These calculations show that the difference

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3 Interested readers can write the author for a simulating using Argentine data or consult Zini (1991) for the Brazilian case. The point is that the importance of the interest rate adjustment is recognized and made.
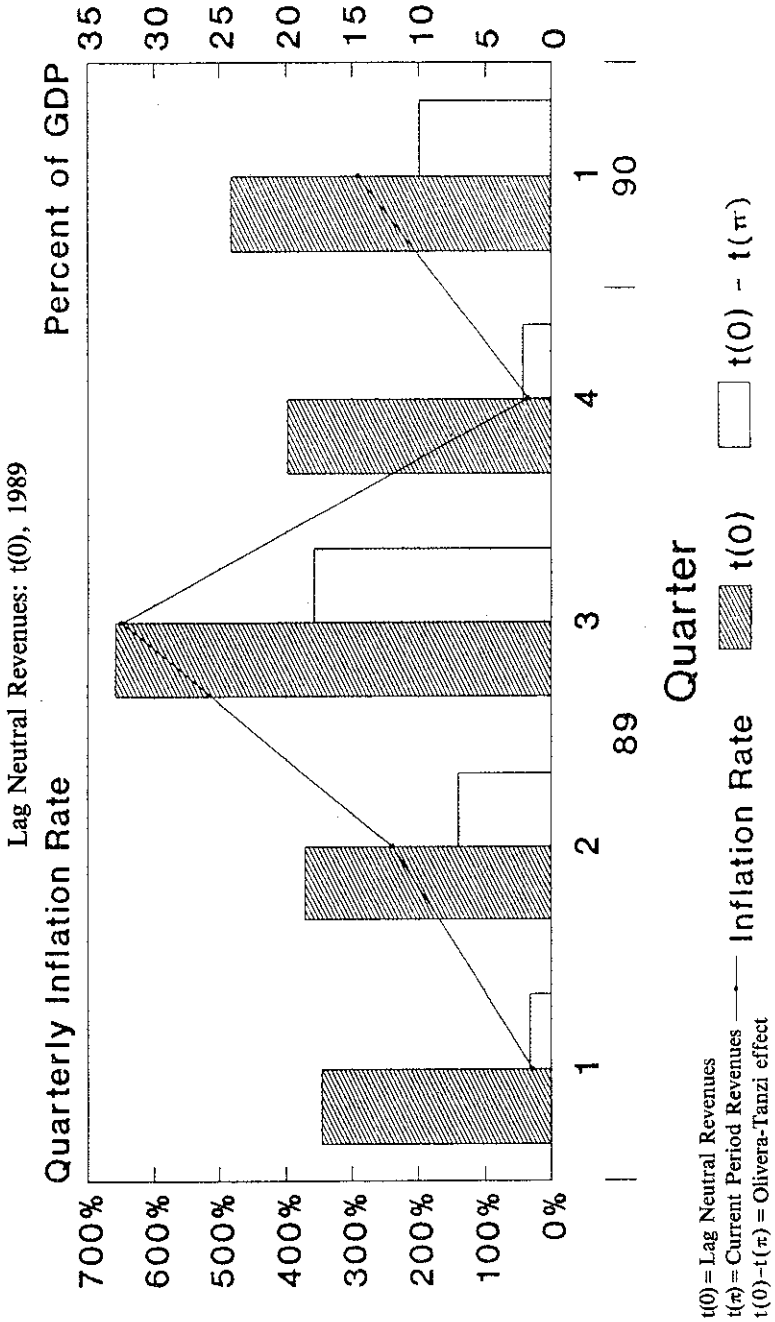
4 We use the average legel lag provided in Duran (1989). It ranged from 55 days in 1983 to 35 days in 1990. Since we are interested in a short-run measure, and the quarterly growth rate of real Argentine GDP is negligible, we have set the real growth rate equal to zero for all periods.

Figure 1

Operational Deficit Argentina, 1983-1990

Source: IBRD.

Figure 2

Lag Neutral Revenues: t(0), 1983-1989

t(0) = Lag Neutral Revenues
t(π) = Current Period Revenues
t(0)-t(π) = Olivera-Tanzi effect

Figure 3

Lag Neutral Revenues: t(0), 1989

t(0) = Lag Neutral Revenues
t(π) = Current Period Revenues
t(0)–t(π) = Olivera-Tanzi effect

between the inflation neutral tax base, $t(0)$, and actual tax revenues, $t(\pi)$, oscillates mainly between two and ten percent of GDP, and increases with the magnitude of the inflation rate. Just as the inflationary component of interest payments is large when the inflation rate is high, so is there a corresponding loss in tax revenue.

