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INFLATION AND POVERTY

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### ABSTRACT

This paper discusses the regressive nature of the inflation tax and the limited extent of its impact on those individuals below the poverty line. It also argues that inflation affects poverty mainly through its impact on real wages: the empirical evidence shows that wages increase more slowly than prices during episodes of rising inflation in Latin America. Finally the paper discusses whether some stabilization programs are less costly in terms of increased poverty than others. Both orthodox programs and attempts to reduce inflation by the implementation of incomes policy have not helped the poor in Latin America.

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This paper discusses the impact of inflation on redistribution and poverty. It focuses on the regressive nature of the inflation tax and the limited extent of its impact on those individuals below the poverty line. Although the inflation tax does not affect those individuals below the poverty line due to their negligible average cash holdings, it may wipe out the savings of the middle class and increase the number of poor. In this sense it widens inequality of income and increases poverty.

It also argues that inflation affects poverty mainly through its impact on real wages because nominal wages fail to increase as fast as prices in episodes of rising inflation rates. In the context of full employment there is no satisfactory explanation for partial indexation, but the empirical evidence shows that perfect indexation does not exist and that wages increase more slowly than prices during episodes of high inflation.

Finally it explores the impact on poverty of stabilization programs and discusses whether some programs are less costly in terms of increased poverty than others. Both orthodox programs and attempts to reduce inflation by the implementation of incomes policy in Latin America have not helped the poor.

## DOES INFLATION MATTER?

Bouts of inflation in the 1980s have revived economists' interest in populism. The recent literature<sup>1</sup> stresses the repeated willingness of Latin American regimes to push demand beyond economic constraints in an effort to improve the lot of all income groups simultaneously. The result is a set of unsustainable macroeconomic policies and the collapse of the economy. Workers wind up worse off than they were at the beginning of the populist period, but even before the collapse, inflation acceleration erodes real incomes.

Inflation increases poverty in two ways. First, the inflation tax can reduce disposable income. Second, if nominal wages increase less than the price of goods consumed by wage earners, workers' real income will decline.

This section uses Brazilian data to define and illustrate the inflation tax and to discuss its regressive effects. Then I move the focus to the impact of rising inflation rates on wages.

The Inflation Tax

The share of the inflation tax in GDP is defined as:

$$(1) \quad \tau_t = [\pi_t / (1 + \pi_t)] (h/y)_t$$

where  $h$  is the average between the monetary base of the current and the previous December;  $y$  is GDP, and  $\pi$  is the inflation rate.

To calculate the inflation tax we need to know the amount of real balances people hold. Figure 1 shows the ratio of the monetary base<sup>2</sup> to GDP in Brazil between 1970 and 1990. In 1970, after many years of inflation, this ratio was already low in comparison to other countries. But as inflation continued to increase, the monetary base/GDP ratio declined further. By 1985, the monetary base was equivalent to 2 percent of GDP. The fitted line in figure 1 (Period: 1970-1990, t-statistics in parentheses) is:

$$(2) \quad \log(h/y)_t = -1.4 - 0.18 \log \pi_t + 0.42 \log(h/y)_{t-1} + (0.58) \text{ dummy}$$

(- 3.46)
(2.84)
(4.71)

$R^2 = 0.94$ ; I use one dummy variable for the expected March 1990 Collor Plan which froze monetary assets in the banks; it is zero in all years except in 1989 and 1990.<sup>3</sup>

Figure 2 shows the inflation tax in Brazil. The fitted line was calculated by using the money demand equation estimated in (1). The shape of the curve which describes the inflation tax in relation to the inflation rate depends on how fast people react to an increase in inflation by reducing their real cash balances. In the short run, this reaction is captured by the coefficient of the inflation rate in equation (1), which I call  $\alpha$ . In the long run it is calculated as  $\alpha/(1-\beta)$ , where  $\beta$  is the coefficient of the lagged money/income variable. In the case of Brazil the long run elasticity of demand for the real monetary base in

relation to inflation is 0.4, that is, the ratio of the monetary base to income declines by 40 percent when inflation increases by 100 percent.

Figure 3 shows how the inflation tax differs depending on the elasticity of demand for real cash balances. The inflation tax also depends on the amount of real cash balances people want to hold when there is no inflation as illustrated in figure 4.

Two implications follow from this analysis. First, countries with the same inflation will exhibit different inflation tax revenues, depending on their money demand functions. Table 1 shows seigniorage<sup>4</sup> as a share of GDP and inflation rates for selected Latin American countries. Second, different groups within a country will pay an inflation tax which will erode different proportions of their income.

#### How Regressive Is the Inflation Tax?

The inflation tax is regressive because it wipes out the savings of the middle-income classes. But those, who were already poor before inflation started, pay an insignificant amount of their income as an inflation tax. How much income does the poorest quintile of the population lose in the form of an inflation tax? Almost nothing. The lowest quintile of the population has no savings and as long as they get paid weekly and the inflation rate remains below 100 percent per year, the inflation tax will amount to less than 1 percent of their income, even if they spread their expenditures evenly during the week. This is easy to show.

Assuming that a worker has no assets, gets paid weekly, and spreads his expenditures evenly during the week, his cash balances are equal to one half of his weekly income,  $y_w$ , and the inflation tax he pays weekly is:

$$(3) \quad r_w = 0.5 y_w (\pi_w / (1 + \pi_w))$$

where:  $\pi_w$  is the weekly inflation rate.

Since there are 52 weeks in one year, the ratio between the annual inflation tax and annual income is:

$$(4) \quad 52 [0.5 y_w (\pi_w / (1 + \pi_w))] / 52 y_w = 0.5 (\pi_w / (1 + \pi_w))$$

In general, as inflation accelerates, the wage payment period is reduced from once a month to once a week, and finally to daily payments during periods of hyperinflation. Table 2 shows the inflation tax as a share of income under the assumption that workers get paid monthly (column 4) or weekly (column 5) and spread their expenditures evenly during the period between payments.

As inflation increases, workers purchase virtually all their necessities as soon as they get paid, keeping enough cash for transportation if they cannot get their bus passes in advance. Table 3 shows what happens when they spend half their income on the day they get paid and the other half evenly during the rest of the period.

Assuming that the inflation rate is 20 percent per year, that workers get paid monthly, and that they spread their payments evenly during the month, workers would pay 0.75 percent of their annual income as an inflation tax. If inflation increases to 100 percent per year without any institutional changes the tax would increase to 2.8 percent of annual income. But if payments were changed to a weekly basis and workers changed their spending habits to those shown in table 3, the inflation tax would decline to 0.3 percent of income. When inflation reaches 1,000 percent per year, life gets tougher. Even with weekly payments and a change in spending habits, the inflation tax can eat 1 percent of workers' incomes. But this is peanuts compared to the decline they experience in their real wages, as will be discussed later.

Table 4 illustrates this argument by showing numbers for inflation, the share of the monetary base in GDP, and the inflation tax in Brazil. Between 1970 and 1980, the inflation rate increased from 20 to 100 percent. In response to the increase in inflation, the demand for real cash balances fell and the share of the real monetary base declined from 8.2 percent of GDP to 4.6 percent. The inflation tax increased from 1.4 to 2.3 percent of GDP. Some income groups lost more than 2 percent of their income in the form of an inflation tax, while others lost less. Wealthy citizens who reacted fast to inflation and had access to other forms of assets such as indexed deposits may not have paid as much. Neither did the very poor. The inflation tax paid by the lowest quintile of the population increased but remained negligible.



