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INFLATION AND GROWTH IN AN  
INTEGRATED APPROACH

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ABSTRACT

Macroeconomic factors in general, and the macropolicy response to common external shocks (such as oil prices and real interest rates) in particular, have in recent decades played a dominant role in countries' protracted growth crises as well as in growth renewal and its long-run sustainability. The paper attempts to construct and apply a simple framework for the joint empirical analysis of growth and inflation, starting from a rudimentary short-term AS and AD framework that is 'averaged' into the medium and long run. For the industrial countries through the 1970s and 1980s such analysis highlights the existence of a marked 20 year inflation and growth 'loop', extending beyond the conventional business cycles, with well identifiable phases of crisis entry, disinflation and partial growth recovery. The interaction of macropolicy response to shocks with structural (mainly labor market) features of economies account for differences across countries both in the depth of the deterioration phase as well as in the gradual recovery, for which a panel regression provides some of the links between inflation, economic activity, profits and investment renewal.

The second part of the paper (Section IV) applies similar tools and uncovers analogous, though much more dramatic, 15-20 year loops, in the crisis and recovery of a group of countries in Latin America (as well as Israel). Likewise the strong macro path-dependence of growth in middle-income countries (with cross-country differences in structure and social cohesion) is borne out by comparisons with countries (both in the same region and outside it) that faced similar external shocks yet exhibited much milder 'loops'. The paper ends with a brief reference to some analogies with the sequencing of the cycle of growth crisis, adjustment and structural reform in Eastern Europe.

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**INFLATION AND GROWTH IN AN INTEGRATED APPROACH**Michael Bruno<sup>1</sup>**INTRODUCTION**

The events of the last decade or two have provided cumulative empirical evidence that macroeconomic factors in general, and the macropolicy response to external shocks, in particular, play a dominant role in countries' protracted growth crises as well as in growth renewal and its long-run sustainability. Ongoing studies based on a large cross-country regression approach as well as research projects on individual case histories, carried out by the World Bank<sup>2</sup> bear this out and part of a recent World Development Report (for 1991) has been devoted to the role of macroeconomic stability in comparative development experience.

The fact that seemingly transitory disturbances may have long-run effects on productivity and growth is also consistent with two distinct theoretical developments of the last decade. One is the methodological econometric attack on the conventional distinction between cycle and trend<sup>3</sup>, which has developed an alternative econometric approach which allows stochastic

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<sup>1</sup> I am grateful to David Coe for helpful discussions during a recent stay as Visiting Scholar at the Research Department, IMF, as well as to colleagues at the Economics Department at Hebrew University and to participants of the CEPR 1993 Summer Symposium in Macroeconomics for discussion at seminars. For very valuable comments on earlier drafts I am thankful to Roland Benabou, Giuseppe Bertola, Rudi Dornbusch, Stanley Fischer, Peter Kenen, and Andres Solimano. Finally I wish to thank Margret Eisenstaedt for the figures and Benny Daniel for help with data and computations.

This paper is part of a study which formed the basis for a set of three Kuznets Memorial Lectures on "Short-Term Adjustment and Long-Run Growth" delivered at Yale University in April 1993.

<sup>2</sup> See, for example, a number of cross section studies recently carried out under the project "Do National Policies Affect Long-Run Growth?" (and presented in a recent conference bearing that title): Fischer (1993), Easterly et al (1993), Easterly and Rebelo (1993) and Saint Paul (1993). The detailed case study approach is represented by a set of country studies carried out under the auspices of the World Bank during the last five years by Corden et al (1992).

<sup>3</sup> In a series of technical papers started by Nelson and Plosser (1981). For a recent survey see Stock and Watson (1988).

disturbances to affect long-run trends. The other body of literature, largely disconnected from the new econometrics and hitherto primarily theoretical, is that of endogenous growth theory.<sup>4</sup> In the latter general framework the existence of increasing returns or externalities could in principle make long-run growth depend, among other factors, on transitory disturbances and the policy response to them.

In spite of the growing empirical evidence, however, the main stream dichotomy between short-term and long-term analytical frameworks persists. A most elementary, and an almost trite, statement is that the long-run is a succession of short-runs. Yet in our basic macro models, in our teaching, and to a considerable extent also in the design of macro policies we tend to separate the frameworks within which we discuss short-run adjustment and long-run growth (and structural reform) into separate analytical compartments. Nowhere is this better exemplified than in the basic macro textbooks and teaching in which for an overriding part of space and time we use the time-honoured "short-term" framework in which the capital stock and productivity are kept constant and aggregate demand management does most of the action.<sup>5</sup> In the remaining, usually end-of-course residual lectures, the discussion is confined to one of a standard smooth long-run growth models, in which the supply of capital and labour plays the dominant role but inflation and the short-term macro disturbances as well as the policy reactions are abstracted from.<sup>6</sup> In the above mentioned large cross-section regressions macroeconomic

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<sup>4</sup> This renewed interest in the role of learning and increasing returns in growth starts with the work of Lucas (1988) and Romer (1986). See also Grossman and Helpman (1989) and a more recent paper by Galor and Tsiddon (1992).

<sup>5</sup> The price shocks of the 1970s have given a lease of life to the incorporation of independent shifts in the aggregate supply schedule in the standard macro model but this has mainly been confined to the short-term effect of terms-of-trade or real wage shocks.

<sup>6</sup> Empirically based country econometric models have to integrate short-run fluctuations with medium or long-run effects, but these are usually ad-hoc and at any rate have not found their way into the standard macro model. A possible reason for the persistence of this bias is the fact that most textbooks are written for the U.S. market, for an economy in which a relatively high frequency of the more conventional business cycles still plays a major role. Most of Europe has been considerably less 'cyclical', in the conventional sense, and most middle and low-income

variables, such as inflation and its variability, are typically introduced as extraneous arguments within a steady state long-run growth framework and not as simultaneously determined components of a more complete macro model.

Likewise one tends to keep a distinction between policies that deal with adjustment (centered on inflation and the balance of payments) and those that take care of structural reform (mainly targeted on productivity and growth) as if that division of instruments can be clearly made. Take, for example, fiscal policy, in the form of a permanent fiscal adjustment — is that a short-term macro instrument or is it, rather, a long-term geared policy to affect growth through crowding in of investment, or through direct expenditure allocation (on infrastructure investment and human capital development)? Maybe the effects of exchange rate and monetary policies is of a more pure short-term adjustment nature? But wasn't the U.S. fiscal and monetary stance in the aftermath of the Vietnam war the main element that triggered the collapse of Bretton Woods, at least partly induced the oil shocks and thus had a lasting effect over world inflation and growth patterns? Or consider the more recent events following German unification. While it is too early to assess their long-run consequences on growth in Germany and the rest of Europe it is already clear that the particular mix of (no) fiscal and (harsh) monetary response to the unification shock in Germany had far-reaching repercussions on the sustainability of the ERM and the protracted recession in Europe with repercussions on the medium run.

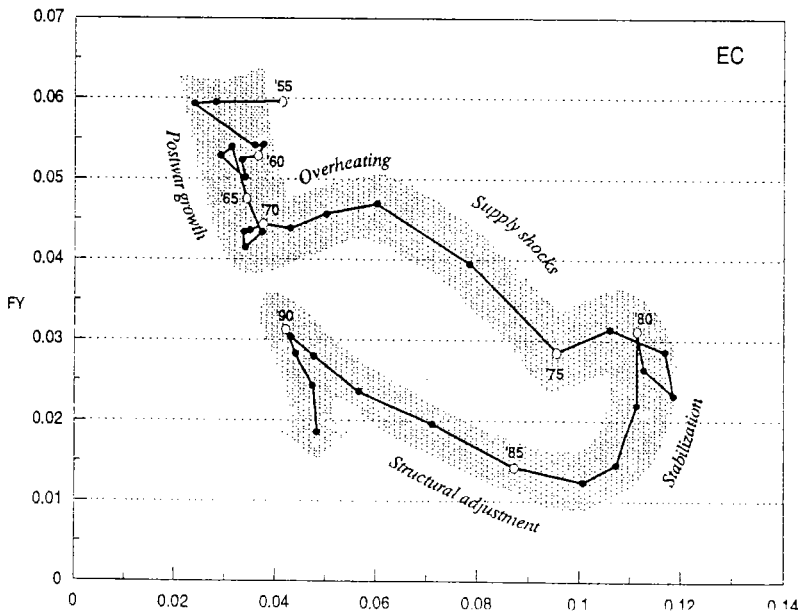
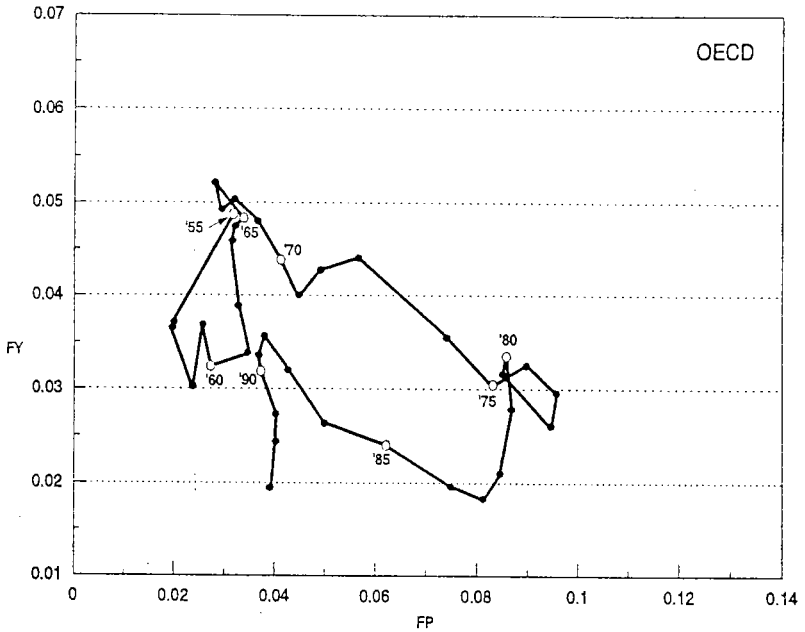
As an illustration consider the representation of postwar history of growth and inflation for the industrial countries in a two-dimensional CPI inflation and GDP growth diagram. This is given in Figure 1 for the OECD aggregate and for the subgroup of the common market countries. Since annual fluctuations make it difficult to follow the developments over the medium and long-run the figures show the five-year moving averages of these rates.<sup>7</sup> Five

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countries even less so.

<sup>7</sup> The starting observation marked 1955 is the average for the preceding period 1950–55, and the same applies for each of the subsequent years marked on the curves. The estimate for 1993 included in the average for 1988–1993, which is the last observation marked in these figures, was taken from the IMF World Economic Outlook, Interim assessment, January 1993.

Figure 1  
 Phases of Growth and Inflation, OECD and EC: 1950-1993  
 (percentages, 5-year moving averages)



years is a long enough period to overcome very short-term cyclical effects, or 'political cycles' (even though the conventional 'business cycle' is variable and often somewhat longer).

The end of each quinquennium is marked on these curves to also enable a view of the actual average trajectory of non-overlapping average rates of change — the five-year endposts, starting from the quinquennium ending in 1970, each stands for a particular worldwide development. The second half of the 1960s is important in terms of the high growth and approach to full capacity utilisation, the year 1970 signals the beginning of the breakdown of Bretton Woods building up to the first oil shock, 1975 signals the depth of recession, 1980 signals the second oil shock and the beginning of the monetary squeeze with the steep rise in real interest rates (which is also very significant for the debt crisis shock in the middle income countries to which we turn in Section IV). 1985 signals a drop in oil prices and real interest rates, the beginning of the last large recovery and a series of attempts at stabilization and reform among some middle income countries. Finally 1990 signals the full breakdown of the Soviet block and German unification.<sup>8</sup>

The most marked feature of these curves, which will also be shown to apply to individual industrial countries (see Section II), is the apparent 20-year cycle or 'loop' which marks the period between 1970, or thereabouts, and 1990 (1988 for OECD as a whole) by the end of which inflation returns to its earlier levels while growth fails to do so, at least on average (this is also true for most individual countries).<sup>9</sup> Superimposed on the curve for EC there is a stylized representation of major phases in this apparent loop to which we return in Section II.

The background to the approach taken in this paper thus derives from the fact that country (and inter-country) growth, inflation and its stabilization, during the last two decades,

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<sup>8</sup> The exact timing of events and responses has differed among countries, but there is an advantage in considering a common external time framework which enables international comparisons in an interdependent world.

<sup>9</sup> For OECD as a whole the 30 year period 1961-1989 looks like a closed longer 30-year loop, but as we shall see this is only the result of averaging over a larger group of countries in which lumping Japan, the U.S. and the EEC together gets this result.

have become increasingly linked. The motto is that long-run growth is not only in theory the outcome of a succession of short-term equilibria, but that it has in recent decades and for both industrial and semi-industrial countries, for that reason, been predominantly path-dependent. Once one takes that line then the seeming empirical paradox of the co-existence of very high persistence of countries' standard growth-determining characteristics across recent decades along with very low persistence (i.e., extreme instability) of productivity and output growth, becomes much less of an enigma.<sup>10</sup> Part of the the reason for this apparent paradox is that a series of external shocks that have affected all countries have met with differential macroeconomic response not only among countries but also within the same countries over time and these, in turn, had long-lasting effects, sometimes extending over two decades, on growth. Yet as we shall see there is considerable qualitative similarity of time profiles of inflation and GDP growth across countries for both the advanced and many of the middle-income countries during this period, once one looks simultaneously at moving averages of both variables. An integrated view is also important for discussion of questions such as cause and effect, e.g., are inflation and growth determined simultaneously, is the relationship always negative, does one cause the other, do some of these relationships vary for countries at different rates of inflation, etc. (a question to be discussed in Section IV). It is also important for the joint evaluation of adjustment and structural reform policies, issues of sequencing and the like.

To argue the point one needs a simple unifying device to combine the short and the long-run. Part of this paper is concerned with the attempt to construct and apply such a simple (and to some extent overly simple-minded) framework, within which medium and long-run output and price behaviour over time are considered. This can be obtained by starting from a rudimentary short-term AS and AD framework, which is extended into the medium and long run. In the next

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<sup>10</sup> Easterly et al (1992) find that in a comparison of about 100 countries across the three recent decades the time correlation coefficient of basic growth characteristics or 'regressors' such as the level of education, share of urban population, trade share, government consumption levels, is close to unity while the cross-decade correlation of growth of GDP per worker is only of the order of 0.1-0.3.



section (I) we develop the framework which is then applied first, in section II, to reinterpret the growth slowdown of the 1970s and the partial recovery of the 1980s in the industrial countries. This spells out a common 'cycle' of approximately the above duration over which macroeconomic adjustment to common shocks interacted with structural characteristics of countries (in particular that of labour markets) to account for both similarities as well as differences in inflation and growth profiles.

Of particular concern in the present context is the medium-term dynamics of investment and its link with short-term macroeconomic developments. Section III analyzes the empirical determinants of capital formation for panel data of sixteen industrial countries, centering on the role of profits and real interest rates in the investment squeeze and the subsequent recovery phase in the industrial countries. A possible separate role in investment determination for short-term growth and inflation behaviour is also discussed. There are competing or complementary theoretical rationales for these links one of which can be provided by the recent option-pricing theory of irreversible investment to which some reference will also be made.

Section IV applies corresponding tools to the analysis of an analogous, usually much more extreme, inflation and growth 'loop' in some groups of high as well as moderate inflation middle-income countries. The structural and political economy factors that affect the probability to reschedule debt (see Berg and Sachs (1988)) as well as the political constraints on the ability to use restraining fiscal and monetary policies turn out to explain quite well why several countries, particularly in Latin America, in response to external shocks entered deep high inflation and low growth crises.<sup>11</sup> Also discussed is the aftermath of successful sharp stabilizations from high inflation and the medium term dynamics of recovery of growth. In this process private and public investment and savings behaviour as well as the political economy of exchange rate policy play an important role. The paper ends with a brief reference to some analogies with the sequencing of the cycle of growth crises, adjustment and structural reform

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<sup>11</sup> A control group of East Asian countries, most of which responded well to the same shocks, were included in this analysis but, for lack of space, are not included in this paper.

in Eastern Europe.

## I. INFLATION AND OUTPUT GROWTH: ANALYTICAL FRAMEWORK AND ILLUSTRATIONS

Our point of departure is a conventional aggregate supply (AS) and aggregate (AD) demand framework. This is drawn in figure 1.1 in terms of the log of GDP ( $y$ ) on the vertical axis and the log of the price level ( $p$ ) on the horizontal axis. The distance travelled between two points of intersection of shifting AS and AD curves will then measure, respectively, the growth rate ( $g$ ) and the inflation rate ( $\pi$ ).

We assume an open economy producing a single final good which competes with foreign goods and uses an importable intermediate import:

Consider a gross output function of the final good  $Q=Q[Y(K,L), N;A(t)]$

where:  $Y$ =GDP       $K$ =Capital Stock       $L$ =Labor Input

$N$ =Material Input       $A(t)$  = time shift or total factor productivity (TFP)

Denote:  $W$  = Nominal wage rate     $P$  = price level,       $t$  = time

$P_n^*$  = world price of input (oil)       $P^*$  = world price of final good

$E$  = nominal exchange rate,       $Y^*$  = foreign GDP level.