In Section III we argued that the operational deficit is a biased index of fiscal stance in inflated economies because it ignores the Olivera-Tanzi effect. Our calculations reveal that in Argentina this bias is substantial. In Figure 4 we compare the behavior of the operational deficit with that of the zero inflation budget, which recognizes the Olivera-Tanzi effect. The difference between the indices is marked. Under br_o the stance is contractionary only in 1989-3. When we use br_z, there are eight periods which are regarded as contractionary: 1984-3, 1985-2&3, 1986-3&4, 1988-3, 1989-3, and 1990-1. Moreover, the overall performance of Argentine fiscal policy is much tighter under the zero inflation budget. In this case, correcting for the inflationary distortion of revenues yields a more responsible pattern of fiscal behavior than that revealed by unadjusted figures. Yet even under "stabilized" revenues Argentine fiscal performance is characterized by long periods of deficit expenditure with isolated attempts at fiscal restraint.

Another benefit of the zero inflation budget is it recognizes that price controls may create the perception of fiscal contraction. When the inflation rate declines, the Olivera-Tanzi effect subsides, and current tax revenues converge to their inflation-free level, producing a "reverse" Olivera-Tanzi effect. For example, in the latter half of the 1980's Argentina attempted various heterodox stabilization policies which were initiated by an incomes policy. These incomes policies artificially reduce the rate of inflation by freezing wages and prices. Such price controls cause $t(\pi)$ to move toward $t(0)$ and br_o registers a fiscal contraction via the "reverse" Olivera-Tanzi effect.