By 1990, inflation had increased to 2,700 percent and the inflation tax paid by the poor as a share of their income had risen to 1.5 percent. Compared to other taxes, the inflation tax remained small.

### Inflation and Real Wages

Inflation stabilization does not come without costs. It is usually associated with a recession which generally means more unemployment and lower real wages. But accelerating inflation also reduces real wages and increases poverty. This second effect dominated the scene in Latin America between 1977 and 1989.

Equation (5) was estimated using panel data for average real wages, average annual inflation rates, and average annual real growth rate, between 1977 and 1989, in seven Latin American countries (Argentina, Colombia, Costa Rica, Chile, Mexico, Peru, and Uruguay) for which average real wages are available for the whole period.<sup>5</sup> The regression uses seven country-dummies;  $w$  is real wage,  $\pi$  is inflation, and  $x$  is real GDP growth rate per year.

$$(5) \quad \log(w) = 2.16 - 0.14 \log(\pi) + 0.15 \log(1+x)$$

$$\quad \quad \quad (- 8.22) \quad \quad \quad (0.53)$$

$$R^2 = 0.57$$

t-statics in parentheses, 98 observations.

Included in the regression are countries with very high

and variable inflation rates, such as Argentina and Peru, and countries with relatively stable and low rates, such as Colombia. In many countries, there are years during which real wages declined with inflation in response to stabilization programs. But the effect of falling real wages during periods of rising inflation totally dominates other influences. According to equation (3), real wages fall by 14 percent when inflation doubles. Figures 5-9 show episodes of rising inflation and declining real wages in Argentina, Costa Rica, Mexico, Peru, and Uruguay.

The careful study of poverty in Argentina by Morley and Alvarez (1991) confirms the importance of a decline in real wages as a determinant of poverty growth in Argentina.<sup>6</sup> The percentage of people in poverty in Greater Buenos Aires increased from 6 percent in 1980 to 11 percent in 1986, and to 22 percent in 1989 (Table 5). Morley and Alvarez's sectoral and occupational decomposition of the aggregate poverty indices in Table 5 show the rising headcount ratio within industry and occupation of production workers. The authors conclude that in the 1989 Argentine recession, poverty increased because real wages went down for working people in both the formal and informal sector and in part also because retirement incomes and transfers were inadequately indexed for inflation. They do not find unemployment per se as a significant additional source of poverty in the 1980s in Argentina.

The costs of inflation for wage earners also include oscillations in their real income. Figure 10 shows the real minimum wage

in Brazil, between 1975 and 1991, and it illustrates the shortcomings of indexation. For individuals who are liquidity constrained, the significant oscillation in their real wages means that they cannot smooth consumption or that their real disposable income will be eroded if they try to carry cash from one month to the next.

#### THE IMPACT OF STABILIZATION ON POVERTY

Just as populism stands for the false dream that growth per capita can exceed productivity growth, the question as to whether the poor suffer from adjustment programs poses a misleading dilemma. Clearly adjustment programs, which call for a reduction in government expenditures and devaluations, reduce real income and increase unemployment in the short run. But adjustment is unavoidable in most cases and the decline in welfare observed during adjustment programs derives in good measure from conditions that existed preceding these programs: declining terms of trade, reduced external finance, increased debt service costs, and unsustainable deficits.<sup>7</sup> Nonetheless, one must ask whether some programs are less costly in terms of increased poverty than others.

The answer to this question can be found by weighing the costs of successful stabilization programs which did not make use of incomes policy compared with those which did. The answer may differ for moderate versus high inflation stabilization.

Dornbusch and Fischer (1991) suggest that seigniorage plays at most a modest role in the persistence of moderate inflations

which are mainly explained by inertia. Such inflation can be reduced only at a substantial short-term cost to growth. They examine four cases and conclude that "there is unfortunately little encouragement in these case studies for the view that an exchange rate commitment, or incomes policy, allows a country to move at low cost from moderate to low inflation."<sup>8</sup>

What can be concluded by comparing four cases of high inflation stabilization? Chile in 1974-76 and Bolivia in 1985-86 are examples of countries that succeeded in bringing down inflation without using incomes policy as a central policy instrument. Brazil in 1964-65 and Mexico in 1988-89 are examples of countries where incomes policy was successfully used to stop inflation.

Unemployment and poverty increased significantly in Bolivia and Chile (Table 6) during the stabilization years, but both programs coincided with a dramatic fall in these countries' terms of trade, which in part explains the severity of the recessions and the increase in poverty they suffered.

In Brazil (1965) and in Mexico (1988), although the recession accompanying inflation stabilization was less pronounced than in Chile (1974-75) and Bolivia (1985-86), there is no evidence that incomes policy helped the poor. In Brazil, the concentration of income in the 1960s resulted largely from policies restraining nominal wages during the stabilization program. In Mexico, the so-called social pact was only used after five years of recession and a dramatic decline in real wages. The

Mexican government has not yet made available the 1989 household income-expenditure survey, but there is reason to suspect that the poor in 1989 were not any better off than in 1984 (Table 7).

In Brazil (with incomes policy) and in Chile (without incomes policy), stabilization was forced on wage-earners by a military dictatorship. In Bolivia (without incomes policy) and in Mexico (with incomes policy), an elected government had clout over unions. In dictatorships or democracies, with or without incomes policy, political compromise is essential to balance budgets and stop high inflation. Workers' claims to higher wages have to be restrained; entrepreneurs have to accept lower profits; taxpayers have to bear additional obligations. Moreover, even dictatorships must have the ability to develop institutions for concerted action against inflation if their programs are to succeed. In the four cases under discussion, stabilization was imposed by a technocratic elite which had the support of important segments of society and which was able to develop institutions to sustain disinflation.

Even in well conceived adjustment programs, the poor are especially hard hit by the transition costs. The poor have less room to cope with the radical policy moves which produce sectoral dislocation of resources and employment. Changes in relative prices, unemployment, and reduction of social expenditures will hurt the poor. Incomes policies do exist which, in principle, would help a more equitable stabilization program, but the success of these policies requires that the government be

accepted as legitimate by the relevant social actors and that organized labor, industrialists, and politicians have a reasonably compatible strategy.

Solutions which appear to be under government control (such as the Austral Plan in Argentina or the Cruzado Plan in Brazil) but lack macroeconomic consistency will fail. There is nothing worse for poverty than failed stabilization programs that lead to rising inflation and further recession. During the 1980s Argentina suffered from two serious recessions interrupted in 1986 by a short and shallow recovery. By the late 1980s recession and hyperinflation came together in a powerful stagflation. Argentina, with only 6 percent of its population in poverty in 1980, saw that number increase to 20 percent because of its erratic macroeconomics (Table 5).

In Brazil, the same disastrous combination of inflation and failed attempts at stabilization also led to no progress on the fight against poverty. Table 8 shows the headcount, the normalized income gap, Foster, and Sen indices for Brazil between 1960 and 1988. The poverty line is set at approximately one real minimum wage.<sup>9</sup>

The figures are telling. Between 1960 and 1970, the headcount index shows that poverty in Brazil remained unchanged despite annual income growth per capita in excess of 3 percent. The lack of progress on the poverty front resulted from the worsening of income distribution in the 1960s: real wages of skilled labor increased while

real wages of non-skilled labor fell. The decline in the real wages of the poor was primarily a result of the rise in inflation before 1964 and of the mid-1960s recession.<sup>10</sup> The income share of the poorest 40 percent of the population fell from 16 percent in 1960 to 13 percent in 1970. In 1970, approximately 40 percent of the population was poor.