We use small letters for logarithms of capital letters

Assuming constant-returns to scale and proportionality of marginal products of  $L$  and  $N$  to respective real factor prices, log-linearizing, one may obtain the GDP supply schedule ( $y^s$ ):

$$y^s = k + \lambda t - b_1(w-p) - b_2(e+p_n^*-p) \quad (1.1)$$

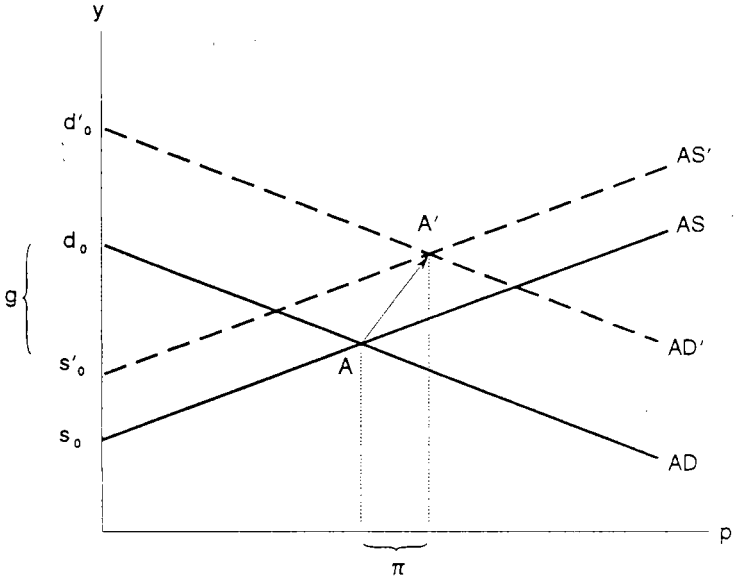
( $k$  is the major, subsequently to be endogenized, shift factor, while  $\lambda$  may stand for a variety of predetermined 'residual' shift factors to be discussed further below).

Next assume a simplified aggregate demand schedule ( $y^d$ ).

$$y^d = a_0 + a_1(m-p) + a_2(e+p^*-p) + a_3y^* \quad (1.2)$$

where  $a_0$  represents the effect of fiscal policy, the second term monetary policy and the other

Figure 1.1



terms come from export demand.<sup>12</sup>

The supply and demand schedules can be written in the following abbreviated form:

$$y^s = s_0 + sp \quad (1.3)$$

$$y^d = d_0 - dp \quad (1.4)$$

where:

$s_0 = k + \lambda t - b_1 w - b_2 e - b_2 p_n^*$  = supply shifts ;  $s = b_1 + b_2$

$d_0 = a_0 + a_1 m + a_2 p^* + a_2 e + a_3 y^*$  = demand shifts ;  $d = a_1 + a_2$

$s$  and  $d$  are the slopes of the short-term AS and AD curves, respectively.

The way the curves have been defined assumes short-term wage (and exchange rate) stickiness. We shall subsequently modify this assumption for medium-term changes over time.

Solving (1.3) and (1.4) for  $y = y^s = y^d$  we get:

$$y = (s_0 d + d_0 s) / (s + d) \quad (1.5)$$

$$p = (d_0 - s_0) / (s + d) \quad (1.6)$$

For given slopes  $s$  and  $d$   $y$  rises with positive  $\Delta d_0$  and  $\Delta s_0$  shifts while  $p$  rises only with  $\Delta d_0 > \Delta s_0$ .

The slope of the joint expansion path of  $y$  and  $p$  will then be

$$\frac{\Delta y}{\Delta p} = \frac{s + (\Delta s_0 / \Delta d_0) d}{1 - (\Delta s_0 / \Delta d_0)} \quad (1.7)$$

This is the slope of the line AA' in the attached figure 1.1. The growth/inflation ratio ( $\Delta y / \Delta p$ ) increases with  $\Delta s_0 / \Delta d_0$ ,  $s$  or  $d$ . (Warning: The axes are reversed from the conventional P-Y diagram).

The slope of the expansion curve in a P-Y diagram will thus fall more the larger are positive demand shocks ( $\Delta d_0$ ) and negative supply shocks ( $-\Delta s_0$ ).

Figure 2.1 in Section II illustrates the above analysis for the joint profile of GDP and

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<sup>12</sup> Under a clean float or a closed economy the exchange rate term will not appear.

CPI<sup>13</sup> log-level development for the six large industrial countries during the period 1950-1990, which can be viewed as the time profile of intersections of the short-run aggregate supply and aggregate demand curves for each country. The mid-year, 1970, was chosen as the joint reference point ( $\ln=0$ ). The other points on the curves mark common five-year signposts which enable some impression of the distance travelled in terms of output and prices across the different countries over time. The figure underscores the marked difference between the two halves of the forty year period — there was fast growth and relative price stability in the pre 1970 period with the ratio  $\Delta s_t/\Delta d_t$  almost equal to unity and thus the slope ( $\Delta y/\Delta p$ ) was relatively high. There was low growth and higher inflation starting in the early 1970s, the negative supply shocks leading to a drop in the two above ratios. Similarly the figure marks Japan as the highest cumulative growth country over both halves of the 40 year period, while Germany was the least inflationary in both (Italy the most inflationary during 1970-90; France and Japan during 1950-70). In comparing the four European countries after 1970 there appears to be a positive long-run average trade-off between cumulative price inflation and cumulative output growth. Germany was the most stable but also had lower growth, while the reverse was true for Italy which on average had the most expansionary macro policy (If we exclude the UK the trade-off was reversed before 1970). A very weak, slightly positive, association between inflation and growth appears to be the case during 1970–90 when we widen the sample of OECD countries to include the smaller ones and is in marked contrast with a highly negative relationship between inflation and growth within the group of Latin American countries (to be discussed in Section IV).

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<sup>13</sup> We use CPI rather than GDP prices throughout because these are generally more consistently measured across different types of countries. Using GDP prices is more consistent with the quantity measure of GDP but on the other hand lends itself to the problem of biases in measurement of GDP, since this would automatically bias quantity and price measures in opposite directions.

### 1.1. Representing Changes Over time

Consider now the output and price relations of equations (1.1)–(1.6) in time difference form, using deltas ( $\Delta$ ) to represent average time changes (E.g., three to five year moving averages.— see below). In figure 1.2 we use the horizontal axis of first quadrant for log changes in the price level ( $\Delta p$ ), to represent the average inflation rate ( $\pi$ ) and the vertical axis likewise for log changes in the GDP level ( $\Delta y$ ), representing the average growth rate ( $g$ ). The same axis will also be used to measure the growth rate of the capital stock (to be denoted  $\Delta k$  or  $\dot{k}$ ).

The time changes in output supply ( $g^s$ ) and demand ( $g^d$ ) will be shown as curves (see curves  $\Delta AS$  and  $\Delta AD$ , respectively in Fig 1.2) whose convex and concave shape, respectively, beyond a certain threshold inflation rate, come from assuming that with rising inflation there is partial indexation (accommodation) of wages, money and the exchange rate whose degree rises with the rate of inflation, reaching a limit with 100 percent indexation (or accomodation), at which point the curves become horizontal. To see this we can write the first difference of the supply and demand schedules in the following form, respectively:

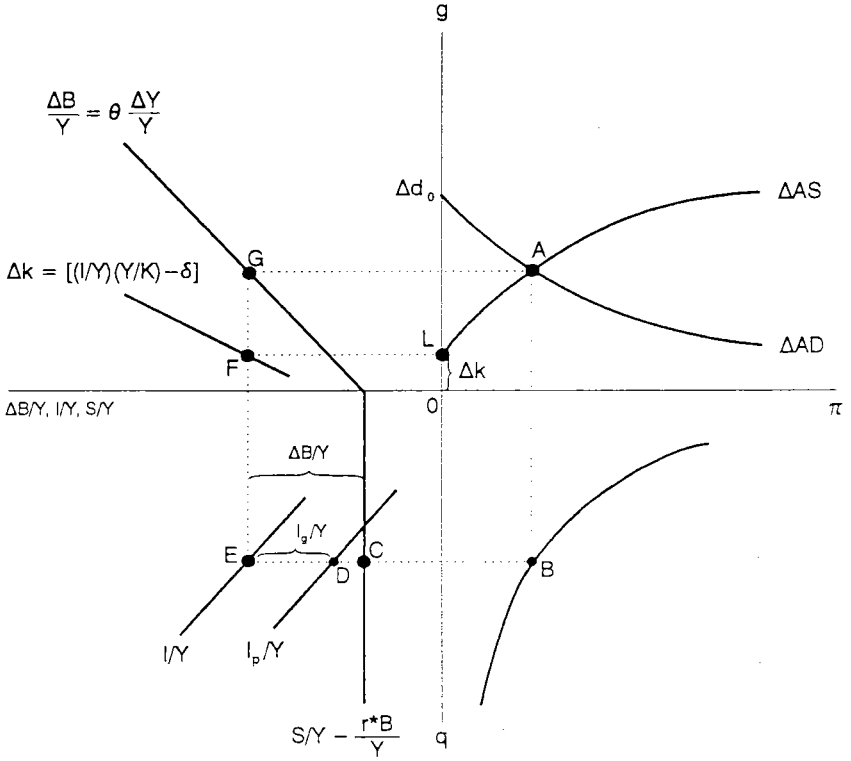
$$g^s = \Delta k + \lambda + b_1(\pi - \omega) + b_2(\pi - \varepsilon - \pi^*) - b_{2f}\pi_n^* - \pi^* \quad (1.8)$$

$$g^d = \Delta a_0 - a_1(\pi - \mu) - a_2(\pi - \varepsilon - \pi^*) + a_3g^* \quad (1.9)$$

$\omega$  is the rate of change of nominal wages,  $\mu$  is the rate of monetary expansion,  $\varepsilon$  is the rate of nominal devaluation,  $\pi_n^*$  and  $\pi^*$  are the rates of change of world prices of raw materials and final goods, respectively;  $g^*$  is the growth rate of world output.

In equation (1.8) the first two elements represent capital accumulation and TFP, respectively, the first brackets give the rate of drop of real wages, the second brackets the rate of real appreciation and the last one represents the effect of a change in the terms of trade. In (1.9) real depreciation and the rate of change of world output ( $g^*$ ) represent the effect of exports on the demand growth side while  $\Delta a_0$  represents expansionary fiscal policy.

Figure 1.2



For the change of nominal wages we may assume

$$\omega = \alpha\pi + (1 - \alpha)\pi^e + \nu, \quad (1.10)$$

$\pi^e$  is the expectation of inflation as reflected in the wage contract, which also incorporates a partial cost-of-living adjustment, and  $\nu$  stands for all other wage shifting factors (such as the distance of unemployment from the natural rate). Accelerating inflation will tend to motivate an increase in  $\alpha$ , which will enhance the inertia of the inflationary process and in terms of the  $g_s$  curve will make it concave until in the limit with 100% formal indexation ( $\alpha = 1$ ) and full purchasing power parity ( $\pi - \varepsilon - \pi^* = 0$ ) the curve will become horizontal.<sup>14</sup>

To argue for analogous curvature of the  $g_d$  curve we need to assume that the respective rates of devaluation and of monetary expansion also accommodate partially to the rate of inflation. The degree of accommodation is an increasing function of the rate of inflation ( $\pi$ ), up to full purchasing power parity and full monetary accommodation.

The intersection of the two curves represents at best a temporary equilibrium of inflation and growth and cannot represent a long-run steady state, since steady state inflation will take place only when all nominal magnitudes, the wage, exchange rate (and money) grow at the same rate. In that case, however, both curves become horizontal and only the growth rate will be determined by the underlying production model.<sup>15</sup> To obtain the steady state inflation rate we need a mechanism to determine money growth, such as, in the case of high inflation, seignorage finance of the budget deficit, which is not spelled out separately here. Before turning to possible

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<sup>14</sup> The gradual nature of the slope hinges on the assumption that there is sluggishness in the adjustment of wages, i.e. long-term contracts extending beyond the length of the period over which averages are calculated, or sluggishness in the adjustment of inflationary expectations. In the case of perfect foresight the respective real wage brackets disappears at once. As to the catch-all shift factor  $\nu$  in equation (1.10), the part that comes from actual unemployment could be solved out by assuming some Okun-type relationship between the growth rate and the unemployment rate, leaving the factors underlying the natural rate of unemployment affecting  $\nu$  positively. The way the equation is set up the shift factor ( $\nu$ ) must also include the productivity part of real wage growth as well as indirect taxes on wages (since producers equate the marginal product to wage costs).

<sup>15</sup> Some mechanism, such as savings-investment adjustment, is required to get to equilibrium from between the demand and the supply side.



applications of this framework for joint inflation and growth response to shocks and macropolicy we may, for subsequent reference, complete the supplement the short-term determination of inflation and growth with the medium-term link from the short-term to the long-run via the effect on profitability and investment.

The intercept of the dynamic supply schedule ( $\Delta s_0$ ) incorporates the rate of change of the capital stock ( $\Delta k$ )<sup>16</sup>, which is related to the investment ratio through the following identity:

$$\Delta k = (I/Y)(Y/K) - \delta \quad (1.11)$$

where  $\delta$  is the depreciation rate and  $(Y/K)$ , the slope of the  $\Delta k$  line in the top left quadrant of figure 1.2, measures the average productivity of capital (or degree of utilization).

The line drawn in the bottom left quadrant relates the rate of inflation (through its variance) via a general  $q$ -factor to the private investment rate ( $I_p/Y$ ). The position of the  $q$  schedule will depend on a number of other factors, including the rate of growth and the real rate of interest ( $r^*$ ) (these will be mentioned in the empirical discussion below). For the moment we write:

$$I_p = f [q(\pi, g, \pi_a^*, r^* \dots)] \quad (1.12)$$

Total investment ( $I$ ) is composed of private ( $I_p$ ) and public ( $I_g$ ) investment, where the latter is determined by government:

$$I_p/Y + I_g/Y = I/Y \quad (1.13)$$

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<sup>16</sup> As shown above, the intercept also includes the effect of  $\lambda$ , 'total productivity' as well as time shifts in the other components of the supply schedule, in particular input (oil) price changes, but could also be affected by other supply constraints such as credit ceilings and interest rates on working capital. In figure 1.2 we abstract from the other shift factors or assume  $g^*$  is measured net of them.

This is shown in the bottom left quadrant of fig. 1.2 along with the net savings (here vertical) line which is measured net of interest payments on the foreign debt ( $r^*B/Y$ ).

The increment to debt ( $\Delta B$ ) can be assumed to depend on growth with a coefficient  $\theta$  that will be negatively related to the level of the existing debt ratio, to the foreign interest rate ( $r^*$ ) and to a country risk factor ( $\sigma$ ), and is shown as the line  $\Delta B/Y$  in the top left quadrant.

Thus we have:

$$\frac{\Delta B}{Y} = \frac{I}{Y} - \left[ \frac{S}{Y} - \frac{r^*B}{Y} \right] = \theta \left( \frac{B}{Y}, r^*, \sigma \right) g \quad (1.14)$$

This completes the very rudimentary framework <sup>17</sup>, which links the short- and the long-term components. It will mainly be used as a descriptive device. Consider a few illustrations, following from the main shocks (oil prices and real interest rates) that have affected industrial and/or middle income countries during the period in question.

### 1.2. Terms-of-Trade Shock:

An import price shock will lead to a temporary downward shift of the AS curve on account of the direct effect on output supply. This will persist over time when the higher *rate* of change of the relative price (including devaluation of the exchange rate) persists. Likewise, going through the various quadrants of Fig 1.2 the price shock reduces  $q$  and thereby  $L/Y$  and thus leads to a lower growth rate of the capital stock ( $\Delta k$ ). Likewise a concomitant drop in foreign demand will show in a downward shift in the AD curve. The effect of a terms- of- trade shock will thus be a drop in the growth rate and a rise in the inflation rate whose size can be mitigated at the expense of an even larger output drop by contractionary macro (fiscal and monetary) policy. In this case the AD curve shifts further down and to the left, at least

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<sup>17</sup> There are some implicit additional interdependencies within this framework, such as between the savings ratio ( $S/Y$ ) and the intercept of the aggregate demand curve ( $\Delta d_0$ ) and some other elements that will be mentioned in the discussion.

temporarily.