This feedback does not occur with the zero inflation index. For example, in the third quarter of 1985 inflation "stabilized" from a quarterly rate of 115.1% to 36.0%. We find that this reduction in the inflation rate produced the expected "reverse" Olivera-Tanzi effect. Figure 5 illustrates that current period tax revenues, $t(\pi)$, increased by 6.55% of GDP while inflation neutral tax revenues, $t(0)$, increased by only 0.8% of GDP. Referring back to Figure 4, br_o shows a significant decrese in the deficit — one would infer a significant fiscal *confraction.* Yet under br_z the true picture shows a slight decrease in the surplus and therefore a marginal discretionary *expansion.* We see,
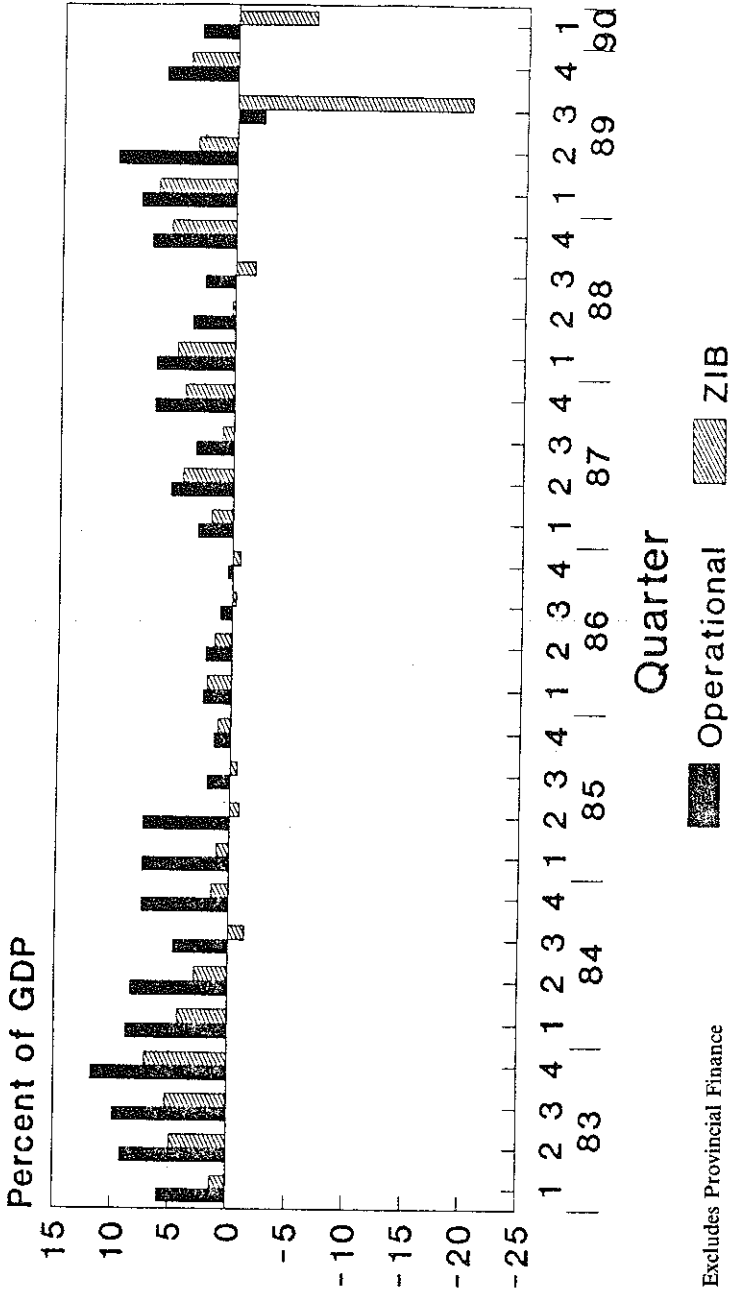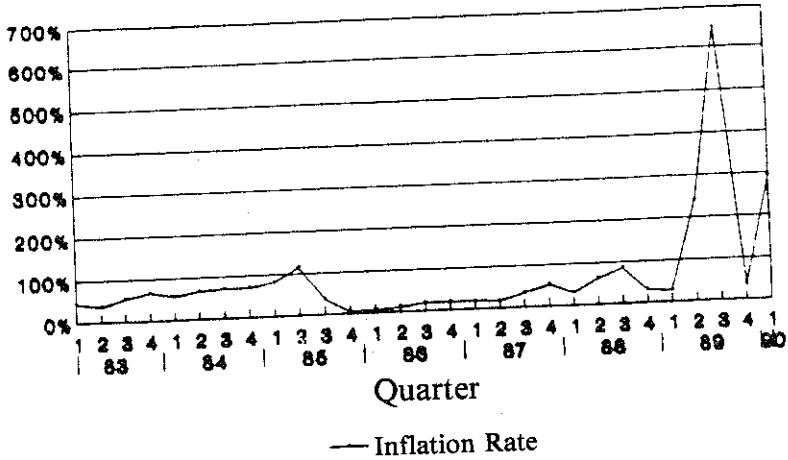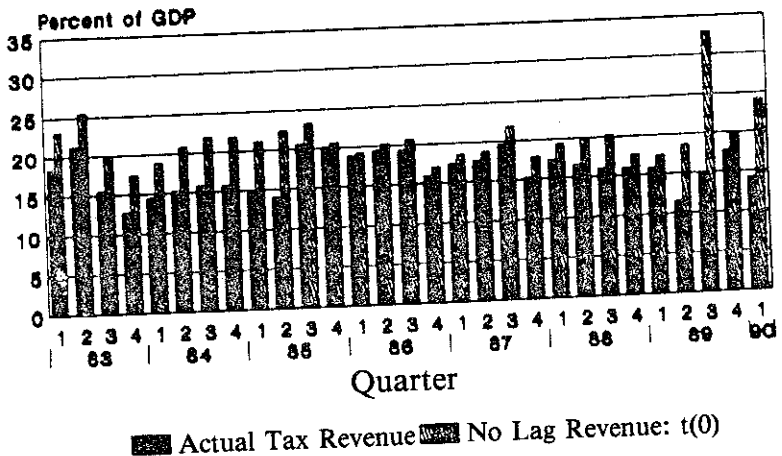
Figure 4