During the 1970s, a period of rapid economic growth, the headcount was reduced by nearly half, despite a further decline in the share of income going to the poorest 40 percent of the population. It is also notable that the Sen index in 1980 also fell to half of its value in 1970. The decline in the Sen index may derive from a large number of poor moving above the poverty line and thus from a change in the weights of poverty gaps and not from a reduction of disparity among the poor.

From 1981 to 1983, all poverty indices in Brazil increased. Rocha (1990), Fox and Morley (1991), and Ravallion and Datt (1991) offer detailed studies of the relationship between the 1982-83 recession and the increase in poverty.

Having argued that inflation, stabilization, and adjustment are costly, I must accept that the only consistent alternative open to governments is the maintenance of conservative macroeconomic policies. On these grounds, the Colombian example stands out.

The eclectic Colombian system used exchange controls but avoided the extreme protectionism of other Latin American countries; its crawling peg kept the exchange rate at reasonable levels and the

government avoided inflationary finance. By stimulating housing construction and exports other than coffee, Colombia experienced sustained growth and avoided the spectacular crises found elsewhere in Latin America. Long run data from the turn of the century to 1988 shows a Kuznets-type of U-shaped curve for Colombia, with a sharp deterioration in income equality up to the 1960s and improvement since then.<sup>11</sup> The dominant factors at work have been a shift of the labor force from agriculture to industry, broader access to formal education, and demographic changes. Education's role in determining the distribution of income was perhaps more important than macroeconomic policy. Evidence from the 1970s also indicates that the wages of agricultural workers increased faster than national income, while wages of lower-income urban workers grew faster than wages of higher-income urban workers and salaries of white-collar employees. At the same time, the tax system was slightly progressive in the 1960s, and was more so after the reforms of 1974-75. The income of the first decile was twice as high after taxes and government transfers, while the income share of the top decile was reduced. A recent survey by the Colombian Ministries of Planning and Agriculture shows that the incidence of poverty among rural families fell from 52 percent to 32 percent over the period 1978-88.

In both the 1970s and the 1980s, education, health, and public services such as water, electricity, and welfare programs substantially raised standards of living among low income families. During



the period from 1973 to 1985, the share of rural households with access to electricity rose from 15 to 41 percent, and rural illiteracy fell from 29 to 23 percent. Although rural income distribution remained strikingly unequal as of 1988, the productivity gap between small farmers and large producers had dramatically decreased as a result of government efforts to channel resources for modernization into the campesino sector.

Liuksila (1991) estimates that the initial negative impact of the adjustment program of 1985 was largely cushioned by action on the minimum wage and by the exemption of food from the 8 percent import surcharge. By 1986, under the influence of the coffee boom, real wages had recovered as had growth and employment.

Nonetheless, serious problems of poverty have persisted throughout this period of sustained economic growth and social change. Income distribution remains skewed with incomes of the top 20 percent of households six to seven times that of the bottom 20 percent. Moreover, gains in the social indicators hide the sharp differences in health and education among rich and poor. The predicament of landless peasants remains unchanged, although it is overshadowed by the conditions of the urban poor found in growing numbers in city slums.

Progress has been slow. The very poor cannot gain from neutral growth because they start from a very small base. They need poverty programs. Increased taxation might prove indispensable to finance such programs, unless governments can rely on revenues from privatization.

### Poverty Programs

Given the extent of poverty in Latin America any program will need to combine policies that allow the poor to increase current consumption with investment to generate future growth of their income. These policies must consider the links among income, health, and education, and give special emphasis to female education, given the evidence that women's education has a strong positive effect in reducing fertility rates and reducing child mortality.<sup>12</sup>

A first step in undertaking poverty programs is to carry out a household income-expenditure survey. These surveys already exist in many Latin American countries and the World Bank's Living Standards Measurement Study unit has quickly carried out surveys on personal computers. Grootaert and Marchant (1991) provide guidelines for identifying target groups and monitoring policy.

Second, one must look for successful programs and determine their relevance to other countries and situations.<sup>13</sup> In Latin America, which policy initiatives are known for efficient targeting and competent delivery of social services? Are there successful emergency programs after stabilization? Recent discussion has focused on programs developed in Bolivia, Mexico, and Chile.

### Bolivia

In Bolivia, the economic crisis of the 1980s exacerbated deep-rooted poverty problems and prompted the government to launch the Emergency

Social Fund (ESF) to cushion the adverse effects of the 1985 stabilization and adjustment program. The ESF aimed at providing temporary employment opportunities and bolstering basic social services. The staff of the ESF approved or rejected funds requested for small-scale, labor-intensive projects that came from local governments or non-governmental agencies. The ESF closed its operations on March 1991 with 3,269 projects (US\$191 million) completed.

Newman et al. (1991) estimate that the average ESF worker received a 32 percent increase in weekly earnings over what he would have earned if he were working in the absence of the ESF. The demand-driven emergency program (the agency did not propose any projects itself) helped lessen the hardships of unemployment during adjustment. This program also achieved notable success in establishing relationships with non-governmental organizations (NGOs). Nonetheless, poverty alleviation in Bolivia still requires greater effort and targeting. To this end, the government started the Social Investment Fund in 1991.

#### Mexico

In response to the 1982 crisis, a restrictive demand policy and sweeping reforms took place in Mexico. Between 1982 and 1988 the cumulative growth per capita was negative and the real minimum wage fell by one-half. For most of the 1980s, social spending was held hostage to Mexico's dire economic problems. Throughout the adjustment period, there was a substantial deterioration in social conditions. Real per capita

expenditures in the social sectors fell by about 7 percent per year, and public investment in rural and regional development dropped by 80 to 90 percent in the 1980s.<sup>14</sup> In the short-term, the decade long recession combined with free-market reforms and cuts in social expenditures have exacerbated Mexico's highly unequal income distribution.

President Carlos Salinas' answer was the Solidarity Program (Programa Nacional de Solidaridad, Pronasol), initiated in December 1988, covering programs on health, education, nutrition, housing, employment, and infrastructure. The broad participation of the program's beneficiaries is sought in setting priorities: the program sharply raises the stake that villagers and townspeople have in the projects. Solidarity pays for materials, but families who share a school or street oversee the project as well as its budget, and build the project themselves with technical advice. The program built almost 1,200 health centers in 1989-91, paved roads, laid sewer lines, refurbished schools, installed drinking-water systems, and distributed rural credit. Its political impact helped the ruling party to win mid-term elections in August 1991.

The ideas behind Solidarity coincided with the decentralization of social services sponsored by foreign aid experts. The World Bank will lend \$350 million for a regional development program under the auspices of Solidarity. The program targets the poor and indigenous producers in the states of Chiapas, Guerrero, Hidalgo, and Oaxaca. The project has three components: investment, institutional development, and

environmental and archeological site protection. Recently approved projects on basic health, primary education, and nutrition complement the regional investment programs. Migration from the poorest areas to growth poles will continue to take place, but unless those who leave have acquired some human capital, they will just swell the number of unskilled workers in the slums of the great cities. This is why the government intends to provide special assistance to the underdeveloped states.

The social situation in Mexico is overshadowed by a decade of dramatic decline. Only three years old, the Solidarity program has not been able to erase the scars left by the recession of the 1980s. But the substantially funded program is making its mark, even though it is still too early to evaluate Solidarity's impact on poverty.