On the other hand the output effects could be mitigated at the cost of higher inflation by an upward shift in  $\Delta a_0$  and the AD curve with temporary equilibrium shifting up along the AS curve. Pure AD movements i.e., cyclical Phillips-curve shifts, at given AS, will show as northeast and southwest fluctuations of inflation and growth unless the cycle is averaged out over a longer time span. If one uses a five-year moving average, as is done in Figure 1 (and will be further illustrated for individual countries) then for most of the time the mean fluctuations of the AD curve will average out and the set of equilibria will be dominated by the negative supply shocks during the 1970s and the positive supply shifts in the 1980s. Thus, the observations in Figure 1 (see stylized representation on the curve for EC) approximately trace 'average' downward sloping demand curves for the 'supply shocks' and 'structural adjustment' phases and likewise trace 'average' upward sloping supply curves during the 'overheating' and 'stabilization' phases.<sup>18</sup>

### 1.3. Positive and Negative Debt Shocks.

Consider an increase in the  $\theta$  - coefficient in equation (1.14), due to a fall in the world interest rate and/or the alleviation of ceilings on the availability of funds, as after the first oil shock. This enables an increase in  $I/Y$  (through government investment) and/or a drop in the savings rate. The former will show in an increase in  $k$  and a possible shift up in the AS curve while the latter enables an upward shift in the AD curve. In both cases an increase in the growth rate is possible, or the ability to prevent a drop in the growth rate that would otherwise be mandated by the oil shock (for an oil importing country). The outcome for inflation would depend on the relative strength and persistence of the supply and demand shifts. The propensity to incur a crisis later on depends, of course, on whether the larger foreign borrowing has been channeled into productive investment or into higher consumption levels (i.e. the dominance of

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<sup>18</sup> Obviously these are only broad brush descriptions. The movement during 75-80, for example, represents a 'mini-loop' caused by both AD and AS shifts.

a permanent upward shift in the AS curve or a temporary upward shift of the AD curve)

The debt crisis shows in this framework as a reverse phenomenon. It takes the form of a supply shock, namely a downward shift of the AS curve, both on account of short-term increases in interest rates or the availability of working capital and/or raw material imports. A step devaluation or the acceleration of an exchange rate crawl will likewise shift down the AS curve, at least temporarily, while the expansionary effect on the AD curve will be mitigated by the required cut in domestic absorption. The depressing influence on public as well as private investments (an inward shift of the  $q$  line) will in turn feed through the  $k$  line into a reduction in the rate of growth of the capital stock. The extent of the squeeze on investments depends, of course, on the compensating increase in the domestic savings rate which in turn must show in a leftward shift of the AD curve. (See discussion of different countries' experience in Section IV). Again there is a growth inflation trade-off here, since higher savings rate imply a greater squeeze on consumption (private and public) which shows, in the short-run, in lower economic activity and higher unemployment with the benefit of a smaller acceleration in inflation. The inflationary outbursts that were common in the 1980s reflect the inability to reconcile conflicting demands on budgetary and political commitments as well as money financing of gaping fiscal deficits as inflation ran into the three digits.

Distortionary effects of very high inflation, for which there is empirical evidence will show in a drop in the 'residual' or 'TFP' factor which again would show in a further downward shift of the AS curve.

A useful summary measure of the response of different countries to the various crises, as we shall see, is the ratio of the average growth rate to the inflation rate which in terms of the geometry of the two charts is represented by the slope of the expansion curve in figure 1.1 or the slope of the ray from the origin to the equilibrium point in the first quadrant of figure 1.2.

#### 1.4. Interactions of Adjustment and Structural Reform

Conventionally one thinks of inflation stabilization (i.e. a shift back along the horizontal inflation axis) as macro-adjustment in which monetary and fiscal tools are the dominant ones -

namely a leftward shift of the dynamic AD curve. A given shift in the AD curve, however, can involve a larger drop in growth and/or a lesser drop in the inflation rate depending on the slope of the AS curve, which is where incomes policy (heterodox stabilization, removal of indexation mechanisms, etc) comes in. In the absence of credibility and/or explicit social compacts movements upward or downward along a given AS curve will not be symmetric, since in general indexation (both ex-post and ex-ante indexation) usually applies only for inflation acceleration. Deceleration will thus be along a steeper AS slope unless wage earners are explicitly willing to take a cut in nominal wage growth as inflation decelerates.

Structural reform, on the other hand, usually consists of measures which would affect the position of the AS curve (all the factors that may increase the 'total productivity' parameter  $\lambda$ ), shifting it gradually upwards and to the left, and thus will bring about an increase in the growth rate (a shift along the vertical axis). However, there are measures, such as fiscal and monetary reform, that work through both blades of the scissors. The convenience of a framework in which *both* inflation and growth appear simultaneously comes precisely from the fact that adjustment and structural reform are often intertwined and, as we shall argue, based on the reform experience of middle income countries, can often not be kept separate. The more one goes into East European reform the more blurred this distinction becomes — this is taken up briefly at the end of this paper.

We now proceed to discuss some of the worldwide short-term adjustment and longer run growth experience of the last two decades, using elements of the above general framework as is convenient. We start with the industrial countries if only to prove the point that even in the most developed part of the world the simultaneous examination of past price and output developments yields some useful insights.

## II. SUPPLY SHOCKS AND THE INDUSTRIAL COUNTRIES REVISITED

Much has been written about the general slowdown of growth and of productivity in the industrial countries since the 1970s. Two somewhat complementary views have been prevalent. One started from the events of the early 1970s, and particularly the first large oil price shock.

and ascribed the poorer performance directly to the oil (and commodity) stagflationary price shock and to the effect on resource allocation and growth of the macroeconomic response to the shock. The latter was the main line taken in my work with Jeffrey Sachs (1985). The other, and in some sense complementary view, mostly centered on an analysis of the U.S. economy, used a multi-factor productivity approach along the lines of Kendrick (1980) and Dennison (1979), in which the productivity 'residual' that is obtained after accounting for quantities of labour and capital is systematically chiseled away by accounting for changing quality of factors, diminished R&D effort, environmental factors, increasing returns to scale etc. Most, though not all, of the slowdown can be accounted for in this way.<sup>19</sup>

There are weaknesses in both types of approach taken. The multi-factor productivity approach is problematic in that its components, almost by definition, would make for a gradual deceleration rather than the seemingly abrupt shift in the growth trend that has actually taken place. Also one could ascribe some of the underlying changes in quantity or quality of factors, which are taken as exogenous in this type of decomposition, to the side effects of the 1973 crisis. Even then, however, there remains an unexplained residual which Maddison (1991) for the case of the U.S. estimates to be of the order of 60 percent (!) of the deceleration from 1950-73 to 1973-87. This large discrepancy mainly comes from the large margin that is unexplained during the high growth period. A larger percentage of the slowdown is explained for five other industrial countries.<sup>20</sup>

The other line of explanation that builds on the shock itself and its ramifications, on the other hand, has been less grounded on hard quantitative evidence. The direct impact of the oil

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<sup>19</sup> For selected literature see the 1988 symposium in the *Journal of Economic Perspectives*, as well as Cullison (1989) and Maddison (1987, 1991). Within that literature the role ascribed by different authors to the oil shock itself varies. Jorgenson (1981) and his associates, for example, by looking in great detail into the sectoral breakdown, ascribe quite a large part to the oil price increase working through both the direct use of oil and its effect on machinery inputs.

<sup>20</sup> The percentage explained is, respectively, 57-58 percent for France and Germany, 81 for Japan, 89 for the Netherlands and 99 percent for the U.K. See Table 5.21, p. 161 in Maddison (1991).

input price increase cannot account for the full measure of the drop in productivity<sup>21</sup>, within a conventional neoclassical production framework, even after one takes into account the indirect effect on the cost of machinery. The complementary arguments about reduced resource mobility, general effect of unemployment on productivity, and the like, make intuitive sense but are hard to quantify. The main argument in Bruno and Sachs (1985) about persistent unemployment hinges on the real wage gap. The latter seemed to work reasonably well in explaining high unemployment, especially in Europe, until the early 1980s but no longer after that, and recourse had to be made to hysteresis effects and insider-outsider models of the labour market of the kind brought forward by Blanchard and Summers (1986) and Lindbeck and Snower (1986).

### 2.1. The 1970–90 Loop: A Descriptive Account

We return now to a brief look at the growth and inflation trajectories of individual industrial countries, which are shown in figures 2.2. A summary measure of economic performance which the analytical framework would suggest is the slope of the output and price expansion curve which is the ratio of the growth rate to the inflation rate, which we shall refer to as the *G/I* or the *GRIN* ratio. The slope of the ray to the origin from each point in figures 2.2 would indicate that ratio for a five-year moving average and is plotted on a time scale in figure 2.3 for the six large industrial countries.<sup>22</sup>

Several observations emerge from these figures:

2.1.1. From postwar growth to overheating: In almost all countries the golden age, until the

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<sup>21</sup> My own work on the subject took into account other raw materials whose price increased in the early 1970s. This part of the explanation, however, is problematic since the relative price of raw materials is mainly cyclical and there was no apparent reversion to trend when raw material prices bounced back. So this line, just as the role of a sharp short-term recession, can only work if one assumes asymmetry of response, threshold effects on investments and/or hysteresis effects.

<sup>22</sup> The underlying data for a set of 16 OECD countries during five year intervals from 1950 to 1993 are given in Table A.3 in the Appendix.

Figure 2.1

Output and Price Level Expansion in the G-Six countries, 1950-1990

(Natural logs of GDP and CPI, 1970=0)

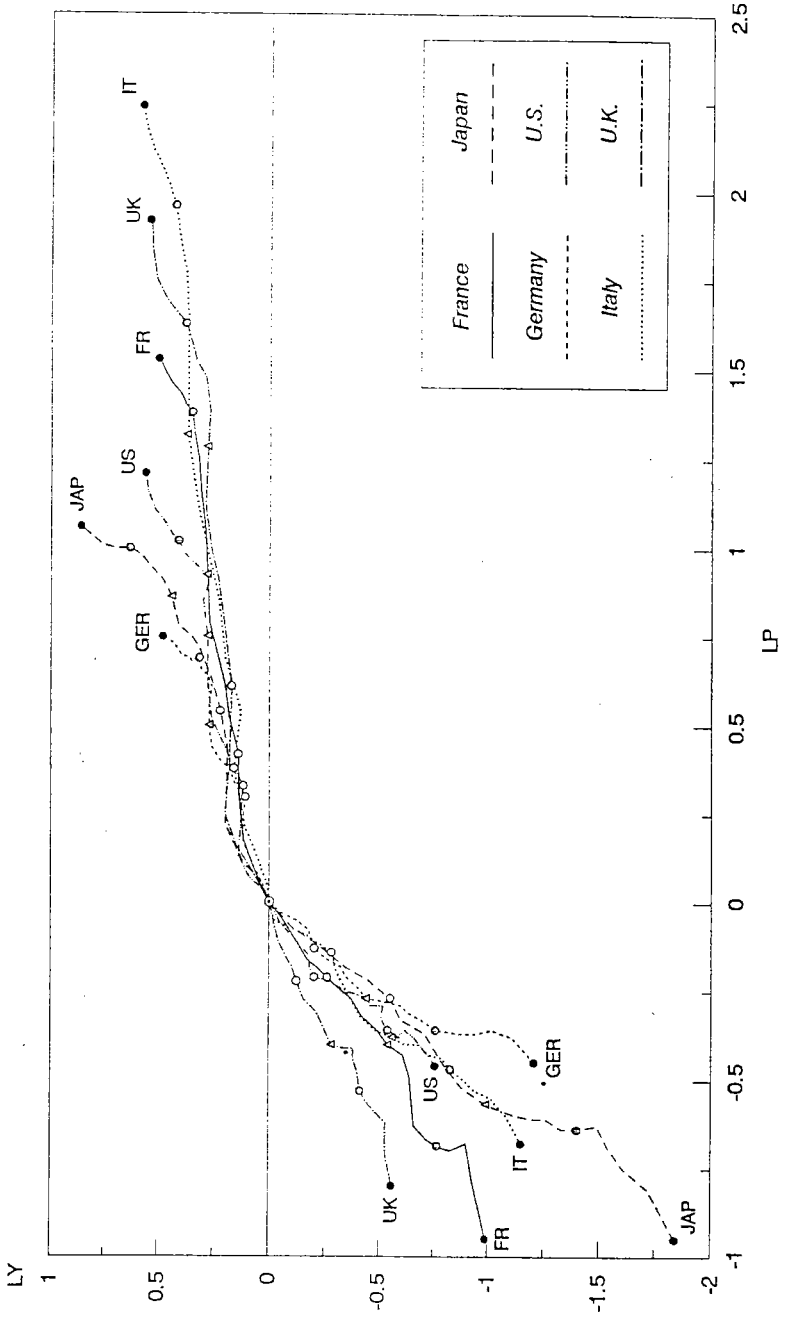




Figure 2.2  
 GDP Growth and CPI inflation, 1955-1993  
 (5-year moving averages, annual rates)

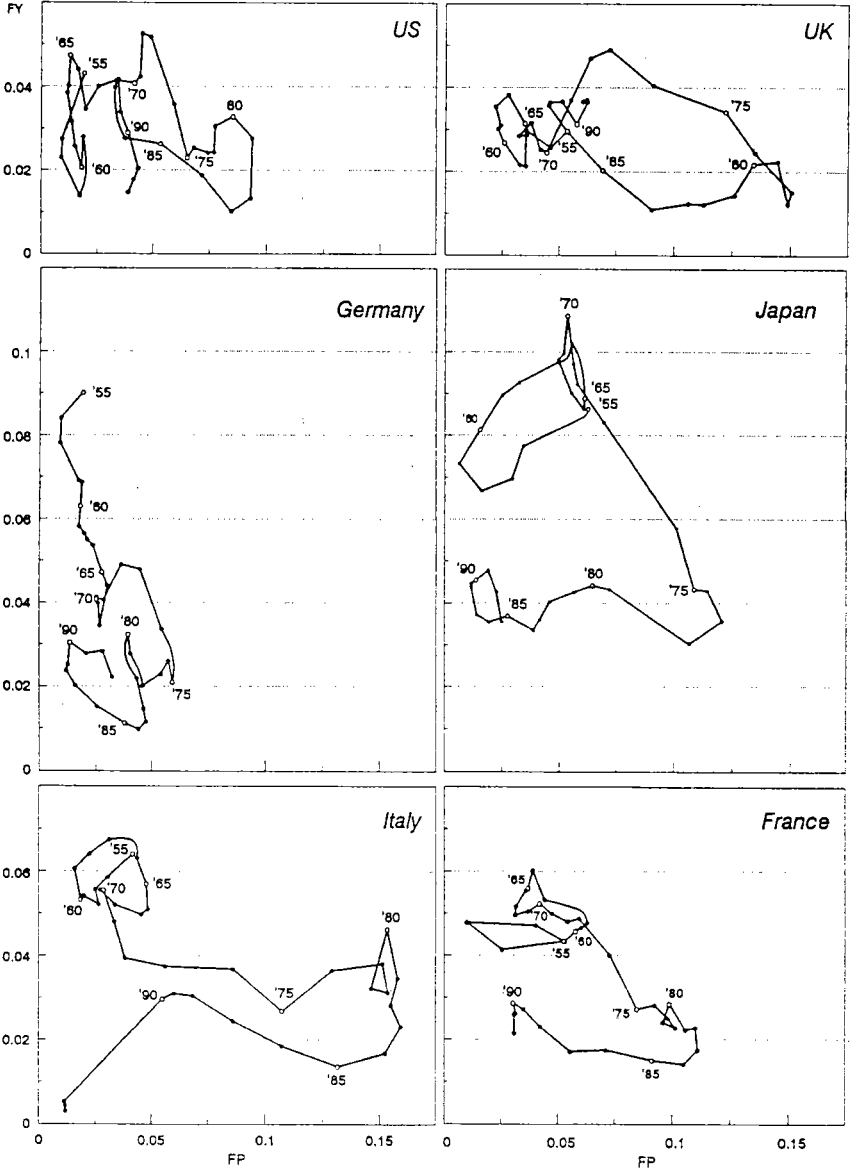
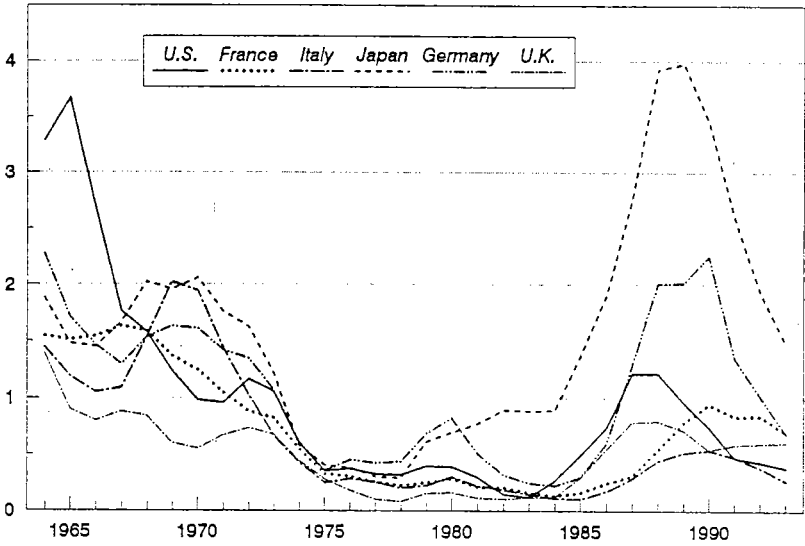


Figure 2.3  
The Growth-Inflation Ratio, Selected Countries: 1964-1990  
Based on 5-year moving averages of GDP and CPI



end of the 1960s, with few interruptions, was marked by high growth, low inflation, high rates of growth-inflation trade-offs (coefficients of at least 1). For most countries the period 1950-70 is marked by relatively small fluctuations of growth and inflation, in line with a standard 'cycles around deterministic trend' model, the synchronisation of business cycles was far from perfect. The amplitude of the growth fluctuations in the U.S. is relatively large and the German drop in growth rate comes from the inevitable adjustment from the postwar very high growth *wirtschaftswunder*.