Comparison of Deficit Measures

Excludes Provincial Finance

Figure 5

Argentina

Quarterly Inflation Rate

Quarter

—— Inflation Rate

Tax Receipts
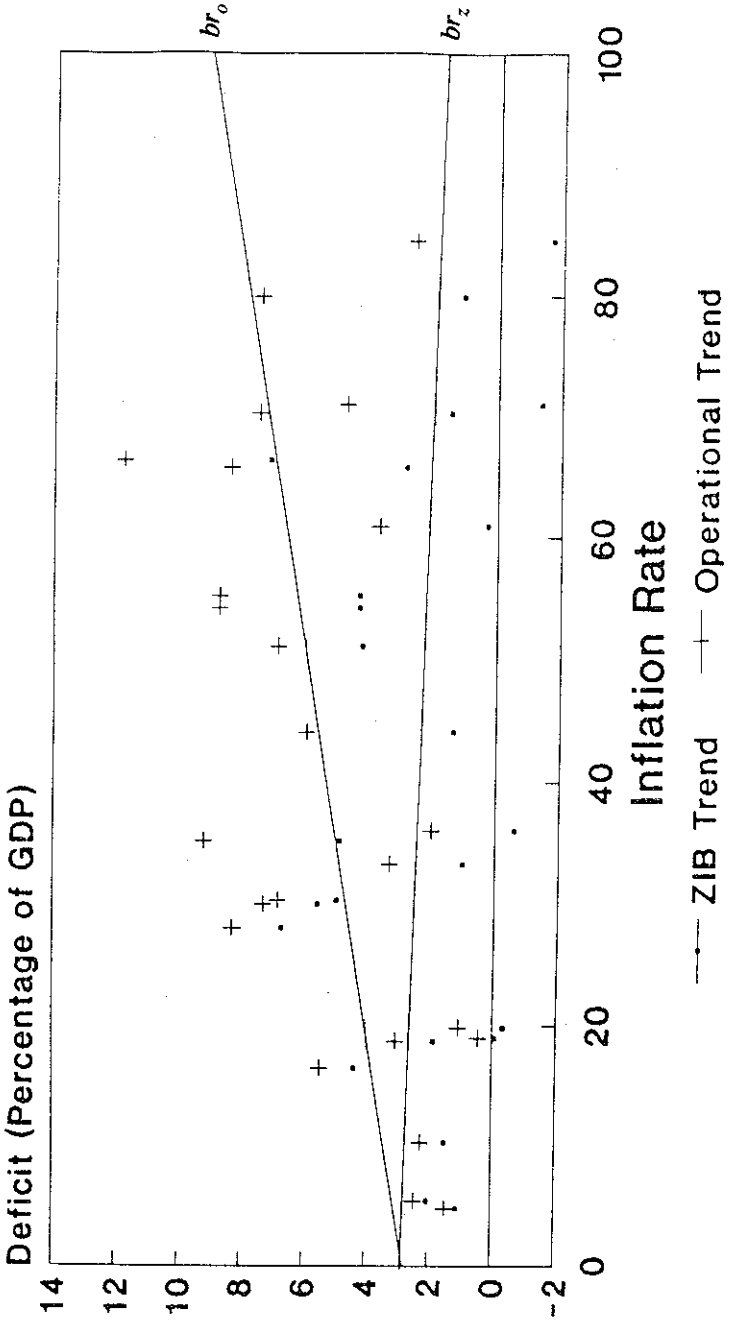

Quarter

▨ Actual Tax Revenue ▨ No Lag Revenue: t(0)

Excludes Provincial Finance

Figure 6

Budget Endogeneity

then, that the "reverse" Olivera-Tanzi effect does occur under br_o. These illusionary changes in current tax revenues were found in every possible period. For the case of Argentina this implies that little, if any, of the reductions in the deficit can be attributed to discretionary fiscal contraction.

Another way to depict the endogeneity present in the operational deficit is given in Figure 6. It shows that, relative to the operational deficit, the trend of the zero inflation budget is flat over a wider spectrum of the inflation rate. In fact, we must accept the hypothesis that the slope of br_z is zero.[5] As expected, when the inflation rate decrease, $t(\pi)$ approaches $t(0)$, and the two indices converge.

V. Conclusion

This paper introduces and estimates a measure of fiscal performance which identifies the discretionary component of public expenditure relative to the inflation rate. We call this new measure the zero inflation budget. The zero inflation budget purges the deficit of the effects of inflation on revenues and expenditure in the same way that output based measures such as the full employment budget adjust the deficit for variations in the level of output.

Moreover, the zero inflation budget reacts equally well to increases and decreases in the inflation rate. In particular, it recognizes how tax revenues increase as the level of inflation decreases, and does not allow this process to be measured as a fiscal contraction. The zero inflation budget is an inflation-free indicator of the need for austerity, and the degree to which fiscal contraction has taken place. Empirical tests using Argentine fiscal data confirm the zero inflation budget has these properties and is a superior index of fiscal performance under conditions of extreme inflation. As such, this index should be useful for assessing fiscal behavior in both the Latin American and Eastern European countries which are currently experiencing these economic conditions.

[5] The slightly negative slope observed is easily explained. We use fiscal data which excludes the quasi-fiscal deficit run by the Argentine Central Bank. The phenomenon is regarded as an extremely important determinant of the inflation rate for this period (Beckerman, 1990). In the latter half of our study the quasi-fiscal deficit reached critical mass, and its effect may have offset any effects of contractionary fiscal policy identified by the zero inflation budget. For example, in 1989-3 there is a zero inflation surplus. Yet in the same period Argentina experienced a hyperinflation. The quasi-fiscal deficit, then, can create some outlying br_z and inflation pairs, which, when plotted as they are in Figure 6, yield a slightly negative trend for the zero inflation budget.

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