### Chile

Recent social policies in Chile and their impact on poverty are controversial. Not surprisingly the democratic opposition to the military regime charged severe neglect on the social front, aggravating an already poorly performing economy until 1984. In 1987, the percentage of Chileans households in poverty had more than doubled from 6 percent in 1970 to more than 13.5 percent in 1987 (Table 5). Income distribution inequality also increased dramatically and the Gini index was 0.63 in 1989.

Protagonists of the military regime, by contrast, show evidence of improvement in living standards as measured by social indicators. Reduction of infant mortality is extraordinary in comparison

to other countries in Latin America, even if such achievement represents the continuation of a long term trend (Figure 11).

The debate remains open. The questions surround two issues. One is the interpretation of a range of social indicators (Tables 5 and 9). The other is how to understand the change in indicators: were they driven by macroeconomic developments or by social policies?

Between 1974 and 1989, social policies targeted the poor avoiding spill-overs to the middle class. Moreover, the private sector was assigned an enhanced role in providing social services and an effort was made to use market mechanisms in the distribution of services.

Castaneda (1991), a strong supporter of these reforms, provides a careful explanation of the decentralization measures undertaken in education, health, and housing. Chile also privatized its national pension fund in 1981. Under the prior system, workers, firms, and the state paid into a common fund administered by the state. Benefits bore little relationship to contributions, which failed to accumulate in value. Under the new system, private firms collect payments, manage funds, and supervise distributions. Pensions have increased markedly. At the same time, payments to the disabled and to widows and orphans are more than twice their previous level. Castaneda believes that overall the results of the reforms were highly positive. He uses broad social indicators (such as the decline in infant mortality) to support this view.

Coleccion Estudios Cienplan (1991) and Mideplan (August 1991) develop the opposite view. They observe that government expenditures

were cut. Even though the share of social expenditures in total expenditures increased significantly, the share of social expenditures in GDP remained barely constant (Table 10). The increase of this share in the mid-1980s is due to the following: with the reform of the pension fund, the government remained in charge of the retirees of the old system. Payments to retirees caused a fourfold increase of expenditures in this area which was included in total social spending. This explains most of the increase in real social expenditures per capita during the 1980s after the severe cuts in 1974-79 (Figure 12).

Meller (1991) argues that the adjustment measures of the 1980s were regressive even though the government was successful in targeting social expenditures toward the very poor. The authorities provided generous subsidies to dollar debtors while reducing subsidies to the unemployed.

Poverty in Chile undoubtedly increased during the military regime because of the deep recession in 1974 and 1983. Until the last household survey in 1987, the economic recovery had not been enough to improve the lot of the low income groups. Social expenditures became better targeted and in this sense became more efficient. But social programs remained too modest to counteract the effects of unemployment which remained high until 1988. On assuming power in 1990, the new democratic government significantly increased the social effort. The new government supports the view that good macroeconomic policies complemented

by a safety net of well-designed social programs are essential for poverty alleviation.



## FOOTNOTES

<sup>1</sup> See, for instance, Dornbusch and Edwards (1991).

<sup>2</sup> Average annual monetary base calculated as the average of the base in December of the current year and the base in December of the previous year.

<sup>3</sup> The regression implies a money demand of the form:

$$(N.2) \quad h/y = A/(r+\pi)^\alpha,$$

where A is a constant and the real interest rate, r, was assumed to be irrelevant. With  $r \neq 0$ , this functional form implies that government revenue from seigniorage always increases with inflation. With  $r=0$ , seigniorage revenue is maximized when  $\pi = (1-\alpha)/\alpha$ .

<sup>4</sup> The revenue from money creation is called seigniorage. When inflation is constant and income growth is zero, the seigniorage revenue is equal to the inflation tax.

<sup>5</sup> The wage data is compiled by Cox Edwards (1991). Unfortunately, Brazil and Bolivia, which suffered from extreme inflation in the 1980s, do not have data for aggregate average wages. Bolivia's real minimum wage shows a strong negative correlation with inflation, but minimum wages are set by the government and minimum wage slow growth might simply reflect an attempt to reduce inflation. I also do not know whether the minimum wage legislation was effective or not. In the case of Brazil, there is data for average industrial wages in Rio de Janeiro and Sao Paulo. Between 1977 and 1980, average real wages and inflation are positively correlated because of strong growth and adequate indexation. Between 1986 and 1990, when

inflation speeds up, real wages in Rio fall. In Sao Paulo they oscillate with industrial employment.

<sup>6</sup> We must treat poverty measures with caution, as definitions and methods of measurement differ significantly. Indices of poverty are based on a broad indicator of economic resources. An individual is defined as poor if his total consumption (or total income) falls below a specified level. An extensive literature proposes a variety of indices which measure poverty on a scale of zero to unity. The most simple procedure is to count the number of poor and calculate the percentage of the population belonging to this category (the headcount). Another popular index is the normalized poverty gap, which is equal to the aggregate income short-fall of the poor as a proportion of the poverty line, divided by population. Sen rejects this measure as insensitive to the inequality among the poor and he proposes that the poverty gap be weighted by the person's rank in the ordering of the poor. His measure can be expressed as a combination of the headcount index, the income gap, and the Gini measure of inequality among the poor (exact definition in Table 8, notes). Finally, the Foster-Greer-Thorbecke's widely used measure (hereafter the Foster index) is based on the sum of squared proportionate poverty gaps. It is similar to the normalized poverty gap but it attaches greater weight to the income gaps of the poorest individuals (exact definition in Table 5, notes).

<sup>7</sup> On the welfare costs of stabilization and adjustment see, for instance, Helleiner (1989), International Monetary Fund (1986), The World Bank Economic Review (1991), and World Development (1991).

<sup>8</sup> Dornbusch and Fischer (1991), pp.64-5.

<sup>9</sup> For the specification of poverty lines on which the measures shown in Table 8 are based, see the notes in the same table and sources.

<sup>10</sup> Brazilian income distribution has been the subject of extensive literature. Cardoso and Helwege (1992) offer a brief review and references. For a recent collection of essays on income distribution in Brazil, see Camargo and Giambioni (1991).

<sup>11</sup> See Londono (1989), Moreno (1989), and Urrutia (1985).

<sup>12</sup> See Herz (1991).

<sup>13</sup> World Bank (1992) provides an abundance of examples. See also Pfefferman (1991).

<sup>14</sup> For an evaluation of the social impact of adjustment see Lustig (1991a).

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Table 1: Average Seignorage as Percent of GDP and Average Inflation Rate per Year  
Selected Latin American Countries

	Seignorage/GDP (Percent) 1965-1989*	Inflation Rate (Percent per Year) 1965-1989
Argentina	4.2	284
Bolivia	2.9	561
Brazil	2.3	147
Chile	3.7	83
Colombia	2.1	19
Dominican Republic	1.6	12
Ecuador	1.8	19
Honduras	0.8	6
Mexico	3.1	34
Paraguay	1.9	13
Peru	3.6	205
Venezuela	1.5	12
Average	2.5	116

\*Periods covered are generally 1965-89, but vary depending on data availability.

Source: Easterly, William and Klaus Schmidt-Hebel, The Macroeconomics of Public Sector Deficits, Working Paper WPS 775, World Bank, Washington D.C.: October 1991, Table 3.1, p.46, and International Monetary Fund, International Financial Statistics.