Almost without exception the second half of the 1960s marks the beginning of a worsening trade-off (Italy seems an exception among the European countries and so is Japan, presumably because both countries still had untapped resources, mainly of surplus manpower in agriculture). This is the period of boom in which unemployment rates throughout the industrial world fell to historically low levels and economies were reaching capacity levels. We note that the worsening trade-off until 1970 is more marked in the U.S. than in Europe, where it was relatively mild. The U.S. experienced and exported the inflationary fiscal and monetary pressures of the Vietnam War which eventually led to the breakdown of Bretton Woods while in Europe the countervailing beneficial effects of the common market and the internal migration of labour were still at work.

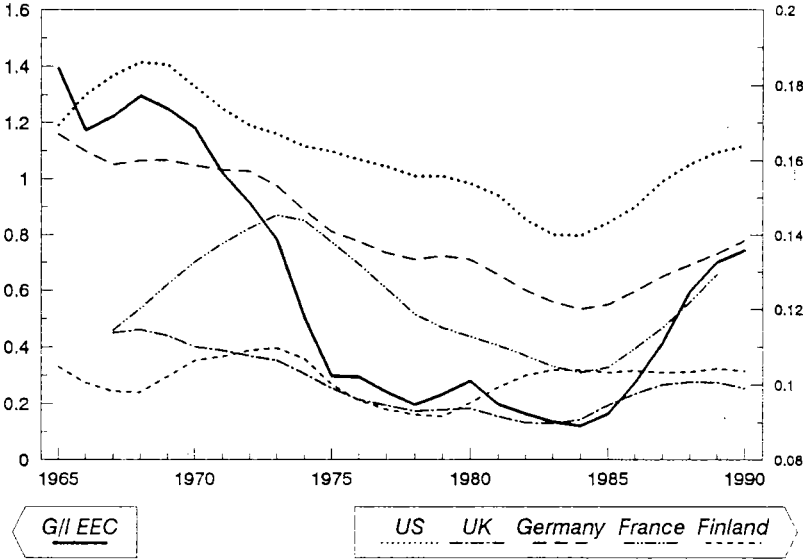
One way or the other 1970 or thereabouts marks an almost synchronized end of the Golden Age of postwar Growth along with the collapse of the Bretton Woods system. The latter started with the suspension of the dollar convertibility to gold in August 1969 which succeeded a worsening of the U.S. trade balance at the end of the 1960s, and was followed by a gradual suspension of dollar parities and floating of major currencies by 1972-73. Prior to that the GATT rounds of tariff reductions, the large expansion of world trade and multinational investment in the 1960s, the expansion of the Euro financial markets all had contributed to a growing interdependence of OECD economies and increasing synchronisation of cycles of expansion and deflation. (For discussion of the relevance of pre-and post 1970 exchange rate regimes to these developments see Bayoumi and Eichengreen, 1992)

In a recent study Glyn, Hughes, Lipietz and Singh (1990) stress, even more than Bruno

and Sachs (1985), that the roots of the 1970s crisis lay in the developments of the late 1960s both on the external front and in the increasing internal tensions. In Europe the 1950s and 1960s had been marked by considerable internal labour migration from agriculture, and international migration from poorer regions of Europe (both sources accounted for 80 percent of EEC employment growth during 1955-70 - see Bernade (1982)). By the end of the 1960s all of this came to an end and with approaching full employment labour started exercising stonger market power. This marks the beginning of the 'overheating' phase, at least in Europe (see figure 1). The student and labour unrest in 1968 and the real wage explosion (see Sachs 1979, Soskice 1978, Pizzorno and Crouch 1978) transformed the system into one of *real* (rather than *nominal*) wage rigidity already before the first oil shock set in. Increasing measure of formal wage indexation schemes took place in a number of European economies. Our measure of the GRIN ratio (in Figure 2.3) as well as the behaviour of business sector profits (see Figure 2.4) indeed show the worsening performance from the second half of the 1960s. As in some middle income countries to which we turn in the next section, unresolved conflict over shares at a time of reduced growth due to overheating and external shocks (be it shares of labour and capital, shares in government budgets for social services and redistribution, and income distribution more generally) was bound to lead to accelerated inflation which indeed started already in the late 1960s.

2.1.2. The Supply Shock Phase: In the aftermath of the first supply shock there was a temporary growth recovery in 75-80, coming from an aggregate demand expansion, which in most countries shows in a simultaneous acceleration in growth and in inflation (with the exception of Germany where inflation falls first, followed by a crash after the second oil shock, and Japan whose performance worsens until 1977, and then turns around). There follows a further drop in growth, at the time of the second oil shock, for all European countries and more briefly for the U.S. and only mildly for Japan (see labour market interpretation below). The drop in output growth following upon the oil shocks has come from the direct shift of the supply curves of countries, exacerbated by real wage rigidity, the need for internal demand contraction to counteract pressures on prices and on current accounts as well as the reinforcing mutual

**Figure 2.4**  
**Rate of Profit in the Business Sector, 5 Selected Countries,**  
**and Average EEC Growth-Inflation Ratio, 1960-1990**  
*(Moving 5-year averages)*



effects of export contraction (all leading to inward shifts in the AD curves).

We note the already familiar difference in trade-off between the first and second oil shock which varies across countries, depending on the immediate macropolicy response to the shock. Only Japan's GRIN ratio (in figure 2.3) shows a *rise* in 80-85, reflecting the much improved macropolicy response to the second oil shock relative to its own performance in 1973-75, the main reason being real wage flexibility (a sharp drop in the consumption real wage while the product wage stayed constant relative to trend — see Bruno and Sachs, 1985, chapter 13). At the same time most of the other industrial countries show a marked worsening in response in the aftermath of the second oil shock.<sup>23</sup> Germany's poor macro response to the second oil shock, compared to Japan's, is particularly marked and probably accounts for its worse growth (and thus GRIN ratio) performance in the subsequent decade - testimony to short-term path-dependence of the growth process, to which we return in the context of the link with investment.

2.1.3. The 'Structural Adjustment' Phase: The period 1985-90 marks a substantial recovery in growth and in the growth-inflation trade-off, for all countries. This process starts in most countries already in 1983 or 1984. The period was marked by a downward reversion in oil prices and a general rise in profitability levels (see Figure 2.4), reflecting inter alia moderating changes taking place in the labour market after a long period of very high unemployment rates which reached their peak in and around that point in time. The systematic improvement in both growth and inflation (and the trade-off measure) continues, for most countries, until the end of the 1980s (the U.S., U.K. and Japan reversed course during 1988-90).

## 2.2. Labour Relations, Corporatism and the Differential Macro Response to Shocks

To what extent can structural factors, in addition to macro policies, account for the differential response of countries to the same shocks? In the earlier study with Jeff Sachs a welfare 'misery index', which subtracts the growth rate from the inflation rate (the measure

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<sup>23</sup> However some Scandinavian countries such as Finland (see the profit rate for Finland in Figure 2.4 and the data for Sweden and Finland in Table A.3), pursued a successful medium term adjustment strategy and showed a better aggregate performance in 1980-85.

followed the work of the late Tarantelli, 1982) and whose change across countries between the pre- and post- oil shock periods (1965-73 and 1973-79) was related to degree of corporatism of countries (which was based on the work of political scientists, Soskice (1978) and Crouch (1978)).<sup>24</sup> Our present framework suggests a measure of economic performance, in the form of the ratio of growth to inflation, whose rationale follows directly from the slope of the  $y$  on  $p$  expansion curve.

The GRIN ratio is inversely related to the 'misery index', but it is defined in terms of ratios rather than sums. (This can make a difference, especially at low rates of inflation, see below). As the analysis of Section I has shown it should be positively related to the slope of the AS curve (which in turn is negatively related to the degree of indexation in the economy) as well as to ratio of shifts of the AS and AD curves along the growth axis.

Table 2.1 gives, for sixteen OECD countries, the Grin ratios in the two sub-periods 1965-73 and 1973-80 (columns 1 and 2) as well as the *drop* in these ratios between the two sub-periods (in column 4). A regression of the GRIN reductions (col. 4) on the corporatism index (col. 5) for 15 countries (excluding Japan) gives a coefficient of 0.084 (standard error of 0.021) and a relatively high  $R^2 = 0.54$  (the adjusted  $R^2$  is 0.51).

In this context one should also mention an interesting study by Calmfors and Driffil (1988) which compares the various measures of macroeconomic performance centering in particular on the role of the degree of unionisation of economies in the increase in unemployment between the period 1963-73 and 1974-85. They show that this relationship should in theory be hump-shaped, a hypothesis for which they also provide some empirical evidence — both the most centralised and the most decentralised economies in terms of union membership seem to have had more real wage restraint and smaller increase in unemployment than the group of countries that are intermediate like Australia, Belgium, Germany and the

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<sup>24</sup> A corporatism rank order and index were based on a composite measure involving the degree of union movement centralization, shop-floor autonomy, employer coordination and the existence of workers' councils. The index runs from 0 to 4; see Bruno and Sachs, 1985, Table 11.3.

Table 2.1. Measures of Structure and Economic Performance

## 16 OECD Countries 1965-1990

	Growth/Inflation Ratios				Drop from (1) to (2)	Corp. Index (5)	Degree of T. U. Centralization (6)	Unemploy. Rate in (1985) (7)	Change in Inflation Rate from 75-80 to 85-90 (8)
	1965-73 (1)	1973-80 (2)	1985-90 (3)	(4)					
Norway	0.73	0.54	0.16	0.19	4	C	2.6	-2.0	
Denmark	0.54	0.16	0.39	0.38	3	C	7.3	-6.0	
Sweden	0.68	0.19	0.34	0.49	4	C	2.8	-4.0	
Netherlands	0.84	0.33	3.62	0.51	4	I	10.6	-5.2	
Switzerland	0.65	0.08	1.10	0.57	2	D	0.9	0.2	
Germany	1.07	0.47	2.25	0.60	4	I	7.2	-2.6	
Finland	0.85	0.23	0.70	0.62	1.5	C	5.0	-5.4	
United Kingdom	0.70	0.08	0.54	0.62	0	D	11.2	-7.7	
Austria	1.12	0.43	1.42	0.69	4	C	3.6	-3.0	
France	0.98	0.22	0.95	0.76	0	D	10.2	-6.9	
Canada	1.21	0.42	0.67	0.79	0	D	10.4	-4.0	
United States	1.03	0.23	0.74	0.80	0	D	7.1	-4.6	
Belgium	1.15	0.31	1.51	0.84	0.5	I	11.3	-4.1	
Italy	1.15	0.23	0.54	0.92	0.5	D	9.6	-9.9	
Australia	1.17	0.24	0.35	0.93	0	I	8.2	-2.4	
Japan	1.56	0.36	3.45	1.20	1.5	D	2.6	-5.1	

*Sources and Definitions*

col.(1)-(4): GDP and CPI data, IFS(IMF)

(5): Based on Crouch (1978); see Bruno and Sachs (1985), Table 11.3.

(6): Calmfors and Driffil (1988), Table 2

(7): OECD data

(8): CPI data, IFS(IMF)



Netherlands which have fared less well in that respect.<sup>25</sup> Their three-way classification of countries by centralized (C), Intermediate (I) and Decentralized (D) unionization appears in column (6) of Table 2.1 and the unemployment rate for the year 1985 appears in column (7).

Neither corporatism nor the degree of wage responsiveness (another measure applied with positive results in the earlier study by Bruno and Sachs) yields any explanation of the change in GRIN, or the misery index, for the period of recovery after 1980. There is, however, some evidence that differential changes in inflation rates across countries are related to the size of the unemployment rate which in turn is related to contractionary macropolicies. A least squares regression of the change in the average inflation rate between 1975-80 and 1985-90, given in column (8) of the table, and the 1985 unemployment rate gives a significant coefficient of 0.39 (standard error of 0.15) and  $R^2$  of .33 (adjusted 0.29), suggesting that conventional Philips curve moderation of wage behaviour must eventually have played a significant role in the disinflation. We have not found any relationship between the change in growth rates and the unemployment rate but there is other evidence from a study by St Paul (1991) that cross-country TFP growth is positively related to the rate of unemployment after 1974.

What these findings suggest is that while differential institutional and structural factors may have attenuated the worsening of macroeconomic performance, in terms of unemployment and the reduction in GRIN ratios, in response to the oil shocks, higher unemployment eventually helped countries to partially correct such disparities through wage moderation.<sup>26</sup> The self-correcting mechanism is, at least partially, at work but at a considerable time lag. The other medium-run channel of inflation, profits and investment will be taken up in the next section.

One way of observing the process of divergence and convergence of countries performance over the so-called 20 year cycle is to look at the cross-country ranking of the five-year average GRIN ratio over five year intervals. Looking at Appendix Tables A.1-A.3 we can

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<sup>25</sup> For a recent survey of the extensive literature on European unemployment and its determinants see Bean (1992).

<sup>26</sup> There is also an empirical negative link, though not a very significant one, between the above measure of corporatism and the rate of unemployment.

see that while the country ranking within the period 1970-1990 changed substantially, this is much less the case when we compare the end point 1965-70 and 1985-90 ratios. There are only 3 countries out of 16 in which a dramatic change in the ranking has taken place - two countries move from the top five class to the bottom class — Italy moves from position 2 to 12 and Australia moves from position 3 to 14. There is one country, the Netherlands, in which a dramatic positive shift has taken place, from position 10 to position 1 (the 1985-90 ratios also appear in column (3) of Table 3.1)<sup>27</sup>. The UK and US have each moved up 4-5 places and all other 9 countries have moved no more than one or two positions. The shifting around of rankings is considerably larger when time intervals within the period 1965-1990 are considered. Since there was convergence in inflation rates across countries towards the end of the period and relatively similar low inflation at the beginning, the above ranking of GRIN ratios could imply a process of convergence to the pre-1970 ranking of growth rates. The growth ladder, though not the actual numbers, may be more stable in the much longer run in which the fundamental growth factors play their dominant role, and it would pay to test that hypothesis, which we have not done. Twenty years, however, is a very long period, corresponding almost to the lifetime of a generation, and it would make little sense to ignore the prolonged systematic departures from the 'very' long-run growth trend even if that hypothesis were to hold.

In section IV we take up a parallel discussion of the inflation and growth framework applied to groups of middle income-countries of both high and moderate inflation to see the qualitative similarities and quantitative differences among groups of countries. But before that we turn to the macro-investment-growth nexus.

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<sup>27</sup> This particular figure is a bit misleading; only in the quinquennium 1985 has the Netherlands surpassed Japan. Minor perturbations in the period of measurement would take the Netherlands out of the top but would still keep it in the top three to five countries. The relatively high GRIN numbers that are obtained for some countries suggests a problem with the comparative use of a level ratio measure when inflation drops to very low rates.

### III. INFLATION, PROFITABILITY AND INVESTMENT

A major link between the short-term and the long-term that needs to be considered in the present context is the one that connects fluctuations in growth and inflation to the profitability of capital and to the investment process. Figure 2.4 already indicated a synchronisation between the long cycle of inflation and growth and the behaviour of the average profit rate for a number of industrial countries. Likewise the rate of capital formation, has also, at a lag, demonstrated a long cycle of recession and recovery during the period 1970-1990. The business sector gross capital stock in Europe grew at rates of 5-6 percent per annum throughout the period 1960-72 and then gradually dropped to rates of 3 percent in the early 1980s.

A strong positive link between profitability and the rate of investment (and a somewhat weaker negative one with respect to the real interest rate) can be established from the data for individual countries and also from the pooling of country data over time, to which we turn below.<sup>28</sup> Likewise there appears to be a link, which an accelerator model of investment would suggest, between the rate of investment and the lagged growth rate. Another significant empirical link to the short-run macroeconomic developments which a recent cross-section study by Fischer (1993) has emphasized is the apparent negative effect of inflation on capital accumulation. It is not apriori clear to what extent the latter two factors have acted on capital formation independently from the profit rate, since their respective movements over time, in response to the supply shocks, were closely synchronized. There is some evidence, to which Benabou (1988, 1992) has given a theoretical basis, for a line of causality running from inflation to reduced markups. Consider first the components and the role of profits.

The average nominal or real rate of profit on capital can be written as the product of the GDP/capital ratio (nominal or real), which is average capital productivity or "capacity utilisation" (CU, for short), and the profit share. In the following identity this is written in

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<sup>28</sup> An earlier study of the link between capital stock growth and the profit rate for the period up to 1982 is reported in Marglin and Schorr (1990).

relative nominal value terms:<sup>29</sup>

$$R = (P_y Y / P_k K) [(P_y Y - WL) / P_y Y] \quad (3.1)$$

WL is the nominal wage bill Y is real GDP, K is the real capital stock and the P's are the corresponding price indices. A fall in R may come as a result of a fall in CU or in the share or in both.

Looking at the components of the OECD data which we shall use below, but not analyse further here, it is interesting to note that the decomposition of the movement of the profit rate differs by type of countries, even though CU, the share and R are all correlated (a rough U-shape) along the 20-year period. In the US, Canada and the UK, which have been more short-term cyclical (due mainly to aggregate demand shifts) most of the action has come from changes in CU, while in France, Germany and Sweden, for example, it is the changes in the profit share in response to changing real wage behaviour. For some countries (e.g. Finland) both factors were at play. The real wage profit nexus is a reflection of the aggregate supply response to the oil shocks which has simultaneously also shown in an increase in inflation and a drop in the rate of growth.<sup>30</sup>

We use the *nominal* rate of profit here because it seems to fit the data and the empirical relationship between investment and profits better. The reason may be the effect of liquidity (due to credit constraints) that larger relative nominal profits gives, in addition to the 'neoclassical' effect of the real profit rate on the expected marginal productivity of capital. The importance of financing constraints in explaining investment behaviour for a broad class of firms even in a most advanced financial system, is well brought out in the U.S. context in an extensive recent

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<sup>29</sup> R here is nominal profits over nominal capital and the first bracket on the right is the capacity ratio in value terms. Both can be turned into real expressions by moving the price ratio  $P_y/P_k$  from the right-hand side to the left.

<sup>30</sup> This longer-run effect of real wage gaps on investment was analysed in Bruno and Sachs (1985) and Malinvaud (1980).

study by Fazzari, Hubbard and Petersen (1988).<sup>31</sup>

We have run a panel regression in which the cross-section of sixteen country data are pooled and run jointly over the 1961-91 period (approximately 460 observations).<sup>32</sup> The following two regressions, which also incorporate country and time dummies (not shown here) are obtained:

$$\dot{k} = 0.722 \underset{(0.027)}{\dot{k}_{-1}} + 0.137 \underset{0.015}{R_{-1}} - 0.021 \underset{(0.009)}{r_{-1}} \quad (\bar{R}^2 = 0.95) \quad (3.2a)$$

$$\dot{k} = 0.745 \underset{(0.025)}{\dot{k}_{-1}} + 0.105 \underset{(0.013)}{R_{-1}} - 0.037 \underset{(0.008)}{r_{-1}} + 0.087 \underset{(0.010)}{g_{-1}} - 0.030 \underset{(0.009)}{\pi_{-1}} \quad (\bar{R}^2 = 0.96) \quad (3.2b)$$

In both equations the coefficients for  $R$  and  $r$  are highly significant. In the second equation the lagged business sector growth rate ( $g$ ) and the rate of inflation in terms of GDP prices ( $\pi$ ) were included and these only slightly change the coefficients of  $R$  and  $r$ . This could suggest that both of these factors may play an independent role in affecting capital formation. The long-run elasticity of capital stock growth ( $\dot{k}$ ) with respect to the lagged rate of profit ( $R_{-1}$ ) is 0.41 or 0.49, depending on whether we apply the second or the first set of coefficients while the elasticity with respect to the growth rate, in equation 3.2b, is 0.34 and that of inflation is 0.12.<sup>33</sup>

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<sup>31</sup> Their empirical work relates the traditional study of financial effects on investment to recent literature on capital market imperfections by studying investment behaviour in groups of firms of different size and different financial characteristics. It is thus possible to rationalize the finding that real factors affect investment in some firms (a la neoclassical models of Jorgenson type, which would also be consistent with the Modigliani-Miller neutrality theorem) but not in others. At any rate it puts into doubt the use of a 'representative firm' model in investment theory. I am indebted to Ariel Pakes for the above reference.

<sup>32</sup> The data originate from the OECD Analytical Data Base.

<sup>33</sup> When only the growth rate is incorporated in the regression the coefficients are almost the same as in 3.2b except for the coefficient of  $r_{-1}$  which gets close to its value in 3.2a. When only the inflation rate is incorporated its coefficient rises to 0.043 while that of  $R_{-1}$  goes up to be the same as in 3.2a while  $r_{-1}$  is as in 3.2b, suggesting the direction in which collinearity may be

How does the inflation rate affect the rate of investment? One possible avenue may be suggested by recent theoretical developments in investment theory, based on option value pricing [see Dixit (1989), Pindyck (1988), Dixit and Pindyck (1992)] linking investment with macroeconomic uncertainty, which raises the volatility of the marginal productivity of capital and pushes up the threshold of the value of irreversible investment below the latter, it will not take place. A recent empirical study by Pindyck and Solimano (1993), based on that theory actually finds that in addition to the conventional lagged link from the growth rate to the investment rate the inflation rate (which is highly correlated with its variability) is the "only robust explanator of the marginal profitability of capital".

A panel regression was run by the two authors in which the dependent variable is the investment/GDP ratio  $I/Y$  (rather than  $\dot{k}$ , the two can be related through multiplication of  $\dot{k}$  by the capital/output ratio). This is carried out for six industrial countries (France, Germany, Japan, Netherlands, the U.K. and the U.S.) over the period 1962-89 and the variables on the right hand side of the regression are the lagged dependent variable  $I/Y$  (with a coefficient of 0.89), the lagged GDP growth rate (with a highly significant coefficient of about 0.1) and the contemporaneous inflation rate (with a highly significant coefficient of 0.088). Incorporating the standard deviation of inflation (which is highly correlated with inflation) adds nothing, but adding the standard deviation of the real exchange rate gives a slight additional negative effect which increases in impact and significance when the inflation rate is left out of the regression.

In order to compare the above estimates with those given in Eq. (3.2) we have to turn the short-run coefficients into implied long-run ones (by dividing the coefficient by  $.11 = 1 - .89$ ) and multiply by an estimate of the capital GDP ratio (which is of the order of 2.5). This would

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running between the two pairs of variables. In an earlier draft of this paper we included a regression in which there appeared to be an additional direct negative effect of inflation on the profit rate, but it was not considered robust enough at this stage. Ideally one would want to estimate a model in which the growth rate and inflation rate as well as the profit rate are determined endogenously within a larger framework, in which the supply shocks as well as the macropolicy variables appear explicitly.

imply the marginal effect of the GDP growth rate on capital growth to be .37 (similar to the one obtained from equation 3.2b) and that of inflation  $-0.32$ , which is stronger than that in (3.2b). A major difference between the two regressions is, of course, the absence of the  $R$  and  $r$  variables from the Pindyck-Solimano regression which are based on a different underlying model.

Whichever channel inflation affects capital accumulation (this must at the moment remain an open question which calls for more research) these groups of results suggest the existence of a strong path-dependence of growth on the shocks and the macroeconomic responses to them as well as a substantial time span over which these short- and medium-run developments could affect the long-run growth outcome. It also lends added importance to the policy link between short-term adjustment, structural features of economies and long-run growth, a subject which assumes even greater importance when we come to discuss, in the next section, the inflation and growth crisis among middle-income countries.

#### IV. SHOCKS AND THE CRISIS AND RECOVERY CYCLE IN MIDDLE INCOME COUNTRIES

We now shift our view to some of the semi-industrial countries, starting with Latin America. Figure 4.1a and 4.1b ( $\log Y$  on  $\log P$ ) applies the previous output and price expansion curve framework to a group of 13 Latin American economies, from which some of the main common and different elements of inflation and growth can be read. They are grouped into the post-1970 high and moderate inflation countries, respectively. Like in the OECD countries the 1950s and 1960s were also here by and large, a 'golden age' of high growth albeit with moderate inflation.<sup>34</sup> There are considerable differences among countries and all profiles show much greater variance of behaviour over time than the OECD countries, mainly a manifestation of terms-of-trade shifts which had always played their important role in countries for which

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<sup>34</sup> The figures start in 1960. Tables A1 and A2 in the Appendix give average growth and inflation data which for some of the countries go back to the 1950s.

Figure 4.1a  
 Output and Price Level Expansion in 7 High Inflation Countries, 1960-1991  
 (Natural logs of GDP and CPI, 1970=0)

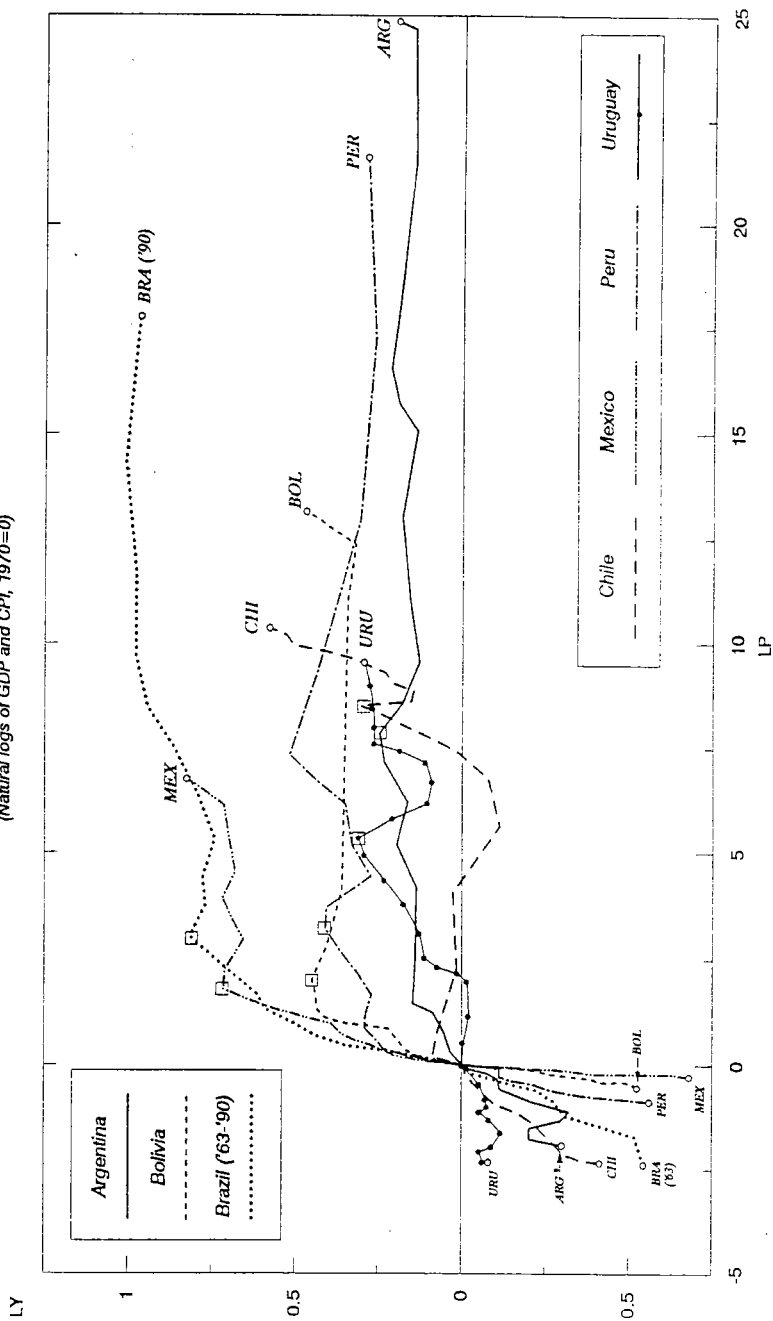
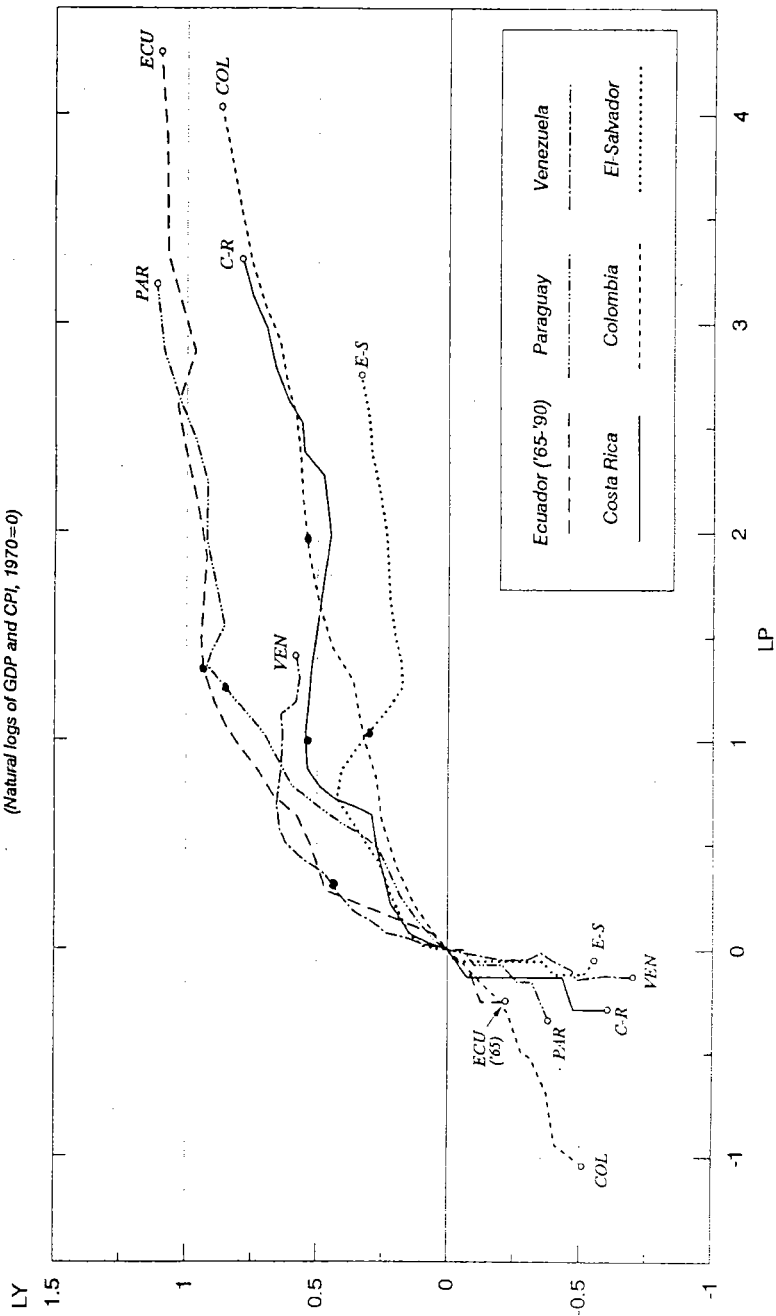




Figure 4.1b  
 Output and Price Level Expansion in 6 Moderate-Initiation Countries, 1960-1990  
 (Natural logs of GDP and CPI, 1970=0)



primary exports are an important source of production and revenue. Our main concern here, however, is with the 1970s and 1980s (The intermediate thick dot on the curves marks the year 1980). We note that Chile (and to some extent Argentina) is an exception in that for this country the early 1970s already witnessed a sharp growth and inflation crisis triggered by very large terms-of-trade shifts. It went into its second major crisis in 1981. For most other countries, which benefitted from the large scale borrowing that became feasible in the aftermath of the first oil shock, the 1970s marked a period of high growth and high investment, financed by extensive and cheap capital inflow, until the increase in real interest rates and the debt crisis came with a vengeance in 1981-2. Figure 4.2 depicts investments and savings before and after the 1981 crises for four large borrowers (more on this follows below).

The group shown in Figure 4.1a includes, other than Uruguay, the six highest inflation countries of which to this date only Brazil stays in very high inflation but only Chile and Mexico (and to a lesser extent Bolivia and Argentina) are into what might be termed renewed growth. The six countries displayed in Figure 4.1b had more minor crises and cumulative inflation that was markedly different from the first group.

One overriding difference with respect to the OECD countries marks the inflation and growth of this group of countries (as well as Israel which will be mentioned below)<sup>35</sup> during the period 1970-1991 as a whole. Not only do we encounter entirely different orders of magnitude of inflation (The horizontal axis of Figure 4.1a multiplies that of Figure 2.1 by a factor of 10!). Here the cross-country correlation between growth and inflation is clearly negative with only Brazil being the most marked outlier.<sup>36</sup> As Table 4.1 shows the Spearman

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<sup>35</sup> In terms of the scale of Figure 4.1a Israel's LP figure for 1991 (1970=0) is 9.96, like Chile's, and its LY value (1970=0) is 0.89, between Mexico and Brazil.

<sup>36</sup> Over the period 1970-1990 as a whole Brazil had the third highest (after Ecuador and Paraguay) cumulative GDP growth and also the third highest cumulative price increase (after Argentina and Peru). The simultaneous high growth no longer applied in the latter part of the period. Since the mid 1980s it joined the rest of the low growth club. We do note, however, that in terms of the GRIN ratio Brazil's relative performance started worsening first absolutely and then also relative to some of the others already in the mid 1970s (see figure 4.3).

Table 4.1 Inflation and Growth 1950-1990:

Rank Correlation ( $\rho$ ) by sub-period and country group

	1960-70			1970-1990		
	GDP Annual Inflation Growth (%)	CPI (%)	$\rho$	GDP Annual Inflation Growth (%)	CPI Inflation (%)	$\rho$
Latin America (10-13) <sup>1</sup>	4	9	-0.75	3	46	-0.48 <sup>2</sup>
OECD <sup>3</sup> (16)	5	4	0.14 <sup>3</sup>	3	7	0.31

<sup>1</sup> For 1960-1970 the 10 countries are: Argentina, Bolivia, Columbia, Mexico, Peru, Uruguay, Venezuela, Costa Rica, El Salvador, Paraguay. For 1970-1990, Ecuador and Chile are also included.