Table 2: Inflation Rates and Corresponding Inflation Tax as Share of Income for a Person Holding One Half of his Monthly (or Weekly) Income as Cash (Percent)

Inflation per Year $z$	Inflation Per Month $z_m$	Inflation Per Week $z_w$	Inflation Tax/Income Monthly Regime $0.5[(\pi_m/(1+\pi_m))]^*$	Inflation Tax/Income Weekly Regime $0.5[(\pi_w/(1+\pi_w))]^{**}$
3	0.25	0.06	0.12	0.03
5	0.41	0.09	0.20	0.05
20	1.53	0.35	0.75	0.18
30	2.21	0.51	1.1	0.25
50	3.44	0.78	1.7	0.39
100	5.94	1.34	2.8	0.66
500	16.10	3.51	6.9	1.69
1,000	22.10	4.72	9.1	2.25
0,000	46.90	9.28	16.0	4.25

$\pi_m = z_m/100$   
 $\pi_w = z_w/100$



Table 3: Inflation Rates and Corresponding Inflation Tax as Share of Income for a Person Holding One Fourth of his Monthly (or Weekly) Income as Cash (Percent)

Inflation Per Year z	Inflation Per Month z <sub>m</sub>	Inflation Per Week z <sub>w</sub>	Inflation Tax/Income Monthly Regime 0.25[(π <sub>m</sub> /(1+π <sub>m</sub> ))*]	Inflation Tax/Income Weekly Regime 0.25[(π <sub>w</sub> /(1+π <sub>w</sub> ))]**
3	0.25	0.06	0.06	0.01
5	0.41	0.09	0.10	0.02
20	1.53	0.35	0.38	0.09
30	2.21	0.51	0.54	0.13
50	3.44	0.78	0.83	0.19
100	5.94	1.34	1.40	0.33
500	16.10	3.51	3.47	0.85
1,000	22.10	4.72	4.53	1.13
10,000	46.90	9.28	8.00	2.12

\* π<sub>m</sub> = z<sub>m</sub>/100

\*\* π<sub>w</sub> = z<sub>w</sub>/100

Table 4: Inflation and Inflation Tax  
Brazil, 1970-1980  
(Percent)

	1970	1980	1990
Inflation (percent per year)	20.0	100.0	2,700.0
Monetary Base <sup>a</sup> /GDP	8.2	4.6	2.3
Monetary Base Held by the Lowest Quintile as a Share of Their annual income <sup>b</sup>	0.5	0.5	0.5
Inflation Tax Paid by the Lowest Quintile as a Share of Their Income <sup>c</sup>	0.1	0.3	1.6
Inflation Tax Paid by the Lowest Quintile as a Share of GDP <sup>d</sup>	0.002	0.008	0.04
Inflation Tax/GDP, Paid by 80% of population <sup>e</sup>	1.4	2.3	2.3
Total Inflation Tax/GDP	1.4	2.3	2.3

<sup>a</sup> average during the year

<sup>b</sup> under the assumption that workers get paid weekly, spend half their weekly payment on the same day, and the other half evenly through the week, their cash balances as a share of their annual income is  $(0.25 y_w / 52y_w) = 0.25/52 = .005$ .

<sup>c</sup> calculated as:  $0.25 \pi_w / (1 + \pi_w)$ , where  $\pi_w$  is the weekly inflation rate (see table 6).

<sup>d</sup> the inflation tax/GDP paid by the lowest quintile is equal to the inflation tax paid by the lowest quintile divided by their income and multiplied by the share of their income in total income.

<sup>e</sup> 80 percent of the population receives 97.6 percent of total income. the lowest quintile receives 2.4 percent of total income.

Sources: Conjuntura Economica, Instituto Brasileiro de Geografia e Estatística, author's calculations.

Table 5: Poverty Indices for Greater Buenos Aires  
1980-1989

	Headcount	Normalized Income Gap	Foster Index
1980	.063	.018	.007
1986	.109	.033	.016
1989	.215	.081	.043

The income gap of person  $i$  with income  $y_i$  is  $g_i = z - y_i$ , where  $z$  is the poverty line. The headcount is  $H = q/n$ , where  $q$  = number of people with  $y_i < z$  and  $n$  = total population size. The normalized income gap is  $\sum(g_i/z)/n$  for  $g_i > 0$ . The Foster index is  $\sum(g_i/z)^2/n$ .

Source: Samuel Morley and Carola Alvarez, "Recession and the Growth of Poverty in Argentina," Interamerican Development Bank: mimeo, preliminary, November 1991.

Table 6: Percentage of Households in Poverty in Chile, 1970-1987  
 (The Poverty Line Is Approximately \$1,000 of 1987 per year  
 per Household of Four Members)\*

	Headcount (percent)	
	1970	1987
Urban	3	13.0
Rural	11	15.7
Total	6	13.5

\* This poverty line corresponds to the cost of a food basket estimated at \$21.71 per head per month in urban areas and \$16.73 per head per month in rural areas.

Source: CEPAL, "Una Estimacion de la Magnitud de la Pobreza en Chile," Coleccion Estudios Cieplan, 31, March 1991, pp.107-129.

Table 7: Poverty Indices  
 Mexico, 1984  
 Poverty Line Approximately \$200 (of 1984) per capita, per year\*

	Headcount	Normalized Income Gap	Foster Index
Rural	0.37	0.12	0.06
Urban	0.10	0.02	0.01
Nacional	0.19	0.06	0.03

\* Corresponds to the cost of a diet which provides 2,083 calories and 35.1 grams of protein, as recommended by Coplamar, Macroeconomía de las Necesidades Esenciales en México: Situación Actual y Perspectivas al Año 2000, Siglo XXI, Mexico City: 1983.

Source: Santiago Levy, Poverty Alleviation in Mexico, WPS 679, World Bank, Washington D.C.: May 1991.

Table 8: Household Poverty Indices

Brazil, 1960-1988

Poverty Line: Approximately One Minimum Wage per Household\*

	Headcount			Normalized	Foster	Sen
	a	b	c	Income Gap	Index	Index
				c	c	b
1960	0.414					
1970	0.393	0.422				0.265
1980	0.244	0.219				0.128
1981			0.265	0.101	0.050	
1983	0.419		0.321	0.131	0.068	
1985			0.262	0.099	0.048	
1986	0.284					
1987	0.359		0.242	0.095	0.048	
1988	0.393		0.265	0.107	0.056	

Sources: a Mauricio Costa Romao, "Distribuicao de Renda, Pobreza e Desigualdades Regionais no Brasil," in Jose Camargo and Fabio Giambiagi, editors, Distribuicao de Renda no Brasil, Paz e Terra, Rio de Janeiro: 1991, Table 8, p.115; b Helga Hoffmann, "Poverty and Prosperity in Brazil," in Edmar Bacha and Hebert Klein, editors, Social Change in Brazil, 1945-1985, University of New Mexico Press, Albuquerque: 1989, tables 6.8 and 6.9, p. 217; c Ravallion, Martin and Gaurav Datt, Growth and Redistribution Components of Changes in Poverty Measures, LSMS Working Paper No.83, World Bank, Washington D.C., 1991.

\*Notes: The three sources use approximately one fourth of one minimum wage per capita corrected for inflation as the poverty line for a household: a Romao (1991) specifies the cost of a food basket for different regions of the country (approximately half the minimum wage) and uses a different multiplier for each region ranging between 1.5 and 2.05. The poverty line for the country is equivalent in 1986 prices to 0.885 of the minimum wage of September 1986; b In Hoffmann (1989), the poverty line is equivalent to the minimum wage in August 1980; c In Ravallion (1991), the poverty line is a household income per head of one quarter of the minimum wage (one minimum wage for family of four) adjusted for inflation using the consumer's price index for a low-income consumption bundle.

The Sen index is  $H(1-(1-I)[1-G(q/(1+q))])$ , where  $I = \sum g_i/qz$  and  $G = 1 + (1/q) - ((2/q^2m) \sum [y_i(q+1-i)])$ , for  $y_i < z$  and  $m =$  the mean income of the poor.

Table 9: Social Indicators in Chile  
1960-1990

	Infant Mortality (per thousand live births)	Life Expectancy (at birth, in years)
1955-1960	115	
1960-1965	106	58
1965-1970	88	61
1970-1975	67	64
1975-1980	44	67
1980-1985	24	71
1985-1990	19	71

Source: Ministerio de Planificación y Cooperación de Chile (Mideplan), Departamento de Planificación y Estudios Sociales, Evolución de las Políticas Sociales en Chile, 1920-1991, Mideplan, Santiago de Chile: August 1991.

Table 10: Social Expenditures in Chile  
1955-1990  
(Percent)

	Social Expenditures/ GDP	Social Expenditures/ Total Government Expenditures
1955	6.0	31.7
1960	8.6	39.6
1965	10.0	45.2
1970	10.5	42.5
1975	10.3	36.0
1980	10.3	37.1
1985	15.1	57.0
1990	10.7	65.2

Source: Ministerio de Planificacion y Cooperacion de Chile (Mideplan), Departamento de Planificacion y Estudios Sociales, Evolucion de las Políticas Sociales en Chile, 1920-1991, Mideplan, Santiago de Chile: August 1991.