<sup>2</sup> When Brazil is included the rank correlation falls to -0.31

<sup>3</sup> The sample includes the G-6 and 10 smaller economies [Australia, Austria, Belgium, Canada, Denmark, Finland, Netherlands, Norway, Sweden, Switzerland]. For OECD the first period extends over the whole 20 years 1950-1970.

rank correlation coefficient between cumulative growth and cumulative inflation for the twelve countries (excluding Brazil) over the period 1970-1990 is -0.48 (it is even more negative for the preceding decade 1960-1970), while for the OECD countries the figure is +0.31. The latter figure may, however, be misleading.<sup>37</sup>

The depth of the joint growth and inflation crisis in these countries as well as in some other middle-income countries (such as Israel's), is not related to the size of the terms-of-trade shocks as such, because these did not markedly differ across countries. It lies rather in the differential domestic macroeconomic response to the shocks, notably large fiscal budget deficits and monetary accommodation. The easy access to large scale foreign borrowing in most cases only postponed the crisis and accentuated it later on. Should one look at output and inflation as jointly determined in this case, in terms of our initial framework, as was done in the case of the OECD countries? It was already argued in Section II that for very high rates of inflation moving intersections within the underlying AD and AS framework cannot capture the dynamics of inflation. The cumulative experience with extreme inflation episodes shows that beyond a certain inflation threshold the economy may lose its nominal anchor and a 'neoclassical dichotomy' between the real and the nominal system sets in, so that the nominal system, so to say, 'lifts off' into a life of its own. It will distort the real economy and reduce its TFP but the conventional short-term Phillips-curve trade-offs no longer exist. (In terms of figure 1.2 this implies that one is on the horizontal portion of the AS and AD curves). However, the nominal components of pricing may still be applied as the basis for analysis of the dynamics of inflationary spirals while the real demand side fiscal seignorage-based model can be applied to determine the 'equilibrium' steady state rates of inflation, if equilibrium exists.<sup>38</sup> The growth

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<sup>37</sup>An ordinary least squares regression of the output expansion over the price expansion gives a significantly negative coefficient with an  $R^2 = .46$  for the 12 countries, but only 0.23 when Brazil is included. OLS for the 16 OECD countries gives a positive but insignificant coefficient and an  $R^2$  of close to zero.

<sup>38</sup>The neoclassical dichotomy à la Patinkin (1956) is extensively discussed, in the context of the high inflation dynamics of Israel and the extreme inflation cases of Latin America, in Bruno (1991, 1993). The seignorage model is analysed in Bruno and Fischer (1991). In terms of figure

rate and the rest of the real system can still be determined within an AD and AS framework along with *relative* prices, leaving the *rate of change* of nominal magnitudes -prices, wages, exchange rates and monetary aggregates to be determined by one of the above dynamic mechanisms.

#### 4.1. High Inflation and Low Growth: Joint Determination and Two-Way Causality

What are the interactions between the growth rate and the inflation rate in such a system — and is there any clear causal link between the two? The answer to this question is not independent of the intensity of inflation and the nature of the crisis and there may be causal mechanisms working in both directions. Let me start with the more generally acceptable causality running from inflation to growth. The conventional argument invokes the distortions caused by the variability of price levels and of relative prices (especially for *unanticipated* inflation) which will affect the total factor productivity residual for given inputs of productive factors. In addition there is the argument that was applied in section III, running from inflation or inflation uncertainty through the rate of profit to depressed capital accumulation. To this one may add the pressure to cut government budgets where it hurts least in the short run, namely investment in infrastructure. There will also be the distortive effects of high inflation on the structure of production, in particular the inflation of financial service activities at both the economy and the firm level<sup>39</sup>.

In an open economy the frequent co-existence of high inflation with considerable balance of payments problems often forces governments to reduce the growth rate in order to economize on imports of raw materials and capital goods. Such contraction is often also coupled with

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1.2 such dichotomy implies that AS=AD becomes a horizontal line and inflation is separately determined.

<sup>39</sup>On this and related arguments see Fischer and Modigliani (1978). While these growth costs apply to sustained inflationary processes there are also the separate more dramatic disruptions of the economic system during brief, but extreme, hyperinflation episodes. I am indebted to Nissan Liviatan for suggesting these distinctions.

price-shocking policies (such as subsidy cuts and devaluations) which lead, under monetary accomodation and/or indexation, to jumps in the inflation rate. This would be one additional explanation as to why high inflation and low growth would tend to occur simultaneously.<sup>40</sup>

Are there causal links working in a clear reverse direction from low growth to high inflation? Let me mention at least two related channels which link the inflation rate with unexpected drops in the growth rate. In an economy which had been running a high growth rate, with relative price stability, such as in many of the semi-industrial economies in the 1960s, a given pre-existing government budget deficit which cannot be reduced, for political reasons, may turn highly inflationary once there is an exogenous shock to the growth rate. The reason is that the growth in demand for real government bonds and real money holdings will drop along with the growth rate. Thus a hitherto noninflationary budget deficit may become inflationary as a result of an exogenous shock to growth. There is no doubt that this factor played an important role in explaining the jump of the inflation rate (in response to the large drop in the growth rate) after 1973 in the case of Israel (see Melnick and Sokoler (1984)).

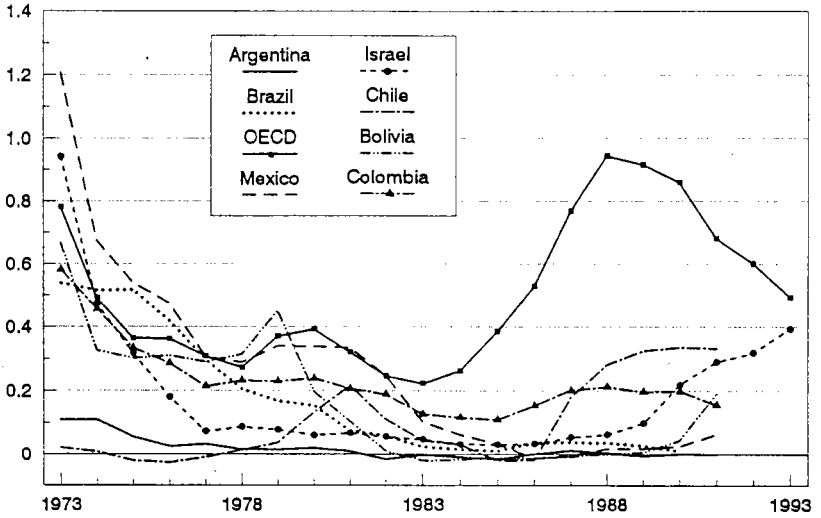
More generally the argument has been made, particularly in the context of several Latin American economies at the turn of the 1970s, that expectations of continuing growth from the 'Golden Age' of the 1960s and the expectations of growing living standards on the part of underprivileged social classes forced democratic governments into 'populist' policies which increased budget deficits.<sup>41</sup> In some of the cases these could at first be financed through the easier access to foreign borrowing, for which the inflationary price had to be paid later, and in others the finance was inflationary from the start. Finally, the events of 1968 in the industrial countries (the student unrest and workers' strikes) were not confined to the industrial world but had repercussions elsewhere. As figure 4.3 (and Table A3 in the Appendix) shows the

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<sup>40</sup> Israel in the 1970s and several Latin American episodes would be cases in point.

<sup>41</sup>For more detailed discussions of individual country histories in this context, see the volumes edited by Dornbusch and Edwards (1991) and Sachs (1989). Alesina and Rodrik (1992) and Persson and Tabellini (1992) are two broad cross-section studies that link political factors and distributional conflict with economic growth.

Figure 4.3  
*G/I Ratio, 6 Latin American Countries, Israel,  
 and OECD, 1973-1991*



worsening GRIN ratio already occurred at the turn of the 1970s even for countries, such as Mexico and Bolivia, as well as Argentina and Brazil, for which the extreme inflation and growth collapse occurred only much later.

What all of these elements have in common is the fact that an exogenous real shock reduces GDP (or, at least, its growth rate) and imposes a real burden on society. Inflation, low moderate or high, is a measure and a manifestation of the irreconcilability of conflicting claims on a diminishing pie. In a corporatist democratic society institutional arrangements exist by which such claims can be settled by consensus, at a lower inflation (or further growth reduction and unemployment) cost. In an authoritarian regime the burden sharing can sometimes be settled by decree but even there coalitions and pressure groups can be formed and compromises must often be made to avoid unnecessary social conflict.<sup>42</sup>

#### 4.2. Interactions of Shocks, Macro Response and Structural Features

As in the case of the industrial countries in the 1970s one may ask what are the structural explanations that could account for the differences in country inflation and growth response at the time of crisis. A study by Berg and Sachs (1988) has asked a related question with respect to the prediction of different countries' ex-ante probability to incur debt rescheduling. The same type of argument can also be applied to the predicted position on the inflation and growth performance scale. The Berg-Sachs study develops a cross-country statistical model of debt rescheduling and secondary market evaluation of LDC debt which links these variables to several important structural characteristics of developing countries - the trade regime (the degree of inward or outward orientation which is inferred from a World Bank comparative study), the degree of income inequality (which is measured by the ratio of the top and bottom quintiles and is shown to significantly increase the probability of debt rescheduling)<sup>43</sup> and the share of

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<sup>42</sup> Both Mexico at the turn of the 1970s and even Chile under dictatorship in the mid 1970s bear witness to this reality (e.g. the 100 percent wage indexation introduced in Chile in 1974).

<sup>43</sup>It is interesting to note that this reverses the causality of the well known Kuznets relationship between income inequality and economic growth.



agriculture in GNP (high degree of urbanisation increases the probability of political instability and thus motivates more 'populist' policies).

Applying a probit model based on these characteristics Berg and Sachs (1988) estimate the debt-rescheduling probability for a set of 24-35 countries (24 have more fully measurable trade indicators) in Latin America, Asia and a few countries from other continents. The 8 Latin American economies included in the smaller sample are listed in Table 4.2. The first column ranks countries by the average inflation rate during 1970-90, in terms of log differences (the most stable country is given the rank of 1), the second does the same for the ranking of average GDP growth rates and the third column indicates the ranking in terms of the GRIN ratio (log difference in GDP over the log difference in CPI between 1970 and 1990). Column (4) gives the calculated ranking by the Berg-Sachs measure which runs from 0.46 for Columbia, the lowest in the group, to 1 for Peru. Columns (5) and (6) give, respectively, the total debt to export ratio in 1981 (public debt ratio in the brackets) and of the debt discount in the secondary market (as measured in July 1987).

We first underscore the Berg and Sachs finding that the calculated probability to reschedule is a good predictor of the actual debt burden and the secondary market price measure.<sup>44</sup> In terms of our own topic of concern here we note that the economic performance measures, the average GRIN ratio as well as the inflation rate (and to a somewhat lesser extent the growth rate) are rank-correlated with the calculated probability to reschedule, which is a composite structural index that in some sense is a counterpart of the measure of corporatism for an industrial country. Only one country is removed by more than two positions for at least one of the two rankings - Uruguay; its macroeconomic performance was considerably worse than would be predicted by any of the structural or actual debt measures.

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<sup>44</sup>Colombia is the only country in the above group which had no debt rescheduling but was on the borderline in terms of the market price of its debt. It was an outlier in terms of low share of urban population, low degree of populism and appropriately low government budget deficits during the period in question, and it shows in the moderate behaviour of the G/I measure over time - see Figure 4.3.

Table 4.2. Economic Performance 1970-90 and Structural Factors:

Ranking 8 Latin American Borrowers

Debt and Income Distribution

	Ranking by:			Ranking by:	Debt/	Public	Debt	Income
	GDP	Inflation	G/I	Berg-Sachs	Exports	Debt/	Discount	Distribution
	growth			Index		Exports		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Columbia	2	2	1	1	121	108	19	21.3
Venezuela	5	1	2	3	129	71	33	18.0
Mexico	3	3	3	5	239	100	47	15.1
Brazil	1	7	4	7	268	85	45	33.3
Chile	4	4	5	4	273	93	33	11.4
Uruguay	6	5	6	2	100	45	32	10.8
Peru	7	7	7	8	160	142	89	32.1
Argentina	8	8	8	6	269	109	53	11.4

Notes:

- Col.(4): Ranking by 'Probability to reschedule debt' estimated from profit model by Berg and Sachs (1988), based on trade regime, urbanization and income distribution.
- Col.(5)-(6): Debt to Export Ratio (percentage) for 1981, total (5) and public only (6).
- Col.(7): Bid price for \$100 claim of debt to financial institutions and secondary market, July 1987.
- Col.(8): Ratio of highest to lowest quintile.

Sources:

- (1)-(2): Calculated on the basis of IFS (IMF) data.
- (4)-(8): Berg and Sachs (1988), Tables 1,2,7,8.

Brazil, as mentioned earlier, fits well in terms of inflation but not in terms of growth (and thus GRIN for the period as a whole. While among the Latin American economies it was, relatively, more outward oriented, and suffered less from balance of payments crises, it had the most unequal income distribution within the group (see last column in Table 3.2). This basic fact prevented successive democratic governments, at the end of a long period of military government, from adopting the required austerity measures or from adopting stringent monetary policies vis a viz its business sector. Brazil proves the point that you may continue with high growth and high inflation for a while but not without limit - its GRIN ratio for 1980-1990 would have placed it much closer to its true position in the ranking by the debt rescheduling predictor. By 1993 Brazil indeed remains the only economy in the region with more than two digit annual inflation.<sup>45</sup>

#### 4.3. The Dynamics of Recovery from Extreme Inflation

Figure 4.3 gives a comparative picture of the development of the GRIN ratio for several countries over the last 15 years along with the OECD curve for reference. Israel is included as the depth of its high inflation and low growth crisis in the 1970s and early 1980s assumed Latin American dimensions.<sup>46</sup> Among the countries that have successfully come out of the deep crisis Chile is particularly marked. After an initial success in the stabilisation and reform during the 1970s at the time of the debt crisis its relative position worsened again and to most observers it looked no better than Argentina and Uruguay in terms of the failure of the reform process. The speed with which it came out of the crisis after a successful 1982-3 stabilisation effort is shown by the rapidly rising G/I curve in figure 4.3 and can be ascribed to the series of structural

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<sup>45</sup>It is probably no accident that Peru which was the worst-off economy in terms of the composite predictor finally stabilized, before Brazil, only after giving up democracy.

<sup>46</sup>The same cannot be said of the elements that make up the Berg-Sachs structural predictor, where Israel ranks among the lowest (probability to reschedule of 0.012) together with several East Asian economies, on account of a more egalitarian income distribution and a more outward trade orientation than that of the average Latin American economy.

reforms it had undertaken in the earlier years.

Figures 4.4a to 4.4d show the cycle of crisis and recovery for four successful stabilisers from extreme inflation. It is interesting to note the qualitative similarity of the 20 year loop<sup>47</sup> with that of a typical OECD country. There are two notable differences, however. One is the obvious 10 and 20 times (for Bolivia) larger amplitude on the inflation axis and for three of the four countries a temporary shift into the negative growth region. The other is anti clock-wise movement of the trajectory during recovery. The fact that growth is systematically higher after a sharp stabilisation is consistent with the finding that very high rates of inflation are definitely harmful to growth. Stabilisation by itself, even before sustainable resumption of investment and long-run growth, improves resource allocation and total factor productivity.<sup>48</sup>

In all four countries the initial stabilization included a sharp cut in the fiscal deficit and a sharp devaluation coupled with a credit squeeze. In two of the countries, Israel and Mexico, stabilization was of the *heterodox* kind, namely direct intervention in the dynamics of inflation in the form of a wage and exchange rate freeze (coupled in the case of Israel with temporary price controls), supplemented the fiscal cut.<sup>49</sup> Structural reforms, which in most cases accompanied the initial adjustment (in Israel this part came gradually during the post-stabilization period) consisted of trade liberalization, financial deregulation, privatization and the introduction of greater flexibility in the labour market.

Figure 4.2 shows the diverse behaviour of investment after stabilization for two of the countries. Chile which was the earliest reformer (mid 1970s) showed a strong effect, mainly a composition switch to the policies; private investment rose from 5.3% in 71-75 to 11.2% in 76-

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<sup>47</sup>Because of the five-year averaging that has been adopted here Mexico's cycle does not look complete since its stabilization took place only in 1988 and the last observation on the curve is the average for 1986-91. The actual numbers for 1991-1992, however, already place it at the end of the loop.

<sup>48</sup> In the case of Israel, for example, average annual TFP growth rose from -0.5 in 1981-84 to 2.6 percent in 1986-90.

<sup>49</sup> For a detailed analysis as well as cross country comparisons see Bruno(1993).