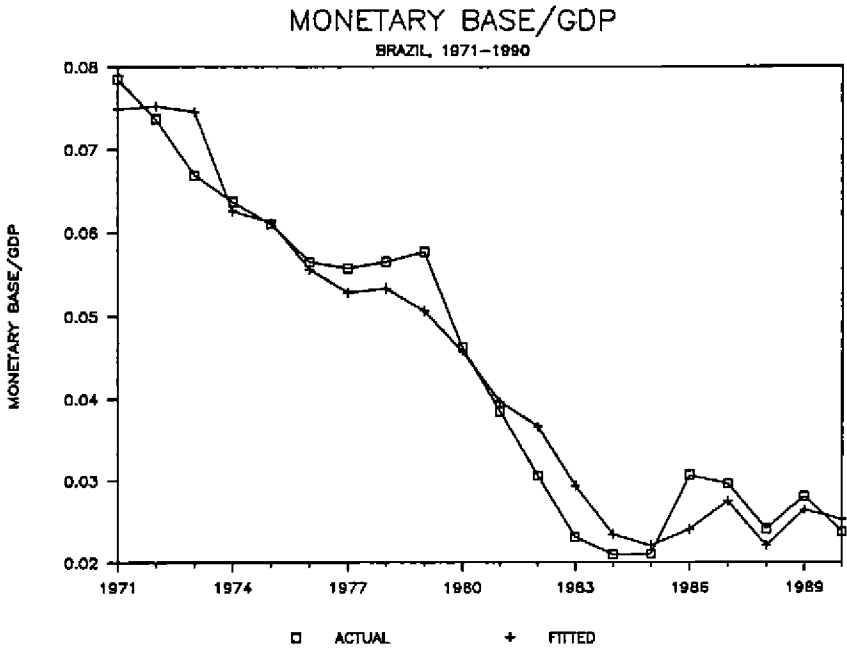


FIGURE 1

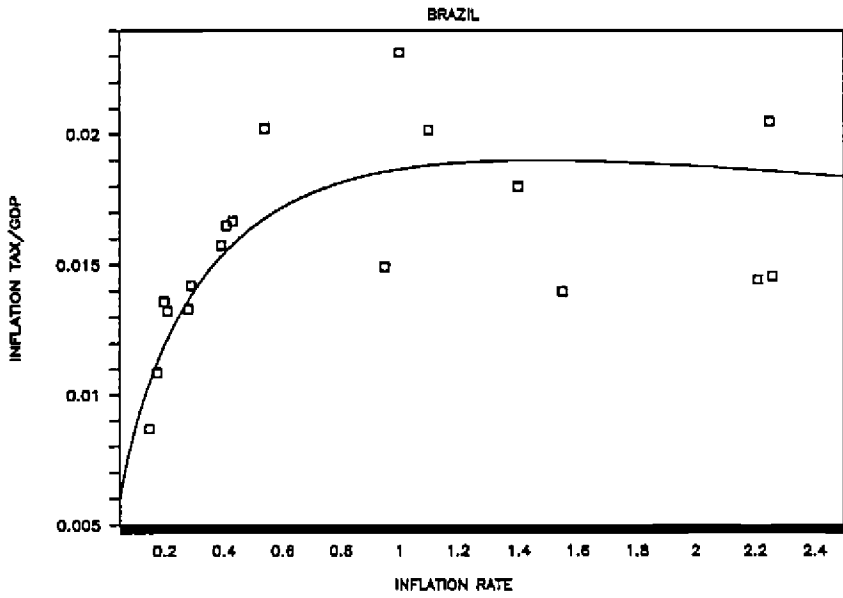


FIGURE 2

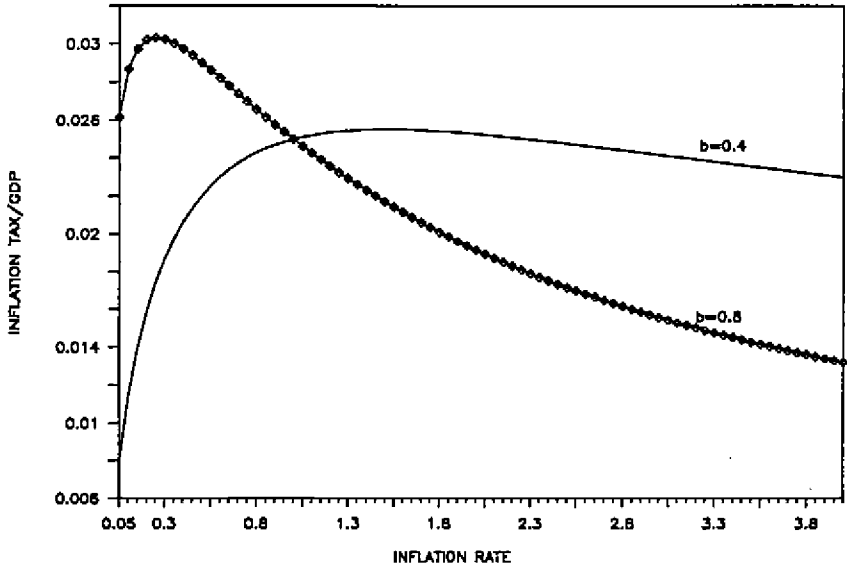


FIGURE 3

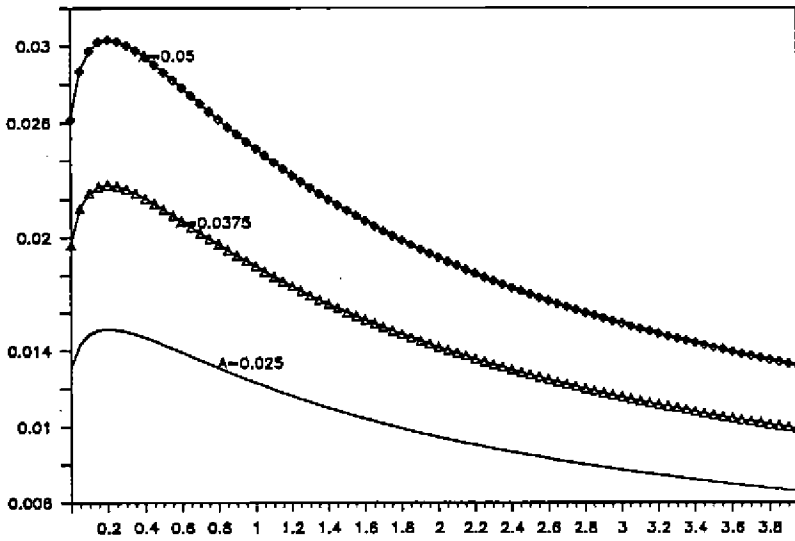


FIGURE 4

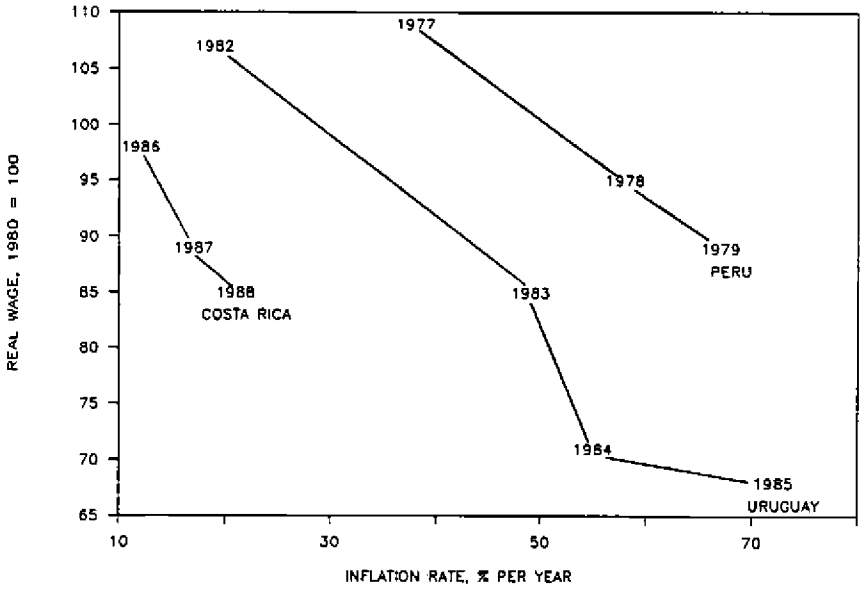


FIGURE 5

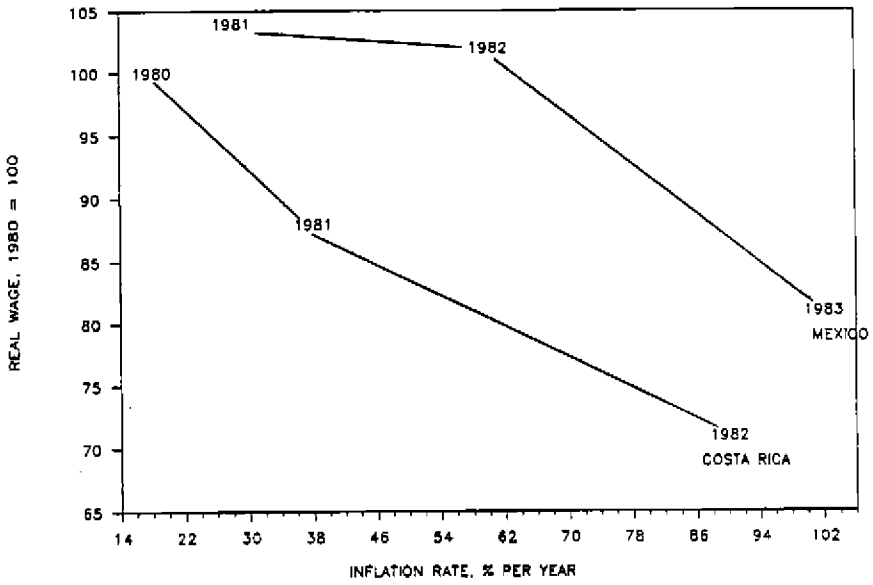


FIGURE 6

# PERU

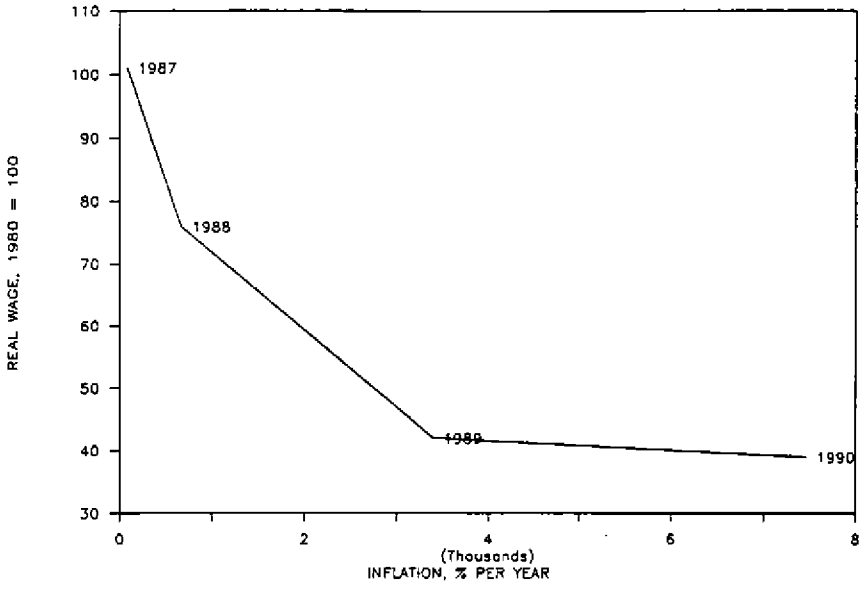


FIGURE 7

# PERU

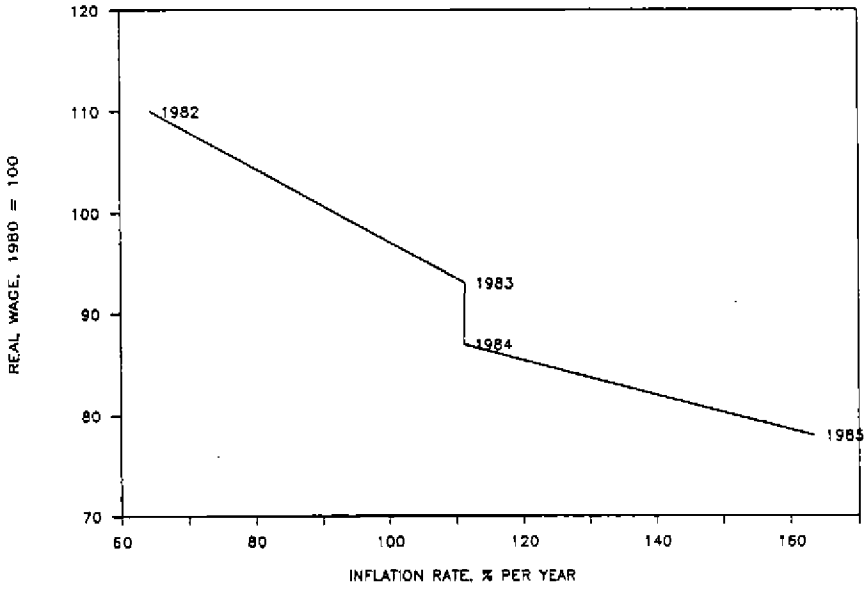


FIGURE 8



# ARGENTINA

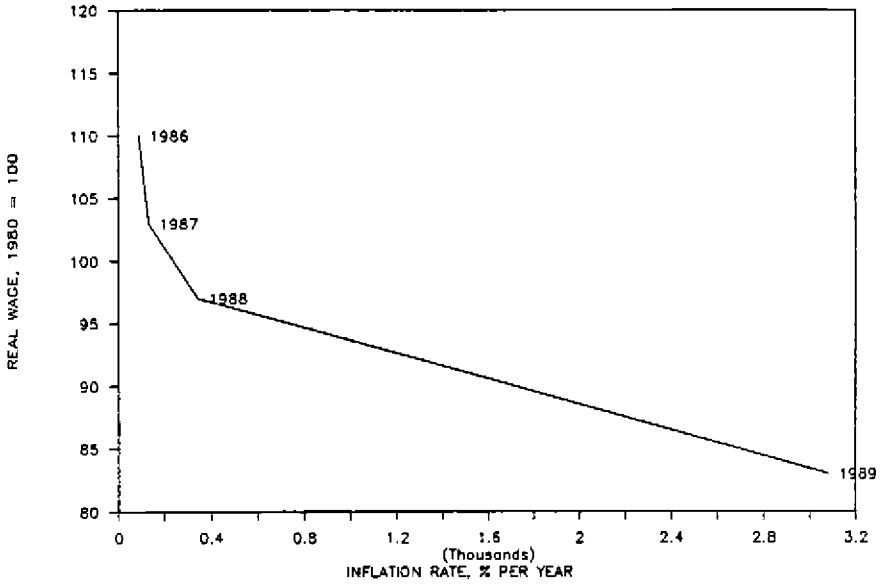


FIGURE 9

REAL MINIMUM WAGE PER MONTH  
IN CRUZEIROS OF 1977

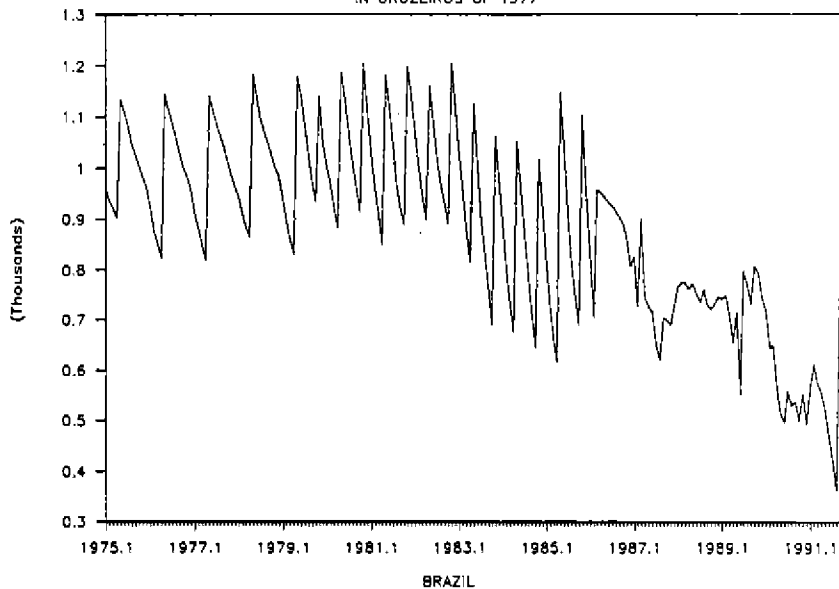


FIGURE 10

# INFANT MORTALITY IN CHILE (PER 1,000 LIVE BIRTHS)

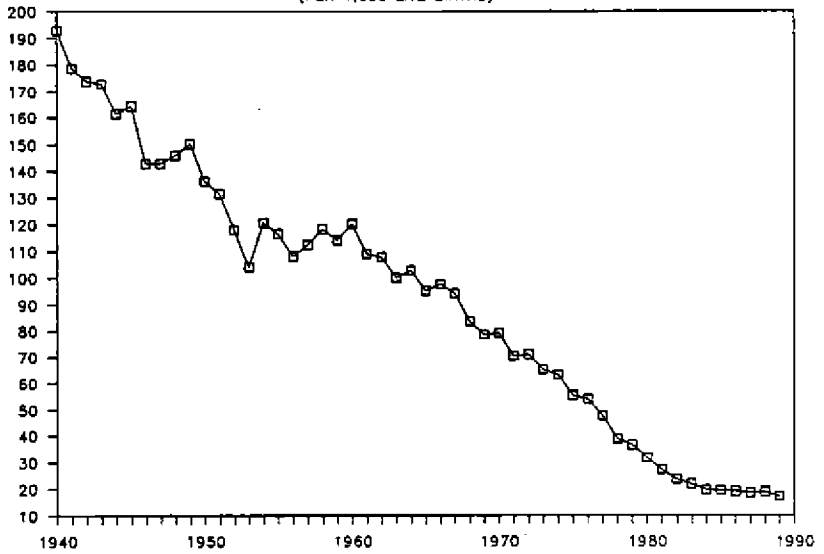


FIGURE 11

# REAL SOCIAL EXPENDITURES PER CAPITA

CHILE, 1970-1990

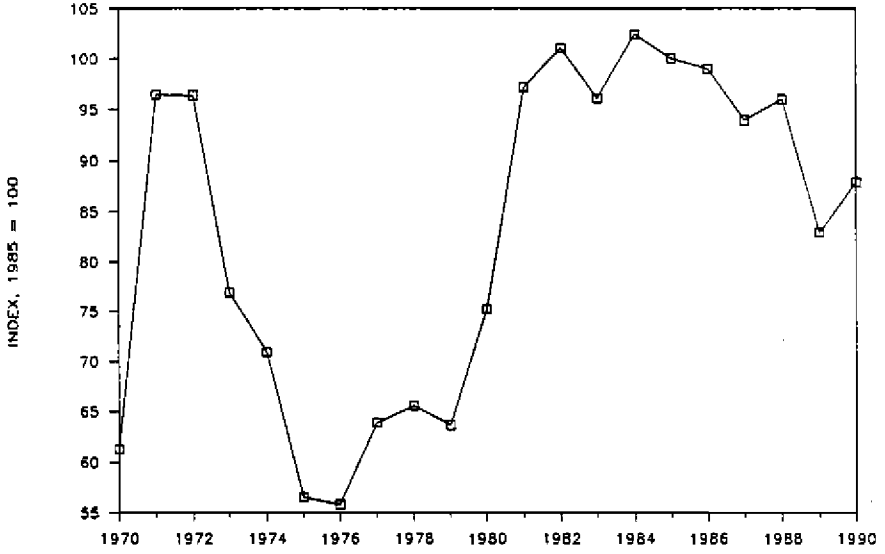


FIGURE 12