Figure 4.4 Inflation & Growth, Successful Stabilizers  
(Moving 5-year averages)

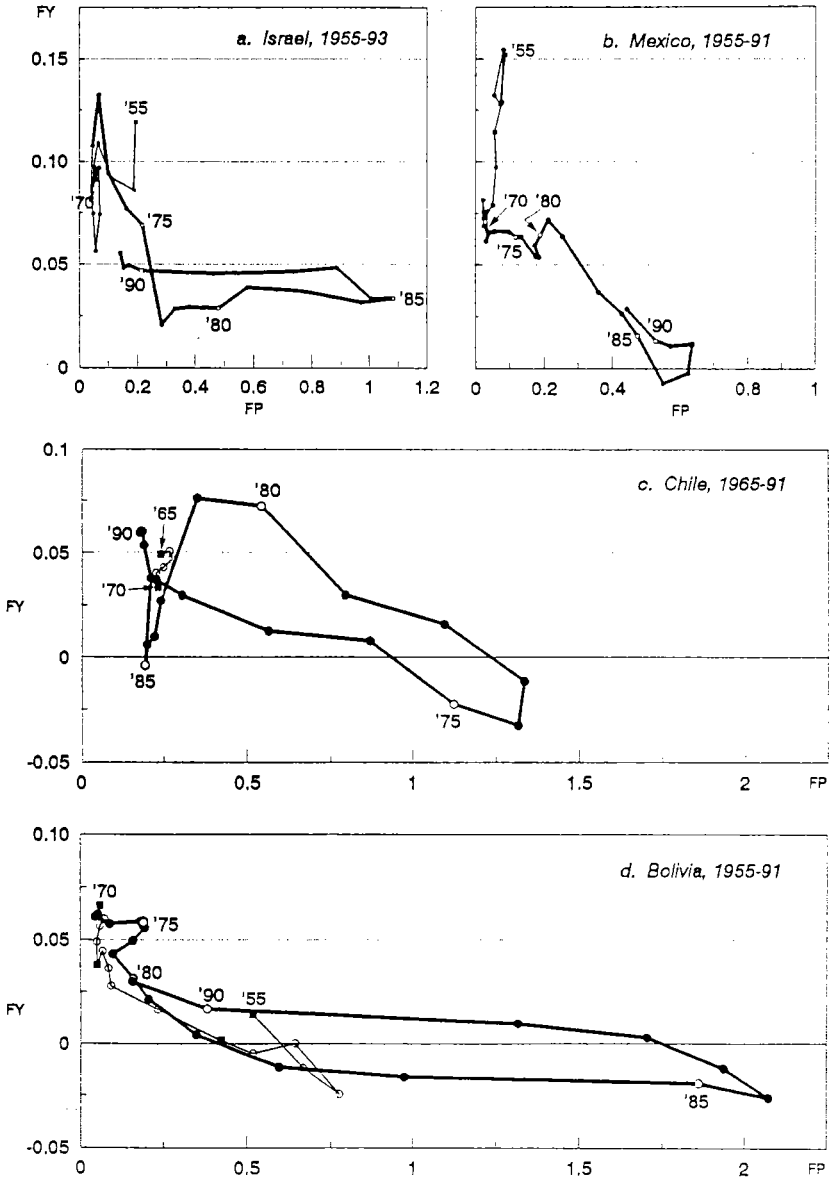
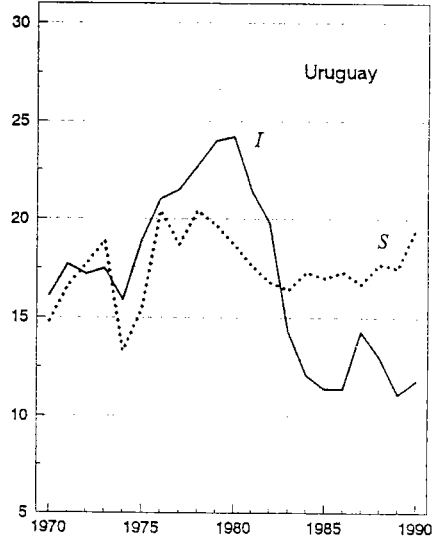
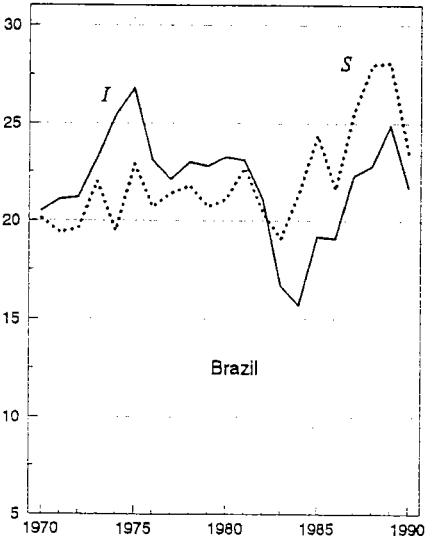
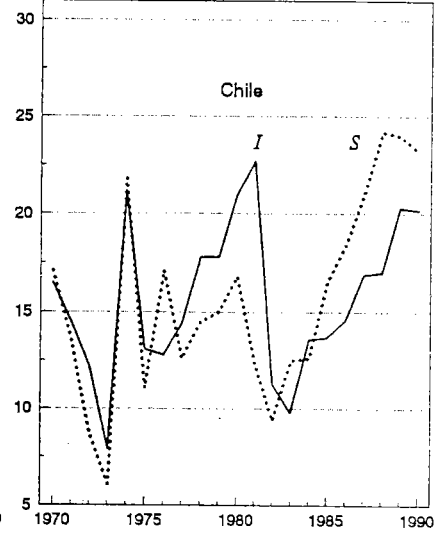
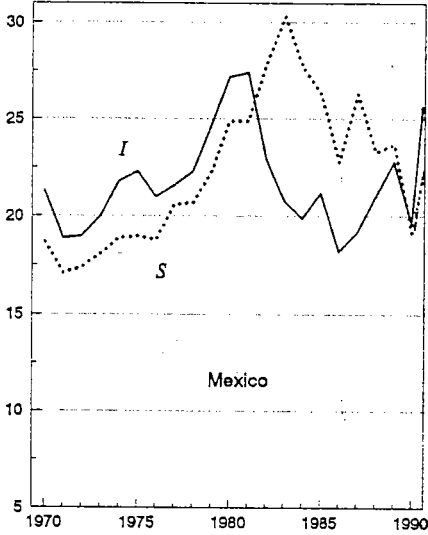


Figure 4.2

Investment (I) and Saving (S) Rates, 4 Latin-American Countries  
1970-1990  
(Percentage of GDP)



81, while public investment was cut in half from 10.6 to 5.8 during the same period (mainly public sector enterprises) - deregulation of markets, full assurance to private property, after Allende's failed socialist experiment. Subsequently Chile's 1982-3 crisis was one of the worst - a 10 percentage point drop in I/Y (11% for private investment), with a sharp rebound in investment later on. As can be seen from figure 2 Chile's medium term adjustment also involved a large increase in the savings rate.

In the case of Mexico I/Y fell by 8% from 78-81 to 82-89, but most of it (5%) was in public investment with only a moderate temporary fall in private investments. This contrasts with the case of Israel, in which there was a sharp drop in investment, from a high of above 30% of GDP in the early 1970s to below 20% after stabilization, with a rebound occurring only very recently, 5-6 years after the successful 1985 stabilization. The numbers for the growth rate of the capital stock in the business sector appear in Figure 4.5. This marked difference between the two countries can be explained in terms of the different behaviour of two key real factor prices - real wages and real interest rates, in both of which there was substantial overshooting in the case of Israel resulting in a sharp two-year recession which took place two years after stabilization.<sup>50</sup>

High real interest rates have characterized virtually all sharp stabilizations and is one of the reasons holding up investment renewal, along with the uncertainty about the sustainability of stabilization. The case of real wage overshooting is confined to the existence of a rigid labour market, like Israel's, where a reputation game had to be played between the government (mainly the Bank of Israel), the employers and labour unions to establish the credibility of a stable exchange rate anchor. The cost was the need to go through a period of unemployment before real wages started falling and a precondition is the existence of a sufficient exchange reserve cushion to tie the government over a period of real appreciation and loss of competitiveness. In the case of Israel this post-stabilization adjustment to more flexible exchange rate and interest rate policy as well as greater wage moderation took 3-4 years, during which

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<sup>50</sup> For a more detailed comparison see Bruno (1993), Chap. 6.

profits continued to be squeezed.

Figure 4.5 shows the close relationship between profitability (in turn affected by unit labour costs) and investment in the Israeli case. A least squares regression of capital stock growth on the contemporaneous rate of profit in the business sector, over the period 1968-92 (25 observations) gives a highly significant coefficient of 0.64 (standard error of 0.06) with an adjusted  $R^2 = 0.82$  (and a Durbin Watson coefficient of 1.73), suggesting that the link may be mainly through the financial channel mentioned in the industrial country context. An earlier detailed study by Lavi (1990) for the period 1962-88 has shown an additional close link between investment and the real short-term interest rate.<sup>51</sup> Lack of data does not enable a similar analysis of other countries in our sample.

Can a link between inflation, investment and growth be established here as in the case of the OECD countries? The previously quoted study by Pindyck and Solimano (1993) includes a separate panel regression for the group of six high inflation economies - Argentina, Bolivia, Brazil, Chile, Mexico and Israel for the same 30 year period 1960-1990. Here again the Investment/GDP ratio is regressed over its own lag (with coefficient .76), on the growth rate (0.17), the inflation rate (-0.00016) and the variability of the real exchange rate (-0.0924). All coefficients are highly significant. Working out the long run response of growth and inflation we get coefficients of 0.73 for the growth rate but only -0.00067 for inflation. Thus, roughly speaking, a 500 percent increase in inflation had the same effect on the I/Y ratio in a high inflation country as a 1 percent had for an industrial country (where the implied long-run inflation coefficient was 0.32). Moderate inflations of the 1960s and early 1970s apparently did not affect investment rates among these countries but the very high inflations later on, and in particular the hyperinflations of Bolivia and Argentina, did, though the estimates seem surprisingly small. The coefficient for the growth rate, however, was larger than for the industrial countries and with much deeper growth collapse the total investment (both private and

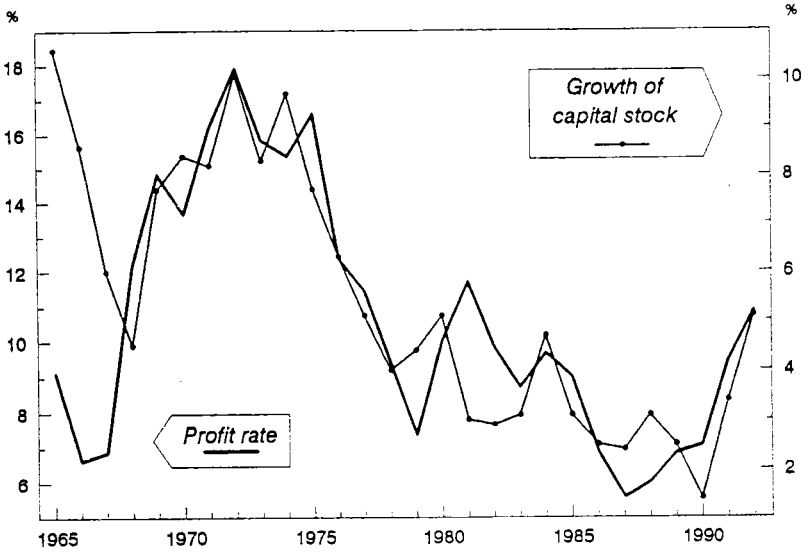
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<sup>51</sup> The significant effect of short-term, rather than that of the long-term, rates is rationalized by the author in terms of firms' recourse for short-term credit finance of investment.



Figure 4.5

Rate of Profit and Growth Rate of Capital Stock,  
Israel's Business Sector, 1965-1992



public) response to the debt shock was very sizeable. Typically investment ratios in some of these countries fell by 5-7 percentage points between the decades of the 1970s and the 1980s. Resumption of investment, once stabilisation has been achieved, is by theory as well as in actual practice, extremely slow.<sup>52</sup> So here, even more than in the case of the industrial countries, the deep crisis of the 1970s (and even more in the 1980s), and the delayed adjustment to the external shocks, had and must still keep having a very marked effect on long-run growth.

#### 4.4 End Note on Eastern Europe

This paper is already too long to include a separate detailed discussion of Eastern European Reform.<sup>53</sup> The only point to be mentioned in the present context is the fact that while Eastern Europe has brought up very many new and substantially uncharted problems some of the issues can be cast into an inflation and growth framework of the type used here.

In almost all the cases of protracted inflation and growth collapse, of the kind discussed in the Latin American context, the crisis involved several dimensions — a drop to zero (or negative) growth lasting for a considerable length of time, and a worsening of *both* the macro-imbalance of the economy and the structural maladjustment dimension of the micro-economy. The former usually involves both internal fiscal imbalances as well as external imbalance while the structural maladjustment involves distorted production structures and distorted signals of relative prices. With time the various dimensions of the crisis tend to reinforce each other; for example, a sustained high inflation (open or repressed) exacerbates the micro distortions in the economy while distorted labour, commodity, or financial market structures may worsen the extent of macro imbalance in the economy.

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<sup>52</sup> See discussion in Dornbusch (1990). An extreme example not shown here is Bolivia whose 1985 stabilization was a success, yet GDP growth per capita by 1991 hardly returned to be positive and investment has remained depressed at barely positive net investment (gross investment in 1990 was of the order of 12%, down from close to 30% in the first half of the 90s).

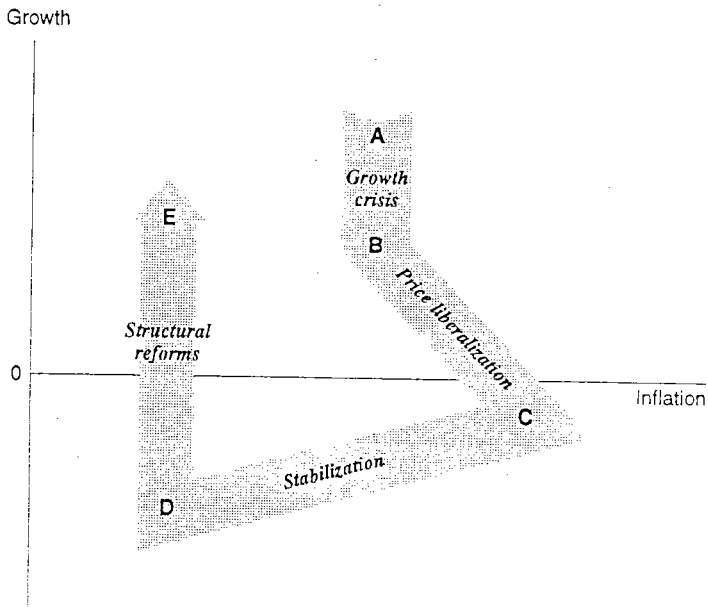
<sup>53</sup> For a more detailed discussion see Bruno (1993a,b).

How relevant is this to Eastern and Central Europe? Obviously their systems lacked basic attributes of market economies making the whole problem of restructuring a very different one. Yet at a level of macroeconomic generalities there are some analogies. All these countries went through a phase of sharp growth slowdown with repressed inflation that burst out into the open once the price system was liberalized. The outcome, in terms of the drop in growth and the rise in inflation in 1989–90, had supply shock properties. As to the adjustment and structural reform phase, the difference is one of considerable degree, which in analytical terms would show in the steepness and distancing of AS curves. For example, the existence of substantial distortions in the financial markets would make the required monetary contraction (to achieve a given reduction in inflation) much more costly in terms of the output loss, namely a considerably steeper  $g_s$ -curve (in the context of Figure 1.2).

Figure 5.1 gives a stylized representation of phases of crisis and reform into which most countries in question can be classified. All of Eastern and Central European countries went through a prolonged growth crisis starting in the second half of 1970s and into the 1980s (a shift from A to B). At different points in time they have all, or are still, in the process of price liberalisation which takes the form of a price shock and a sharp drop into the negative growth region (from B to C). Poland, Czechoslovakia and Hungary (the latter much more gradually) have gone through price liberalization and stabilization and find themselves now somewhere on the structural adjustment phase (between D and E) with Poland so far the only country beginning to show positive growth (with the Czechs soon to follow). Romania and Bulgaria have opened up and are still in the process of stabilization (somewhere between C and D in Figure 5.1), while most members of the former Soviet Union (with the exception of some of the Baltics) have not quite yet reached the point C, yet are in very high inflation and negative growth.

One of the many interesting questions that both the Latin American experience and the more recent Eastern European episodes raise is that of the sequencing of stabilization and structural reforms. Stabilization, in stylized terms, implies a sharp inward movement along the horizontal inflation axis with smaller or larger output sacrifice, while structural reform is depicted as the subsequent vertical movement along the growth axis amidst relative price

Figure 5.1  
Stylized Representation of Crisis, Adjustment and Reform  
In Eastern Europe



stability. Can stabilization be achieved without some simultaneous structural reforms? Moreover, are there 'diagonal' short-cuts between C and E, by which some structural reforms can also be achieved amidst very high inflation? I shall not attempt to answer these questions here. Instead I will end this paper by reiterating the point made at the beginning and followed as a motto throughout - both the positive economics of growth and growth crises in recent decades as well as the policy and reform options, for very heterogenous types of economies, are more properly discussed within a framework in which growth and inflation are simultaneously tackled.

## REFERENCES

- Alesina, A. and A. Drazen. (1991), "Why Are Stabilizations Delayed?" American Economic Review, 81 (No.5, December): 1170-88.
- Alesina, A. and D. Rodrik. (1992), "Distribution, Political Conflict and Economic Growth: A Simple Theory with Some Empirical Evidence", in Armstrong, P. and A. Glyn. (1986), "Accumulation, Profits, State Spending 1952-83" (Oxford: mimeo).
- Bayoumi, T. and B. Eichengreen (1992), "Macroeconomic Adjustment Under Brettan-Woods and the Port-Brettan-Woods Float: An Impulse-Response Analysis", NBER Working Paper, No. 4169, September.
- Bean, C. (1992). "European Unemployment: A Survey", Discussion Paper No. 71, ESRC, London School of Economics, March.
- Benabou, R. (1988), "Search, Price Setting and Inflation", Review of Economic Studies, Vol. IV: 353-376.
- Benabou, R. (1992), "Inflation and Markups", European Economic Review, Vol. 36: 566-574.
- Berg, A. and J. Sachs. (1988), "The Debt Crisis: Structural Explanations of Country Performance", Journal of Development Economics, Vol. 29, No. 3, November: 271-306.
- Bernade, F. (1982), "The Labour Market and Unemployment", in A. Boltho (ed.), The European Economy: Growth and Crisis (New York: Oxford University Press): 159-88.
- Blanchard, O. J. and L. H. Summers. (1988), "Hysteresis and the European Unemployment Problem", NBER Macroeconomics Annual: 15-78.
- Bruno, M. (1991), "High Inflation and the Nominal Anchors of an Open Economy", Essays in International Finance, No. 183, Princeton University, June, 1-29.
- Bruno, M. (1993a), "Stabilization and the Macroeconomics of Transition - How Different is Eastern Europe?" Economics of Transition, Vol. 1 (1), January: 5-19.
- Bruno, M. (1993b). Crisis, Stabilization and Economic Reform: Therapy by Consensus, Oxford University Press (forthcoming).
- Bruno, M. and S. Fischer. (1990), "Seignorage, Operating Rules and the High Inflation Trap", Quarterly Journal of Economics, 105 (421): 353-74, May.
- Bruno, M. and Sachs, J. (1985), Economics of Worldwide Stagflation. Cambridge, Mass.: Harvard University Press.

- Bruno, M. and Sachs, J. (1985), Economics of Worldwide Stagflation. Cambridge, Mass.: Harvard University Press.
- Calmfors, L. and J. Driffil. (1988), "Bargaining Structure, Corporatism and Macroeconomic Performance", Economic Policy, April, 6: 14-61.
- Corden, M., R.N. Cooper, I.M.D. Little and S. Rajapatirana. (1993), Boom, Crisis and Adjustment: The Macroeconomic Experience of Developing Countries, The World Bank, (forthcoming).
- Crouch, C. (1985), "Conditions for Trade Union Wage Restraint" in L. Lindberg and C.S. Maier (eds.), The Politics of Economic Stagflation, The Brookings Institution, Washington, D.C.
- Crouch, C., and A. Pizzorno. (1978), The Resurgence of Class Conflict in Western Europe Since 1968, London: Holmes and Meier.
- Denison, E.F. (1979), Accounting for Slower Growth: The United States in the 1970s, Brookings Institution, Washington, D.C.
- Dickens, W.T. (1982), "The Productivity Crisis: Secular or Cyclical?" Economic Letters 9(1): 37-42.
- Dixit, A. (1989), "Entry and Exit Decisions Under Uncertainty," Journal of Political Economy, 97, June: 620-638.
- Dixit, A. (1992), "Investment and Hysteresis", Journal of Economic Perspectives, Winter, 6: 107-132.
- Dornbusch, R. (1990), "Policies to Move from Stabilization to Growth" in Proceedings of the World Bank Annual Conference on Development Economics, The World Bank, Washington, D.C.: 19-48.
- Dornbusch, R. and S. Edwards (eds.). (1991), The Macroeconomics of Populism in Latin America, Chicago: University of Chicago Press.
- Easterly, W., M. Kremer, L. Pritchett and L. H. Summers. (1992), "Good Policy or Good Luck? Country Growth Performance and Temporary Shocks", The World Bank, Washington, D.C. March (mimeo).
- Easterly, W. and S. Rebelo. (1992), "Fiscal Policy and Economic Growth: An Empirical Investigation", The World Bank, Washington D.C. December (mimeo).

Fazzari, S.M., R. Glenn Hubbard and B.C. Pefersen (1988), "Financing Constraints and Corporate Investment," Brookings Papers on Economic Activity I, The Brookings Institution, Washington, D.C.

Fischer, S. (1993), "The Role of Macroeconomic Factors in Growth", Department of Economics, MIT, January (mimeo).

Fischer, S. and F. Modigliani. (1978), "Towards an Understanding of the Real Effects and Costs of Inflation", Weltwirtschaftliches Archiv, 810-832.

Fernandez, R. and D. Rodrik. (1991), "Resistance to Reform: Status Quo Bias in the Presence of Individual-Specific Uncertainty", American Economic Review, 81, No.5, December: 1146-55.

Galor, O. and D. Tsiddon. (1992), "Transitory Productivity Shocks and Long-Run Output", International Economic Review, Vol.33, No.4, November: 921-933.

Gross, G. and E. Helpman. (1992), Innovation and Growth in the Global Economy, Cambridge, Mass: MIT Press.

Jorgenson, D.W. (1984), "The Role of Energy in Productivity Growth", in J.W. Kendrick (ed.) International Comparisons of Productivity and Causes of the Slowdown, Cambridge, Mass. Ballinger: 270-323.

Kendrick, J.W. (1983), "International Comparisons of Recent Productivity Trends", in S.H. Schurr (ed.), Energy, Productivity and Economic Growth. Cambridge, Mass. Oelgeschlager, Gunn and Hain: 71-120.

Lindbeck, A. and D.J. Snower, "Wage Setting, Unemployment and Insider-Outsider Relations", American Economic Review, 76(2), May: 235-39.

Lucas, R.E. (1988), "On the Mechanics of Economic Development", Journal of Monetary Economics, 22, June: 3-42.

Maddison, A. (1987), "Growth and Slowdown in Advanced Capitalist Economies: Techniques of Quantitative Assessment", Journal of Economic Literature 25, June: 649-698.

Malinvaud, E. (1982), "Wages and Unemployment", Economic Journal, 92 (365): 1-12.

Marglin, S.A. and J. Schorr (eds.), The Golden Age of Capitalism: Reinterpreting the Postwar Experience, Oxford University Press: 153-186.

Melnick, R. and M. Sokoler. (1984), "The Government's Revenue Creation and the Inflationary Effect of a Decline in the Rate of Growth of GNP", Journal of Monetary Economics, 13: 225-36.



- Nelson, C. and C. Plosser. (1982), "Trends and Random Walks in Macroeconomic Time-Series", Journal of Monetary Economics: 128-162.
- Patinkin, D. (1989), Money, Interest and Prices, Cambridge, Mass: MIT Press.
- Persson, T. and G. Tabellini. (1992), Growth, Distribution and Politics" in A. Cukierman, Z. Hercovitz and L. Leiderman (eds.), Political Economy, Growth and Business Cycles, MIT Press.
- Pindyck, R. (1991), "Irreversibility, Uncertainty and Investment," Journal of Economic Perspectives, 29, September: 1110-1152.
- Pindyck R.S. and A. Solimano. (1993), "Economic Instability and Aggregate Investment", MIT, February (mimeo).
- Romer, P. (1986), "Increasing Returns and Long-Run Growth", Journal of Political Economy, 94: 1002-1037.
- Saint-Paul, G. (1991), "Productivity Growth and Unemployment in OECD Countries", Working Paper No. 91-09, DELTA, Paris.
- Saint-Paul, G. (1992), "Productivity Growth and the Structure of the Business Cycle", CEPR Discussion Paper No. 709, London: October.
- Sachs, J.D. (1979), "Real Wages and Unemployment in the OECD Countries: A Comparative Study", Brookings Papers on Economic Activity, 1979:2, 269-319.
- Sachs, J.D. (ed.). (1989), Developing Country Debt and Economic Performance, Chicago: University of Chicago Press. (Volumes 1-3. Vol. 3 edited with S. M. Collins).
- Serven, L. and A. Soliwano (1992), "Economic Adjustment and Investment Performance in Developing Countries: The Experience of the 1980s" in V. Corbo, S. Fischer, S. Webb (eds.) Adjustment Landing Revisited: Prices to Restore Growth, A World Bank Symposium. Washington, D.C.
- Soskice, D. (1978), "Strike Waves and Wage Explosions, 1968-70: An Economic Interpretation," in C. Crouch and A. Pizzorno (1978), op.cit.
- Stock, J. H., and M. W. Watson. (1988), "Variable Trends in Economic Time Series", Journal of Economic Perspectives, Vol.2, No.3, Summer: 147-174.

Table A1

## AVERAGE RATE OF GDP GROWTH 1950-1990

OECD countries	(Annual Percentage, based on Log differences)							
	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
AUSTRALIA	3.9	4.0	4.8	5.6	3.6	2.8	3.1	2.7
AUSTRIA	6.2	5.4	4.0	5.2	3.8	3.3	1.3	3.0
BELGIUM	3.3	2.6	4.9	4.7	3.4	3.0	0.8	3.1
CANADA	5.1	3.9	5.6	4.5	4.9	3.8	2.9	2.9
DENMARK	2.0	4.3	5.1	3.6	1.9	2.5	2.6	1.5
FINLAND	5.1	4.5	4.8	4.7	3.9	3.0	2.8	3.4
FRANCE	4.4	4.6	5.6	5.2	2.7	2.8	1.5	2.9
GERMANY	9.0	6.3	4.7	4.1	2.1	3.3	1.1	3.1
ITALY	6.4	5.3	5.7	5.6	2.7	4.6	1.4	3.0
JAPAN	8.7	8.2	8.9	0.9	4.4	4.5	3.7	4.6
NETHERLANDS	5.2	3.8	4.7	5.2	3.2	2.6	1.0	2.6
NORWAY	3.9	3.5	4.5	3.7	4.5	4.7	3.3	0.9
SWEDEN	3.0	3.4	6.1	3.9	2.6	1.3	1.8	2.0
SWITZERLAND	4.8	4.2	5.1	4.1	0.8	1.7	1.4	2.7
U. KINGDOM	3.0	2.7	3.2	2.5	3.4	2.2	2.0	3.1
UNITED STATES	4.3	2.1	4.7	4.1	2.3	3.3	2.6	2.9
OECD TOTAL	4.9	3.2	4.8	4.4	3.0	3.4	2.4	3.2
<u>LATIN AMERICA</u>								
	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
ARGENTINA	5.9	1.2	1.7	4.2	2.7	2.2	-2.2	0.3
BOLIVIA	1.4	0.2	3.8	6.6	5.7	3.1	1.9	1.7
BRAZIL				6.2	9.9	6.4	1.1	2.0
CHILE			4.9	3.3	-2.2	7.2	0.4	6.0
COLUMBIA			4.6	5.6	5.5	5.2	2.2	4.5
COSTA RICA			5.0	6.8	5.8	5.1	0.3	4.5
ECUADOR			-4.3	4.3	11.5	6.4	2.2	1.9
EL SALVADOR			6.6	4.4	5.3	1.1	-1.8	2.2
MEXICO	5.2	11.4	6.9	6.7	6.3	6.4	1.6	1.3
PARAGUAY			3.4	4.1	6.5	10.2	1.7	3.8
PERU			6.9	4.3	5.1	2.0	-0.2	-1.8
URUGUAY		0.0	-0.0	0.8	1.4	4.4	-3.7	3.3
VENEZUELA			6.8	7.1	4.7	4.7	3.3	-1.1
ISRAEL	11.9	8.5	9.7	8.1	6.9	2.9	3.4	4.7

Source: International Financial Statistics (IMF)

Table A2

## AVERAGE RATE OF CPI INFLATION 1950-1990

OECD countries

(Annual Percentage, based on Log differences)

	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
AUSTRALIA	8.5	3.1	1.8	3.1	9.7	10.1	8.0	7.6
AUSTRIA	7.8	2.1	3.8	3.2	7.0	5.1	4.8	2.1
BELGIUM	2.1	1.7	2.5	3.4	8.0	6.2	6.8	2.1
CANADA	2.5	1.9	1.5	3.8	7.1	8.4	7.2	4.4
DENMARK	4.1	1.8	5.2	6.2	8.9	9.9	7.6	3.9
FINLAND	4.4	6.4	5.2	4.6	11.1	10.2	8.2	4.8
FRANCE	5.3	5.8	3.7	4.2	8.5	9.9	9.1	3.0
GERMANY	1.9	1.8	2.8	2.5	5.9	4.0	3.8	1.4
ITALY	4.2	1.8	4.8	2.9	10.7	15.4	13.2	5.5
JAPAN	6.2	1.5	6.0	5.3	10.8	6.4	2.7	1.3
NETHERLANDS	2.9	3.1	3.2	4.7	8.3	5.9	4.1	0.7
NORWAY	2.9	3.1	3.2	4.7	8.1	8.1	8.6	6.1
SWEDEN	5.5	3.6	3.6	4.4	7.7	10.0	8.6	6.0
SWITZERLAND	1.6	1.2	3.2	3.4	7.4	2.3	4.2	2.5
UNITED KINGDOM	5.4	2.6	3.5	4.5	12.2	13.4	6.9	5.8
UNITED STATES	1.9	1.8	1.3	4.1	6.5	8.5	5.3	3.9
OECD TOTAL	3.2	2.7	3.4	4.1	8.3	8.6	6.2	3.7

LATIN AMERICA

	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
ARGENTINA	13.9	35.8	20.8	17.8	49.8	107.4	144.1	192.3
BOLIVIA	51.8	42.3	5.0	5.7	18.7	15.7	185.3	38.2
BRAZIL			47.9	24.3	19.1	41.3	91.2	203.8
CHILE	34.7	27.0	24.0	23.2	112.6	54.3	19.3	17.7
COLUMBIA			11.0	9.8	16.5	21.8	20.2	22.3
COSTA RICA			3.1	2.7	12.8	7.8	29.9	15.7
ECUADOR			6.7	5.0	12.6	11.1	24.3	37.7
EL SALVADOR			0.0	1.1	8.2	12.0	13.7	21.1
MEXICO	8.7	5.7	2.5	3.3	11.8	19.0	47.5	52.9
PARAGUAY			5.2	1.5	10.9	13.7	14.6	24.7
PERU	7.0	8.0	8.5	9.3	11.9	40.9	70.4	222.3
URUGUAY	0.0	11.2	20.0	26.1	52.5	44.8	37.0	57.7
VENEZUELA			2.3	0.3	1.6	5.6	10.5	10.5
ISRAEL	19.4	44.4	6.9	3.9	21.6	47.9	108.3	21.3

Source: International Financial Statistics (IMF)

Table A3

## THE GROWTH/INFLATION RATIO 1950-1990

OECD countries	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
AUSTRALIA	0.459	1.306	2.683	1.817	0.366	0.274	0.386	0.352
AUSTRIA	0.798	2.571	1.057	1.605	0.541	0.640	0.269	1.416
BELGIUM	1.602	1.485	1.954	1.375	0.423	0.484	0.112	1.505
CANADA	2.060	2.094	3.641	1.190	0.697	0.454	0.399	0.674
DENMARK	0.478	2.388	0.979	0.578	0.217	0.250	0.339	0.394
FINLAND	1.169	0.707	0.917	1.022	0.354	0.294	0.346	0.699
FRANCE	0.825	0.793	1.511	1.241	0.323	0.287	0.164	0.948
GERMANY	4.689	3.493	1.710	1.612	0.355	0.822	0.297	2.252
ITALY	1.532	2.898	1.191	1.945	0.250	0.302	0.104	0.541
JAPAN	1.404	5.482	1.480	2.061	0.406	0.697	1.373	3.448
NETHERLANDS	1.814	1.220	1.477	1.107	0.383	0.439	0.241	3.618
NORWAY	1.340	1.136	1.419	0.789	0.559	0.580	0.379	0.156
SWEDEN	0.548	0.921	1.704	0.885	0.334	0.132	0.210	0.339
SWITZERLAND	2.949	3.512	1.608	1.214	0.109	0.723	0.329	1.101
U. KINGDOM	0.554	1.035	0.902	0.552	0.280	0.163	0.293	0.544
UNITED STATES	2.239	1.146	3.667	0.984	0.353	0.387	0.493	0.743
OECD TOTAL	1.540	1.185	1.433	1.065	0.365	0.394	0.387	0.859
<u>LATIN AMERICA</u>								
	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
ARGENTINA	0.428	0.034	0.083	0.235	0.055	0.020	-0.016	0.001
BOLIVIA	0.027	0.004	0.764	1.155	0.303	0.199	-0.010	0.044
BRAZIL				0.254	0.517	0.155	0.012	0.010
CHILE			0.205	0.143	-0.020	0.133	-0.020	0.337
COLOMBIA			0.417	0.564	0.335	0.240	0.110	0.200
COSTA RICA			1.629	2.530	0.455	0.655	0.011	0.290
ECUADOR			-0.637	0.853	0.911	0.575	0.092	0.050
EL SALVADOR				3.809	0.637	0.088	-0.132	0.102
MEXICO	1.756	2.006	2.749	2.058	0.539	0.339	0.033	0.025
PARAGUAY			0.655	2.772	0.599	0.746	0.118	0.155
PERU			0.813	0.461	0.432	0.050	-0.003	-0.008
URUGUAY		0.000	-0.002	0.031	0.022	0.098	-0.099	0.058
VENEZUELA			2.899	21.388	3.013	0.843	0.310	-0.102
ISRAEL	0.616	1.894	1.410	2.055	0.318	0.061	0.031	0.220

Source: Tables A.1 and A.2